ECOMOMIC REFORMS AND LABOR MARKETS:

POLICY ISSUES AND LESSONS FROM CHILE*

By

SEBASTIAN EDWARDS

University of California, Los Angeles

and

National Bureau of Economic Research

and

ALEJANDRA COX EDWARDS

California State University, Long Beach

January, 2000

ABSTRACT

This paper deals with the reform to labor market regulation implemented by Chile during the last twenty years. We concentrate on the reform to job security, on the decentralization of the wage bargaining process, and on the reduction in payroll taxes. Our interest is to understand to what extent these reforms helped reduce Chile's rate of unemployment from "European" to "U.S" levels. We argue that the reduction of payroll taxes (within the context of the social security reform), and the decentralization of bargaining increased labor market flexibility and contributed to the reduction of unemployment. Our analysis suggests that the reform on job security had no significant effect on the aggregate rate of unemployment.

* This is a revised version of a paper presented at the 29th Economic Policy Panel, Frankfurt, April 1999. We are indebted to Charles Wyplosz, the referees, and our discussants for their comments and suggestions. We thank Steve Nickel and Carmen Pages-Serra for helpful comments and discussions. Alejandro Jara provided very able research assistance. We are grateful to Carmen Pages-Serra and Rodrigo Fuentes for sharing their data with us.

I. Introduction

Most countries that embraced the economic reform agenda during the last decade found out that the road to market-orientation was bumpier than expected. In many cases macroeconomic stability has been elusive, growth has been timid and social conditions have not improved significantly. This has been the case in virtually every region in the world, including in Central and Eastern Europe. Faced with this reality, policy makers, academics and analysts have searched for examples of successful reforms and for lessons of experience. Chile has possibly amassed the most successful economic record among reforming economies during the last decade. GDP growth averaged 7.2% per year during 1988-1997, unemployment declined from almost 20% in the early 1980s to 6% in 1996-97, real wages grew at a rate that exceeded 5% per year during 1988-97, and, after a long history of macroeconomics disequilibria, inflation reached the 5% range in 1997-98.[1] See Figure 1 for the evolution of these variables during 1984-1997.

Starting in the mid-1970s, and under the aegis of a dictatorial military regime led by General Augusto Pinochet, Chile's economy underwent a profound market-oriented reform process. The major elements of the Chilean modernization program were:[2]

- A sweeping tax reform aimed at eliminating major distortions, taming the fiscal deficit, and achieving macroeconomic equilibrium.
- The (unilateral) opening up of international trade through the elimination of quantitative restrictions and the adoption of a 10% uniform import tariff.
- A major privatization program, that covered most (but not all) areas of the economy. The state, for instance, maintained ownership of the national copper company (CODELCO), as well as other large public enterprises.
- A deep financial reform that deregulated the domestic capital market, and allowed relatively free entry into the banking sector.
- A reform of labor market regulations aimed at increasing labor market flexibility and reducing the degree and intensity of labor conflicts.

---

[1] During 1998-99, and partially as a result of the East Asian crisis, the rate of growth of real GDP declined significantly, and unemployment increased above the 10% level.

[2] On the Chilean reforms see, for example, Edwards and Edwards (1991) and the essays in Bosworth et al (1994).

- The privatization of social security.

Chile's experience with market-oriented reforms has attracted considerable attention among policy makers and analysts throughout the world. For instance, many participants in the debate on the future of the social security system in the United States have referred to the Chilean experience with admiration. The political economy of the Chilean reforms has also been a subject of considerable analysis. Also, many analysts have noted that in spite of the depth of the reforms, Chile maintained a somewhat pragmatic attitude towards capital mobility. Both during the military regime as well as during the democratically administrations that followed, Chile imposed restrictions on the free mobility of short-term capital, while encouraging direct foreign investment. In the aftermath of the Mexican, East Asian, Russian and Brazilian currency crises this policy towards capital flows has attracted considerable attention and some analysts, including senior officials at the World Bank, have argued that most emerging markets should contemplate adopting some version of it.[3]

One of Chile's most remarkable achievements during the last fifteen years – and, paradoxically, one that has received very little attention in the professional literature – is the reform of labor market regulations.[4] Two major reforms were undertaken in an effort to modernize labor relations, reduce labor market distortions and increase labor market flexibility. The first reform was implemented in the early 1980s by the military regime. The second reform was implemented during the early 1990s by the first democratic government. Chile's labor market reforms covered three areas:

- Employment protection legislation was reformed in an effort to increase the degree of labor market "flexibility." From a practical pint of view this reform imposed a ceiling on the maximum severance payment a dismissed worker was entitled to.

---

[3] It is questionable, however, whether these controls have been effective. See Edwards (1999).

[4] The Brookings volume on the Chilean experience edited by Bosworth et al (1994) does not have a chapter on labor reforms. Our own book includes a chapter on the subject, but only covers developments until 1985. Gruber (1997) is one of the few recent pieces in the English language devoted to the subject. Edwards (1995), Edwards (1996) and IDB (1996) discuss Chile's labor reforms within a broader Latin American context.

- Legislation on collective bargaining was modified. The goal of this reform was to reduce the power of unions, and increase the degree of decentralization of the bargaining process.
- Payroll taxes were reduced. This measure was undertaken within the context of a major social security reform that replaced an insolvent "pay-as-you-go" system with a privately managed, full capitalization regime.

What makes this experience particularly interesting is that between 1983-85 and 1993-95, Chile went from rates of unemployment usually associated with some European countries, to unemployment rates similar to those traditionally prevailing in the U.S. While during 1983-85 the open rate of unemployment averaged 17.3%, by 1993-95 it had declined to 5.8 percent. And all of this while real wages experienced rates of growth in excess of 5% per year.[5]

The purpose of this paper is to analyze the way in which Chile's market oriented reforms affected labor market outcomes, and in particular aggregate unemployment. Our discussion centers on the changes introduced to labor market regulations during the military regime and during the first democratic government. An important aim of our analysis is to provide lessons of experience for countries – both emerging and advanced – that are contemplating reforming their economic structures and moving towards greater market orientation. In order to provide the appropriate background for the discussion, the starting point of our analysis is the early 1970s, when the administration of President Salvador Allende attempted to build an economic system based on socialist principles. We then deal with the main labor market-related developments during the military regime and the first democratic government of the post-Pinochet era. We analyze in detail specific aspects of the reforms to labor legislation, including changes dealing with employment protection legislation, and the role of labor unions. Throughout the paper we make an effort to provide a comparison between the degree of labor market regulation in Chile and in European countries.

[5] The initial level of wages was, however, highly depressed (Edwards and Edwards, 1991). Also, and as explained above, the 1998-99 emerging markets crisis resulted in a sever economic slowdown and in an increase in the rate of unemployment.

The paper is organized as follows: Section I is the introduction and motivates the paper. Section II provides an overview of Chile's labor market during 1966-97. We discuss the way in which regulations evolved during this period. In this section we use survey data to analyze the evolution of unemployment patterns.[6] Sections III through V deal, in great detail, with the three major components of Chile's labor market reforms: Section III concentrates on the reforms to job security legislation. Section IV deals with the reforms to collective bargaining rules and with the evolving role of unions. In Section V we focus on the labor market consequences of the privatization of social security. In Section VI we use aggregate time series to analyze the effects of the reform package on labor market flexibility. In doing this we concentrate on their effect on the "equilibrium" rate of unemployment and on unemployment persistence. In this section we make an attempt to quantify the contribution of each of the components of the labor reforms to the reduction in long run unemployment. Finally, Section VII contains the concluding remarks. The paper also has an appendix where we present a dual-labor market model to analyze the labor market consequences of a social security reform.

II. Labor Market Regulations and Trends in Chile: An Overview

In this section we provide an overview of Chile's labor markets during the last 25 years. We start with an analysis labor regulations, including the labor market reforms of 1981 and 1990. Next, we use survey data to discuss the evolution of some key variables, including the rate of unemployment and participation rates.

II.1 Four Broad Phases in Chile's Labor Legislation

Recent studies on employment regulations have tended to concentrate on: (a) employers' ability to dismiss workers; (b) the cost of severance payments; (c) the power of unions; and (d) limitations on temporary job contracts. Grubb and Wells (1993) and Nickell (1997), for example, have focused on these variables in their attempt to analyze the effect of employment regulations on labor market outcomes in the United States and in the European Community. Bertola (1990) used a set of indicators on job security to

[6] A discussion of the political economy of these reforms would be relevant here. However, due to space constraints we refer the reader to Edwards and Lederman (1998); Bostworth et.al. (1994) and Piñera (1990).

rank OECD countries from highest labor market regulations (Italy) to lowest regulations (the U.S.). These rankings were then used to analyze the evolution of employment and the wage gap in a group of ten countries. Edwards (1995) has investigated the effects of some of these indicators, including union prerogatives and job security legislation, on labor market behavior in a group of Latin American countries.

Based on the behavior of these indicators, and as it will become apparent in the sections that follow, it is possible to divide Chile's recent labor market history into four distinct phases:[7]

- The first phase, spanning from 1966 through 1973,[8] corresponds to an era of increasing government intervention and regulations. This policy stance achieved its peak in 1970-73 during the administration of socialist President Salvador Allende. During the first three months of the Allende government the legal minimum wage was raised, through a Presidential decree, by 56 percent.[9] This period was characterized by the massive nationalization of private sector companies, an expanding macroeconomic disequilibrium and growing political unrest. Inflation increased rapidly, and by 1973 real wages had declined significantly (see Dornbusch and Edwards 1990, for details).
- The second phase corresponds to the early years of the military regime and covers the period 1974-1979. During this period, and largely for politically repressive reasons, union activity was suppressed. From a legal standpoint, however, no significant reforms to labor legislation were introduced. During this period Chile was affected by a steep decline in terms of trade, that led to a major recession in 1975. Unemployment climbed to unprecedented levels, and the military government implemented a temporary public works program – known as the Minimum Employment Program

[7] Edwards (1999) and Mizala (1998), among others, have proposed a similar classification scheme for this period.

[8] We date the beginning of this era on 1966 for two reasons: first, and as we discuss in section III of this paper, in that year a stringent legislation severely limiting workers dismissals was enacted. Second, 1966 is the first year for which there are aggregate nation-wide data on employment and unemployment in Chile.

[9] This type of increase was, of course not sustainable. By the second quarter of 1973, and in spite of the government's effort, inflation had eroded real minimum wages very significantly. By that time the minimum wage was, in real terms, 20 percent below its 1970 level. For an analysis of the Allende experience see, for example, Dornbusch and Edwards (1990) and Larrain and Meller (1991).

(MEP) – as a way of combating it. This period comes to an end in 1980 with the enactment of the military's labor reform, popularly known in Chile as the *Labor Plan*.

- The third phase covers the years 1980-90 and corresponds to the last ten years of the military regime. Throughout these years labor relations were governed by the newly approved *Labor Plan.* During this period the overall effort to modernize the Chilean economy continued, with the privatization of social security becoming one of the most important reforms undertaken at this time. During this phase Chile was again affected by a major recession, as the 1982-83 debt crisis resulted in a deep decline in output and a major hike in unemployment.
- The fourth and final phase corresponds to 1991-1998, and covers the democratically elected administrations of Presidents Patricio Aylwin (1990-1994) and Eduardo Frei Ruiz-Tagle (1994-2000). During the first year of this phase a new reform to labor legislation was implemented. Employment protection was increased and unions' were given a greater role in the collective bargaining process. The new democratic governments, however, made an effort to maintain a "flexible" labor code.[10]

In terms of the intensity of "rigidities," these periods can be ranked as follows: The period 1966-73 was the most restrictive (with 1970-73 being particularly distortive). The second most restrictive period is 1974-79 when job protection legislation maintained its traditional features while mandated wage indexation was in place. Next comes 1990-97, a period of significantly fewer restrictions, in turn followed (closely) by the least restrictive 1980-89 period. In the rest of this paper we analyze the way in which Chile's labor market performed during these phases, and in particular after the labor reforms were undertaken.[11] More specifically, we ask whether the labor market performed more "fluently" during periods with lower restrictions.

Table 1 summarizes the evolution of the key labor market interventions during these four periods. This table covers four aspects of labor markets: (a) Rules governing collective bargaining; (b) legislation dealing with job security; (c) payroll taxes; and (d) regulations affecting wage setting and wage adjustment, including indexation rules. In

[10] At the time of this writing, however, the administration of President Frei is pushing a new labor reform that, if approved, will increase the degree of centralization of the bargaining process.

[11] Pages and Montenegro (1998) make a similar classification.

order to provide an adequate background, this table also includes information on the historical (pre-1966) evolution of labor market regulations.

II.2 Labor Market Trends Across Periods

In this subsection we use survey data from the Universidad de Chile for the Greater Santiago Area (GSA) to analyze unemployment trends between 1964 and 1994. Although this is the only survey-based data set that goes back in time, the fact that it covers only about a third of the country's labor market is a limitation, and should be kept in mind when interpreting the results. The survey takes place in June of each year, and contains information on labor market participation and employment during the week preceding the survey, and wages received during the month of May. The GSA is predominantly urban, with a concentration in services. Figure 2 contains the rate of unemployment and estimated mean duration of unemployment for the GSA area. Both the 1975 and 1982 increases in unemployment were associated with major recessions that reduced GDP growth significantly below its long-term trend. After 1982, there was a steady reduction of the unemployment rate until it reached historical levels in the early 1990s. The estimated mean unemployment duration rises from around 8 weeks in the period 1964-73, to around 12.5 weeks in the period 1974-78, and to 14.8 weeks in the period 1979-90 reaching 23.5 weeks in 1983. [12]

III. Reforms to Job Security Legislation

As in most of Latin America, Chile's traditional labor legislation provided ample degree of employment protection. With time, job security had become so high that it was very difficult for firms to adjust to external shocks or to changes in relative prices. In fact, since the mid-1960s it had become extremely difficult for firms to dismiss workers under virtually any circumstances. Moreover, this legislation had increased the total cost of hiring labor, encouraging firms to adopt technologies that were relatively more capital intensive (Edwards and Edwards 1991). One of the explicit goals of the 1980 labor reform was to reverse this trend, by reducing the cost of dismissing workers – while still providing some minimum degree of job security. It was expected that by reforming the

legislation on job security, firms would have a greater ability to adapt to new external circumstances. In this section we discuss, in some detail, Chile's reforms to job security protection, and we evaluate the extent to which this aspect of the reform was able to achieve its goals.

III.1 Job Security legislation in the 1960s and early 1970s

Chile has traditionally used three tools to provide employment security:

- Advanced notice to workers in case of impending dismissal. Throughout our period of interest firms had to give a one-month advance notice.
- Limitations to the use of fixed-term labor contracts;
- Severance payments in case of dismissal. The extent of this last instrument was severely changed in the labor reforms of 1980 and 1990.

Job security legislation was introduced in 1966 with the approval of the so-called "Immobility Law" or *"Ley de Inamovilidad."* Until 1966, the "employment at will" doctrine prevailed, although there was a significant distinction in the law between white collar and blue-collar workers. Employers could dismiss blue-collar workers without expression of cause, with advance notice or, alternatively, by making a payment equal to one month wages. White-collar workers would receive a severance payment *("desahucio")* which was a function of their salary and length of tenure. The 1966 law established the principle of "just cause," which included "grave faults" such as criminal behavior and absenteeism, and the "economic need" of the firm. The law gave workers the right to appeal a dismissal in Court, and if the Labor Court determined the dismissal to be lack "just cause", the worker had to be reinstated to his/her job. If in such case, the employer refused to reinstate the worker, the judge would order the employer to pay a severance equivalent to no less than one monthly wage per year of service. There was no upper limit to this severance payment. While the legislation contemplated economic reasons among "just causes," in practice, and with time, labor courts tended not to consider economic or financial reasons as "justified," increasing very significantly the cost of dismissals to the firm.

---

[12] The methodology used to produce an estimate of the mean duration of unemployment is presented in

III.2 Reforms to Job Security Under the Military Regime

Between 1973 and 1979 the military regime took a piece meal approach towards job security legislation. Possibly, the most important change during this period was that labor courts became more sympathetic to firms' claims, de facto reducing the extent of employment protection. Furthermore, in March of 1975, the military government added politically-related causes to "just dismissal." These included taking part in illegal stoppages or strikes, delinquent activities, and infringement of the law on arms controls.

In 1978 the Pinochet administration abolished the distinctions between blue and white collar workers, and established that all workers dismissed for "unjustified reasons" were subject to a severance payment equivalent to one monthly wage per year of service, with no upper limit on the total amount to be paid.

It was not until the *Labor Plan* of 1980 that job security legislation was amended in a significant way. This new legislation continued to treat all workers – blue and white collar – alike, and established that, in general, the nature of severance payment would become part of the overall job contract, with its level and other characteristics being negotiated by the employee and the employer.[13] However, according to the reform, the severance package agreed upon by employees and employers could not be lower than one monthly wage per year of service, with a maximum of five months.[14] This minimum severance payment would be legally in effect in the absence of an explicit agreement between the parties. In June of 1984, the Pinochet regime established that the firm's economic or financial needs did not constitute a "just cause" for dismissal, and that those workers laid off for those reasons were subject to the same severance package as other workers (See Table 1 for details).

III.3 Reforms to Job Security Introduced by the First Democratic Government in 1990

In December 1990 the Aylwin government labor reform went into effect (Law 19,010). This reform modified the norms on dismissals without "just cause" along five lines: (1) It reinstated the notion of dismissals with "economic cause", maintaining the legal severance at thirty days wages per each year of service, but raised the maximum

---

Ureta (1998).

[13] This new provision applied only to contracts signed after August 1981. See Law 18,018 for details.

[14] In rigor, the law established a maximum of 150 days' wages.

package from five to eleven months' wages. (2) Employers that dismissed a worker arguing "economic cause" would be liable for the legal severance, or whatever severance was previously agreed with the worker above the legal. The burden of proof of "economic cause" was placed on employers, with a limit placed on the liability for failing to provide legal proof in court. Failure to prove economic cause would raise the legal severance in 20%.[15] (3) The law established a separate treatment for domestic workers. They would have the right to a severance upon separation, independently of the cause. This severance would be the accumulated fund resulting from a monthly deposit of 4.11% of taxable monthly wages in a savings account in the worker's name. (4) All workers with tenures above six years could opt out of the job security protection, and participate in an "unemployment fund." Under this system the employers make monthly contributions of 4.11% of taxable monthly wages into an individualized account, in the worker's name. If the employee leaves his job for any reason – either dismissal or voluntarily – he/she can withdraw the amount that has accumulated in the fund. And (5), the politically motivated causes for dismissal, introduced by the military in 1975, were abolished.

III.4 The Cost of Job Security Legislation in Chile.

Neither the 1980 nor the 1990 reforms tried to change the fact that severance payments increased with tenure. The reforms set a ceiling to the maximum severance to be paid, and changed the role played by Labor Courts. The 1980 reform established a severance-ceiling equal to five monthly wages, while the 1990 reform increased that ceiling to 11 monthly wages. Tenure-related severance schemes have, in principle, two effects on labor market incentives. First, they will tend to discourage firings; more specifically, they will discourage firings of longer tenured workers. Second, they will discourage hiring. The net effect on labor market outcomes – and in particular on the aggregate rate of unemployment – is, in principle, ambiguous. Alvarez and Veracierto (1999), for example, have developed a general equilibrium model where higher employment protection will reduce the incidence of unemployment, but will increase its duration. The net effect on the *rate* of unemployment will depend on the specific

[15] Using the same principle of establishing a limited liability, failure to prove "just cause" would oblige

parameters of the model. In their specific simulation, an increase of severance payments from 3 to 12 monthly wages reduces the aggregate rate of unemployment.

A number of authors have tried to construct indexes that capture the costs of job security schemes. While some authors have constructed cross-country comparative indexes (Grubb and Wells 1993, Lazear 1990), others have calculated the way in which dismissal costs evolve through time in a particular country (see Bentolila 1997 for an application to the case of Spain). In this paper we use a methodology recently proposed by Pages and Montenegro (1999) to construct an index of the costs of job security legislation in Chile. According to these authors' the cost of employment protection legislation can be summarized by the following expression:

$$(1) \qquad C_t = \Sigma \beta^I \delta^{I-1} (1 - \delta) (b + a S^j_{t+I} + (1 - a) S^u_{t+I}) .$$

Where β is the discount factor, δ is the probability of remaining in the same job, $\delta^{I-1}(1 - \delta)$ is the probability of dismissal after i years, b is the cost of advance notice (one monthly wage, throughout the period under analysis), a is the probability that the courts will admit economic distress as a "just" cause, S^j_{t+I} is the payment under justified cause, and S^u_{t+I} is the payment under unjustified dismissal. In the actual computation of this index we considered eight different time periods: (1) Pre-1966, when the "employment at will" doctrine prevailed, and the one month advance notice constituted the only restriction to dismissals. (2) The 1966-1969 period, when courts, firms and workers were learning to operate under the new job security law of 1966. During this period courts were not completely unsympathetic towards firms' economic needs. (3) The 1970-73 period, when social and political conflict in Chile increased significantly. During this period courts rarely sided with firms in adjudicating labor conflicts. (4) 1974-77, a period corresponding to the early years of the military regime. During these years courts leaned towards firms. (5) 1978-80, when the probability of economic distress being considered a "just cause" (parameter a, in equation 1), became even higher. (6) 1981-84, corresponding to the first years of the military labor plan. (7) The period 1985-1990,

---

the employer to pay the legal severance (for economic cause) augmented in 50%.

when economic distress was eliminated as "just cause". (8) And 1991-1997, corresponding to the democratic labor reform.[16] Figure 3 depicts the evolution of this index through time. As may be seen, it captures the important changes in labor protection legislation during the period under study.[17] The liberalization of labor markets during 1980-90 is clearly reflected by the index, as is the increase in employment protection implemented by the 1990 reform. In order to have alternative measures of the cost of dismissal, we also computed what would be the expected cost to a firm of dismissing workers with ten and twenty year tenure. We called those indexes, *Cost_ten* and *Cost_twenty*, respectively. All three indexes are highly correlated; when measured in logs, their correlation coefficients range from 0.94 to 0.97.

As our *Security Index* in Figure 3 clearly shows, by the early 1990s the cost of Chile's employment protection laws was significantly lower than what it had reached in the 1970-73 period. An interesting question, however, is how does Chile's job security legislation compares internationally. This issue is addressed in Table 2, where Chile's employment protection legislation in the early 1990s is compared to that of 36 countries from all over the world.[18] The basic data in this table are taken from a recent paper by Marquez and Pages (1998), where Grubb and Wells (1993) methodology is used to rank countries according to the degree of restrictivenness of six aspects of job security legislation. The most restrictive country in a given category is given a ranking equal to 1; the less restrictive one is given a ranking equal to 37. The following features of job security legislation are considered: (1) Cause for dismissal: This ranks countries according to the likelihood that economic distress will be considered a just cause for dismissal. (2) Tenure-based severance at 3 years. This ranks countries according to the expected cost to the firm of dismissing a worker with 3 years of tenure. (3) Probationary

[16] The actual parameters used to construct the job security index are available from the author on request.

[17] The main difference between our index and that of Pages and Monetenegro (1999) is that we explicitly take into account the court's change of attitude in the 1969-73 period. That is, in our computations, parameter "a" takes a different value than in theirs. In order to have some comparability with their work, we deliberately used the values that they assigned to the other parameters in equation (1). In that sense, our index could be called a "revised Pages-Montenegro index."

[18] In addition to Chile, the following countries are included in the sample: Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Colombia, Costa Rica, Dominican republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Paraguay, Peru, Suriname, Trinidad, Uruguay,

period: ranks countries according to the length of the probation period. (4) Severance at 20 years. Ranks countries according to the expected cost to the firm of dismissing a worker with a 20 year tenure. (5) Reinstatement. Asks whether firms have to reinstate workers that, according to the courts, have been unjustly dismissed. (6) Overall index of restrictiveness. In Table 2, the actual numbers for "Rest of Latin America" and "Selected European Countries" corresponds to the median ranking for that specific group of countries reported in Marquez and Pages (1998). The most interesting aspect of this table is that, in spite of the reforms of the last two decades, Chile's job security legislation continues to be – at least from an international comparative perspective – rather restrictive.[19]

Several empirical studies have tried to measure the effect of job security legislation on labor market outcomes. Bentolila's and Saint Paul's (1992) use a "before and after" approach to analyze the Spanish case. They show that labor demand fluctuated more in response to output shocks after flexible employment rules were adopted. Houseman (1991) uses data from Western Europe steel plants and offers evidence that more restrictive policy on severance slowed hiring. Dertouzos and Karoly (1990) use USA data to show that state exceptions to the employment at will doctrine reduce employment. Lazear (1990) used a similar research design on a panel of countries to show that more generous severance pay reduces employment. A recent study by Pages and Montenegro (1999) used Chilean data from 1960 to 1997 to evaluate the effect of changes on job security legislation on employment, unemployment and rates of participation. They find that tenure-based job security reduces long-run aggregate employment rates, particularly through the effect on youth employment. However, because the reduction in youth employment coincides with a reduction in labor force participation among the youth, there is no visible impact on unemployment. They argue that, a flat severance pay would have little effect on youth employment or on aggregate

---

Venezuela, Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, the United Kingdom and the U.S.

[19] Rank indexes of this type are subject to a number of limitations, including the fact that they fail to incorporate the fact that the cost of job protection legislation tends to affect the incentives that firms and workers have to reach enforceable agreements privately. For this reason, these indexes should be interpreted with care.

employment or unemployment. In Section VI of this paper we use our indexes on the costs of job security legislation to investigate the effect that this particular labor reform had on Chile's aggregate unemployment rate.

IV. The Role of Unions and Collective Bargaining

One of the fundamental goals of Chile's labor reforms was to drastically change the nature of the collective bargaining process. In the early 1970s labor relations had become seriously strained: on the one hand, unions had become highly combative and politicized; on the other, the private sector had been taking an increasingly anti-labor stance. The conflict between unions and the private sector had reached its peak during the Allende administration, when many unions used force to size the companies where they worked, giving the government an excuse for nationalizing them. Immediately after the military coup unions' rights were suppressed. It was not until 1979, and under pressure from the US, that the Pinochet regime decided to reinstate unions' rights. At that time, however, it became evident that the old legislation was not adequate any longer, and that a new legal framework was required. This was exactly the aim of the so-called *Labor Plan* of 1980. In this section we discuss the military (and subsequent) reform to collective bargaining legislation, and we discuss the extent to which its goals were achieved.

IV.1 Some Background on Chile's Collective Bargaining Legislation

The rules governing collective bargaining in Chile were first established in the labor code of 1931, and throughout the years evolved in the direction of giving unions increased power. At the time of the military coup in 1973, the main features of the collective bargaining process were the following:

- The government was actively involved in the negotiation process, through the so-called *Tripartite Commissions*.
- Union membership was obligatory for workers employed in any firm that had a union. The creation of a union required the approval of 55% of workers in a firm.
- Unions could decide whether to negotiate at the level of each individual firm, or at the industry level. By 1973 the vast majority of unions negotiated at the industry level.

- Legal strikes could be called if a number of steps – including arbitration – had failed. Strikes length was indefinite. By 1973, however, many unions staged illegal strikes or stoppages as a way to pressure management into giving up to their demands.
- Lockout practices were severely restricted, and once a legal strike was started the firm could not hire replacement workers. Since unions could strike indefinitely, this latter provision could be particularly costly to firms. Moreover, unions usually demanded the payment of wages forgone during the strike as a precondition for returning to work.
- There were a number of laws that established especial rules for specific industries. This trend started as early as 1956, when workers in the copper industry (the country's main export) were granted unique privileges.
- Many trades required, by law, membership in the industry wide unions – the so-called *Professional Unions*. These provisions applied to barbers, TV announcers, teachers, bus drivers, among others, and established serious barriers to entry.

Between the early 1960s and 1973 the rate of unionization increased rapidly from 11% of total employed workers, to almost 37% in 1973. At that time the rate of unionization exceeded 85% in the mining sector, 60% in manufacturing and 50% in the utilities sectors (Feres 1997). During the first years of the military regime the government played an increasing role in the bargaining process and, in particular, in wage determination. For example, staring in July of 1975, the government imposed a de facto system of backward-looking wage indexation.

IV.2 The Military's "Labor Plan"

In 1979, and under significant international pressure, the military decided to allow free union participation within the context of a new set of labor laws.[20] Three pieces of legislation approved in mid 1979 established new norms on the constitution of unions, and determined their rights and obligations. These decrees also dealt with the constitution of employers' organizations, and with norms governing collective bargaining.[21] With the military labor reform, the "closed shop" requirement was

[20] Piñera (1990) provides a fascinating account of the process leading to the labor reforms.
[21] This new legislation replaced Title II of Book IV of the 1931 Labor Code which, ironically, was titled *"Collective Conflicts."*

eliminated, union affiliation within a firm became voluntary, and all negotiations had to be conducted at the firm level. An important goal of these reforms was to contain (most of) the costs of a labor conflict to the two parties directly involved in the bargaining process. For example, it stipulated that in the absence of a new collective agreement, the old contract would continue to be in effect while negotiations proceeded. Employers' new contract offer would have to contain a wage adjustment that matched accumulated inflation. The new contract, or a substitute one with the same condition, would enter into effect unless workers called a strike. For a strike to be called, the law required the approval of the absolute majority of the workers represented. In case of a strike, a firm could impose a lockout and temporarily lay off workers, a step the previous law had explicitly prohibited. In contrasts with the old legislation, the new law allowed workers to take other jobs, and employers could hire temporary replacements. Individual workers could abandon the negotiation and return to work after 30 days of strike, and employers were obliged to take them back into their, at a wage rate fully adjusted by the rate of inflation that had accumulated since the previous contract. The continuation of a strike over 60 days was considered as voluntary resignation from the job.

IV.3 Unions and the Labor Reform of the First Democratic Government

New laws on unions' rights and collective bargaining went into effect in February and August of 1991. The new legislation did not depart significantly from the framework established in 1980. However, the prohibition of negotiations above the firm level, or the prohibition to cover certain themes in collective bargaining were abolished. Trade unions and worker's associations were given the right to bargain with more than one employer. The new law eliminated the 60 days period for the legal strike, which allowed employers to dismiss striking workers without severance after the 60 days period. The new law also reinstated stricter conditions for workers replacements in case of strike, which had been eroded with the amendment of article 26 of the previous law in 1982.[22]

---

[22] Article 157 of Law 19069 established that, the employer could hire replacement workers from the first day of initiated the strike, only if the last offer contained the same conditions of the previous contract adjusted by cost of living increases. In such case, workers could return to their jobs from the fifteenth day of initiated the strike. If the last offer had not fulfill the conditions mentioned above, employers could hire replacements from he fifteenth day of initiated the strike, and workers could return to their jobs after thirty days of initiated the strike.

IV.4 Quantifying the Extent of Chile's Reform to Collective Bargaining: Comparative and Time Series Perspectives

The basic goal of the reforms on collective bargaining, was to reduce the cost of disputes, reduce the power of unions, decentralize negotiations, and bring the parties quickly into agreement. In a way, the objective of the reform was to move collective bargaining away from the more centralized European tradition, and closer to the decentralized United Stated model. To a large extent this goal of the reforms was achieved. In Table 3 we present an explicit comparison between some important features of Chile's collective bargaining legislation, with the same features in a selected group of European countries and the U.S. The first variable in this table is the degree of union density, or percentage of the labor force that belongs to a union. The second is an index that measures the degree of centralization of the bargaining process. The index goes from 1 to 3, and a higher number depicts a more centralized process. The indexes for Europe and the U.S. are taken from a recent paper by Flanagan (1999); this is also the source for the other indexes in this table.[23] The values of the indexes for Chile were determined by us, after analyzing the evolution of collective bargaining legislation in Chile during the period under analysis.[24] The third index in the table captures the degree of bargaining coordination across unions, firms and the government. The index goes from 1 to 3, with a higher number denoting greater coordination. The fourth index measures the extent to which union federations are actively involved in the bargaining process. A higher number depicts a higher degree of involvement. Finally, the fifth index measures government involvement in collective bargaining. A value of 1 refers to minimum involvement, a higher number is an indication of a more active government (see the notes to the table for details). The data in Table 3 capture quite eloquently the drastic change experienced by Chile's collective bargaining process. Labor unions became less important, and the process itself became more decentralized. Moreover, the government,

---

[23] The following European countries are included by Flanagan (1999) in his study: Austria, Belgium, Denmark, Finland, France, Germany, Italy, the Netherlands, Norway, Sweden, Switzerland and the U.K. The numbers in table x correspond to the median index for these countries. Table 1 in Flanagan (1999) contains individual data for each one of these countries.

[24] For the earlier period we relied on Barria (1971 a, b)

which until 1979 had played a key role in labor negotiations, was completely taken out of the process.

As Flanagan (1999, p.1172) has pointed out, data on union density can provide a misleading picture of the nature of industrial relations. The problem is that these data say very little, if anything, on the "intensity of union influence…[or] bargaining power." In that regard, data on actual number and intensity of strikes provide important complementary information. According to the ILO (1994), the level of labor conflicts in Chile in the early 1990s was equivalent to just one fifth of the levels in the period 1966-70. Furthermore, according to this study, during the period 1990-93, the losses associated to strikes corresponded to an average of 1 hour of work per year. This would put Chile's conflict levels below those of most developed countries. In 1996, out of 1,584 registered negotiations, 183 made use of a strike –that is 11.5 percent of the cases. This percentage has been falling since 1986, when it reached 12.5 percent. The average duration of strikes has fallen from 25 days in 1985 to 10 days in 1996. The number of worker-days lost per strike fell from around 750 thousand in 1991 to about 250 thousand in 1996. All of these indicators suggest that strikes are a last resort recourse.

Table 4 presents some aspects of strike activity in Chile during 1960-1996. In order to sharpen the discussion we have included data on three periods: (a) 1960-70, which corresponds to the pre reform era, characterized by rigid and combative legislation. (b) The years 1985-1989, which correspond to a period when the new labor legislation was in effect, but the country was still ruled by the military. And (c), the 1990-96 period, which corresponds to a post-reform-but-democratic era. The first two columns refer to the number of legal strikes. As may be seen, from column1, during the post-reform but democratic period, the total number of strikes peaked in 1992 and has since declined steadily. Moreover, in every one of these years the number of strikes has been lower than in the pre reform period. This fact is particularly impressive if one considers that these figures refer to the absolute number of strikes. When these data are adjusted by employment (column 2), they are even more impressive. During 1960-70 there were, on average, 9.9 strikes per 100,000 employed workers per year; by 1994-96 that number had declined to 3.6 strikes per 100,000 employed workers per year. What is particularly

important is to notice that during 1994-96, this decline in strike activity took place as real wages were growing at 4.2% per year. Another interesting aspect of column (1) is that it shows that once democracy was re-established in 1990, the number of strikes increased very significantly in relation to its level during 1985-89. This drastic change provides some evidence that during the even after the labor Law was enacted in 1980, unions felt inhibited, and did not push the bargaining process all the way to the strike level. Column (3) deals with the number of days of work lost by strikers, as a consequence of strikes. This is an (indirect) measure of the economic costs of strikes. As may be seen, with the exception of 1991 (the first full year of democratic rule), the number of days of work lost was lower in the post-reform-but-democratic period than in 1960-70. Column (4) on the average duration of strikes, also shows a marked decline in the 1990-96, relative to the 1960-70 period. All in all, the evidence presented here provides some strong evidence that after the return of democracy, the collective bargaining system has been relatively more effective than in the pre-reform era. The number of strikes has declined, as has their length and the average number of days of work lost by strikers.

In order to gain further insights on the evolution of Chile's collective bargaining process through time, we constructed two indexes. The first one attempts to capture the degree of decentralization of the bargaining process. In constructing this index we focused on the characteristics of the bargaining process emphasized by Flanagan (1999). Unfortunately, we were only able to construct long series for three of Flanagan's indicators: bargaining level, federation involvement, and government involvement. Our *Bargaining Indicator* is the simple average of these three partial indexes, and can take a value of 1 to 4; a higher number means that the collective bargaining process is more centralized.[25] Our second index measures the intensity of union activities, and is constructed from ILO data on strike activities. Our *Union Index* is made up of two components: (a) number of strikes per year, per 100,000 workers; and (b) average worker-days lost per strike. After properly re-scaling these data from 1 to 4, the *Union Index* was defined as their simple average. It should be noticed, however, that because of Chile's political history both of these indexes should be interpreted with care. In Figure 4

[25] On the historical evolution of wage bargaining in Chile we relied on Barria (1971 a,b)

we present the evolution of our *Bargaining* and *Union* indexes. We use these indexes in Section V, in our effort to understand the way in which the different aspects of Chile's labor market reform impacted the country's aggregate rate of unemployment.

V. The Social Security Privatization Reform and the Labor Market

From early on, one of the objectives of the labor reforms in Chile was to reduce the level of payroll taxes, which in the 1970s exceeded 50% of wages for low income workers. This, however, was a difficult task, since the bulk of the payroll taxes corresponded to contributions to a government-run and extremely inefficient social security system. In 1981 the military regime decided to introduce a major social security reform aimed at replacing the old pay-as-you-go system for a privately managed system, based on individual retirement accounts. The purpose of this section is to analyze the way in which Chile's privatization of the social security system affected labor markets. In order to do this we develop a simple model of a segmented labor market, where as in the case on Chile, only a fraction of workers are covered by a formal social security system.

V.1 The Privatization of Social Security: Background

Chile's traditional pay-as-you-go social security system was created in the 1920s, and was characterized by very high contribution rates. In 1973, for example, total retirement contributions -- by employers and employees -- varied between 16 and 26 percent of wages, depending on the type of job the individual held. Once contributions to the national health system were added, the social security payroll tax was above 50 percent of wages for most workers. In the absence of a connection between contributions and perceived benefits, the social security system imposed a heavy tax burden on the labor market during the 1960s and 1970s, and at the same time offered entitlements that were impossible to materialize (Edwards, 1993).

In 1981, and after significant internal debate, the military government decided to introduce a sweeping reform to the social security (retirement) system, which has been in effect since that year, with a number of minor changes. The bases of the new system are individual retirement accounts managed by private companies known as "*Administrador-*

as de Fondos de Pensiones", AFPs. Each AFP can manage only one retirement fund; likewise, each participant can have only one retirement account.

A key feature of the system is that it is ***mandatory*** for individuals working for a formal employee. Participants can freely decide which AFP will manage their retirement funds, and are free to transfer their funds freely among the different management firms. On retirement, individuals can choose to buy an annuity, or to withdraw their funds according to a predetermined (actuarially fair) plan (Vittas 1995)[26].

Contributions to the retirement component of the system are equal to 10% of income, compared with 26% on average in the old system. Total contributions for retirement, health and survivorship insurance add up to 21% of wages, with a cap achieved once wages reach the equivalent to US$40,000 per year. A detailed and modern regulatory framework -- enforced by an institution especially created for this purpose, the Superintendency of AFPs -- regulates investment portfolios, ensures free determination of fees and commissions and free entry into the industry.

Self-employed workers are not required to participate in the system. They have the choice, however, to set retirement accounts which are (basically) subject to the same regulations as those of formal sector employees. In 1997 the percentage of active contributors stood at 58% of those employed; in addition 4% of workers were still contributing to the old system. In 1997, then, the total *coverage* of the Chilean retirement system amounted, then, to 62% of the labor force, approximately the same percentage as in the traditional pay-as-you-go system. The lack of universal is explained by two basic factors: first, the self-employed are not legally required to participate in the system. Second, the existence of a government-guaranteed (universal) minimum pension creates a moral hazard situation among low income workers, many of which are self employed. For these individuals it pays to contribute only sporadically, and only enough as to obtain the minimum pension once they retire.[27]

---

[26] In case an accumulated fund does not provide for an annuity above the minimum pension, the state complements the funds, so long as the individula has made contributions for a minimum of twenty years.

[27] See Edwards (1998) for details on the system's operative aspects.

V.2 The Pension System Reform and the Labor Market

Most analyses of social security reforms have tended to neglect the effects of the reforms on labor markets (Siebert 1997; Lorz 1997; Gruber (1997) and Schmidt-Hebbel 1997 are some exceptions). It is possible to argue, however, that, in principle, a pension reform will affect the functioning of the labor market through two related channels. First, reforms that reduce the payroll tax rate, will reduce the cost of labor and and or increase net wages, thus, will tend to encourage employment creation and labor force participation, ultimately rising the equilibrium level of employment.[28] [29] Second, by relying on a capitalization system, these reforms will increase greatly the connection between contributions and perceived benefits of the system. That is, this type of reform will tend to reduce the proportion of the social contribution that is perceived as a pure tax. In this section we develop a simple model of Chile's labor market to analyze the way in which the social security reform affected Chile's labor market outcomes. Although the model is rather simple, it has enough structure as to capture some key microeconomic aspects of the social security reform.

Labor markets in emerging economies in general – and in Chile, in particular –, have a number of institutional features that set them apart from labor markets in industrial nations. The most important among these features are:

- In emerging countries labor markets are usually characterized by a rather large "informal" segment. This segment is, de facto, not directly affected by labor market regulations, such as minimum wages, job security legislation or social security. The informal sector coexists with a "modern" sector, where labor market regulations are fully in effect. The fact that in Chile the social security system covers only 62% of those employed, provides some evidence of the existence of this segmented structure. Moreover, Basch and Paredes (1996) present micro-based evidence for Chile that

[28] Naturally, those reforms that increase the payroll tax will tend to have the opposite effects.

[29] Gruber (1997) argued that the shift in financing of social insurance in Chile in the early 1980s did not have important consequences for labor market efficiency. He believes that the reduced costs of payroll taxation to firms were fully passed on to workers in the form of higher wages, with little effect on employment levels. But his conclusion is unwarranted because the measured variation in wages captured in his study was to a large extent engineered. To encourage affiliates to move to the new system, there was a legal mandate to pass on to workers the tax savings associated to that voluntary move (Decree Law 3,501 – November 18th 1980).

supports the view that the country's labor market is characterized by the coexistence of these two labor segments.[30]

- Contributions to social security are often seen as a (partial) tax on labor, rather than as deferred compensation, or an insurance program. The percentage of the contribution that is actually considered a pure tax depends on the nature of the social security system and, more specifically, on the perceived connection between contributions and benefits (Diamond and Valdes-Prieto 1994). In the case of Chile, Torche and Wagner (1997) have argued that, although the reform reduced the tax component of contributions to social security, it did not fully eliminated it.

Formally, assume that, as is the case in many developing and transitional economies, the labor market is segmented. There is a *"modern"* or *"covered"* sector subject to a minimum wage and to social security coverage, and an *"informal"* or *"unprotected"* sector with no social security coverage, and competitively determined wages. With other things equal, workers will rather be employed in the "protected" sector. The problem, however, is that there are not enough jobs in that sector; individuals that apply for a job in the modern sector face a probability (p) of obtaining it, and a probability (1-p) of being unemployed. In equilibrium, and under the assumption of risk neutrality, the wage rate obtained in the *informal* segment is equal to the expected (take home) wage rate in the *protected* sector. We further assume that every period employment in the modern sector turns over fully, so that the probability of getting a job there is equal to the ratio of openings to applicants.[31]

Prior to the reform workers in the *protected* sector are subject to a payroll tax – whose purpose is to fund the social security system—equal to T_1. We also assume that there is a disconnect between social security contributions and benefits. More specifically, we assume that social security contributions are considered by individuals to be fully a tax (we amend this assumption in the empirical application of the model).

---

[30] These authors use a "break points" econometric method to determine (a) whether Chile's labor market is segmented, and (b) to define each segment.

[31] This mechanism is similar to the one consider in migration models of the Harris-Todaro type. In our model, however, there is no migration. The assumption of risk neutrality is not essential; all the results will follow if individuals have a constant degree of risk aversion.

Notice, however, that the analysis that follows would not be affected by the assumption that only a fraction of the contribution was considered to be a tax. Workers employed in the modern sector receive a "take home" wage rate equal to the minimum wage (W_{min}). The cost of labor to firms operating in this sector is equal to minimum wage rate plus the payroll tax. The social security reform will result in a reduction of this tax. There are two sources for this reduction: first, as was the case in Chile, the reform itself may entail a reduction in the contribution. Second, the replacement of the old pay-as-you-go system by individual retirement accounts, reduces the disconnect between contributions and benefits. In the post reform period, at least part of the contribution will be considered as deferred compensation

In this setting, workers prefer to be employed in the higher paying covered sector. In equilibrium, however, the expected wage rate in the covered sector E (W_c) is equal to the wage rate in the uncovered sector (W_n):

(2) $$W_n = E\,(W_c).$$

Assume, for simplicity, that the unemployed obtain earnings equal to zero and that the probability of finding a job in the modern sector is equal to the ratio of openings – that is employment in that sector (L_c) – to applicants. The latter is given by the sum of openings plus the total number of unemployed ($L_c + U$).

(2) $$W_n = [L_c / (L_c + U)]\, W_{min},$$

where L_c is employment in the sector covered by social security, and U is the number of unemployed. $[L_c / (L_c + U)]$ is, thus, the probability of being employed in the covered sector. The total labor force is equal to F:

(3) $$L_c + L_n + U = F.$$

Firm's are assumed to maximize profits, and their demand for labor in each sector (covered and non-covered) are assumed to depend on wages and product prices:

(4) $L_c=f\ (W_c,P_c\ldots)$

(5) $L_n= g\ (W_n,P_N...)$

P_c and P_N are the product prices in the covered and uncovered sectors.

The initial equilibrium is depicted in Figure 5 where curve yy is a rectangular hyperbola, that satisfies the wage-rate equilibrium condition in equation (3). Initially, $O_cL^c{}_0$ people are employed in the protected sector, $O_NL^N{}_0$ are employed in the non protected sector, and $L^N{}_0L^C{}_0$ are unemployed. W_{min} is the minimum wage, which is assumed to be set in net, take-home basis. The initial (pre-reform) social security contribution (or, more specifically, its pure tax component) is assumed to be To, and W_0 is the equilibrium wage rate in the non covered sector. (This wage rate is obtained from the intersection of the rectangular hyperbola yy and the demand schedule for the uncovered sector L(N)). It is clear from this figure that the expected wage rate of those employed in the protected sector and for the unemployed - -that is, for the pool of applicants for protected sector jobs - -is equal to W_0.

Consider now the effects – on both wages and employment-- of a social security reform that, as was the case in Chile, results in the reduction in the social security tax. This case is again depicted in Figure 5, under the maintained assumption that the non-labor factors of production are fixed in their sector of origin and that the supply for labor is inelastic. The new tax is assumed to be T_1. As a result of the reduction in the payroll tax component the cost of hiring labor in the covered sector declines and, thus,, employment in this sector increases to $L_1{}^P$. The wage rate in the non-covered sector is now determined by the intersection between its demand for labor and the new wage rate equilibrium schedule (y'y'), and is equal to W_1; employment in the uncovered sector declines to $L_1{}^N$. It is not possible, however to establish a priori what happens to unemployment. This will basically depend on the extent of the reduction in the tax component of social security contributions, as well as on the values of the elasticities of demand for labor in the covered and uncovered sectors. Formally, the effect of the reduction of the tax component on the non-covered sector wages rate will be:

(7) $d \log W_n = (1/\Delta) [(U/(L_c + U)) \eta_c (U/F) + (L_n/F) \eta_c(U/(L_c + U))] (T/(1 + T)) d\log T.$

where, η_c is the demand elasticity of labor in the covered sector, η_n is the demand elasticity of labor with in the non-covered sector, and,

(8) $$\Delta = \{ (U/F) - (L_n/F) \eta_C(U/(L_C + U))\} > 0.$$

Equation (7), then, is negative, indicating that, under our assumptions, reductions in the tax on labor in the covered sector ($d \log T < 0$) will always result in an increase in the clearing wage rate for those workers not covered by the formal social security system. On the other hand, the effect of the reform on the total number of unemployed will be:

(9) $$d U = -\{(U/\Delta) \eta_c(L_n/F) \{ 1 + (U/(L_c + U)) \eta_n \}\} (T/(1 + T)) d\log T .$$

As figure 8 indicated, it is not possible to sign this expression a priori. This means that, in principle, in this setting a social security reform that reduces the tax on labor in the covered sector could generate either an increase or a decline in the number of unemployed in the economy. According to equation (9), however, the sign of d U will depend on the value of the elasticity of demand for labor in the non-covered sector. More specifically, if $|\eta_n| < (L_c + U)/U$, then the social security reform will result in a reduction in the number of unemployed.

If the assumptions regarding sector specificity of capital and inelastic labor supply are relaxed, the computations become somewhat more complicated and the ambiguous results become more likely. If, on the other hand, capital is reallocated the results will depend on the capital-labor ratio. If, as is likely to be the case in developing countries, the formal (covered) sector is capital intensive, the probability that the reform will increase the number of unemployed is even higher. With an inelastic F, wages in the non-covered sector will still increase after the reform. Interestingly enough, even under the assumption of an elastic labor supply, the model developed here can still provide an estimate of the impact of the reforms on employment. This would be, in fact, the way to

interpret equation (9), under this set of assumptions (of course, with a negative sign). In the Appendix to this paper we present a more general version of the model, with an elastic supply for labor, endogenous prices and capital mobility. There we show that the basic results presented in this section follow under that more general set of assumptions.

In spite of its simplicity, this model captures quite well the most salient institutional aspects of the Chilean case, and can be used to simulate, under suitable parameter values, the effects of the pension reform on Chile's labor markets. In order to perform this simulation we require estimates of the relevant elasticities, the initial number of employed in each sector, the initial number of unemployed, and the initial and final values of the tax component of the social security contributions.

Table 5 contains the parameter values used in the calculations. The basic values of the parameters correspond to 1981, the year the reforms were launched. In order to make the calculations as sharp as possible, it has been assumed that under the old pay-as-you-go system, the complete contribution was perceived as a tax, while under the new capitalization system one half of the contribution is seen as a deferred contribution. That is, we are assuming that the tax component of the new system is only one half of the required contribution, or 5% of wages. This latter assumptions is consistent with recent estimates made by Torche and Wagner (1997), who used an equalizing wage differentials approach to estimate the proportion of the contribution to social security that workers considered a tax.[32]

Additionally, as may be seen from Table 5, we have assumed a range of values for the two elasticities of demand for labor (Coeymans and Mundlak 1993). This allows us to simulate ranges for the effects of the reforms on wages in the non-covered sector and on employment creation. The results obtained from the simulations, under the assumptions used to derive equations (8) and (9), are presented in Table 6. As may be seen, under the parameters constellation considered in this section, we estimate that the Chilean pension reform generated, with other things given, an increase in non-covered sector wages ranging from 3.7 to 6.2 percent, and a net increase in employment ranging from 61 to 96 thousand jobs. If it is assumed that labor supply is inelastic with respect to

social security contributions, this effect is equivalent to a decline in the rate of unemployment (with all other things given) ranging), at the time of the reform, from 2.0 to 3.1 percentage points. These results should be interpreted as providing an upper bound estimate of the effects of the reforms on unemployment. This is because they have been obtained under the assumption that the supply for labor is not affected by the reform itself. Using the general model developed in the appendix, in Edwards and Edwards (1999) we estimated that, when there is a labor supply response, the social security reforms contributed to reducing unemployment in 0.7 to 1.1 percentage points.

VI. Labor Market Regulations and Unemployment Persistence: An Aggregate Analysis

In the preceding sections we have concentrated on the most important microeconomic aspects of Chile's labor reforms, and we have analyzed the way in which new legislation introduced in 1980, 1981 and 1990 affected job security, collective bargaining, strike activity, payroll taxes, and take-home wages. In this section, we take a different perspective, and we use time series aggregate data to analyze the way in which the reforms affected the degree of labor market flexibility and the equilibrium level of unemployment. This is an important issue since, as stated in the introduction, two of the explicit goals of the reforms were to increase labor market responsiveness to shocks, and to reduce the long run equilibrium level of unemployment.

A number of authors have argued that the degree of rigidities embedded in labor legislation will affect the equilibrium level of unemployment. This has been, for example, the view of many authors that have attempted to explain the high degree of unemployment in Europe during the last decade and a half, and has been expressed in particularly strong terms by the *OECD Jobs Study* (OECD, 1994).

Most attempts at testing this general proposition have been based on comparisons across countries with different regulatory environments, and in particular on comparisons between the countries of Europe and the United States. The general view on these matters has recently been stated by Nickell (1997, p.55) as follows: "Here is the received

---

[32] They estimated wage equations on a data set with over 21,000 observations in 1990. Unfortunately that

wisdom: The European job market is rigid and inflexible: Result: high unemployment. The North American job market is dynamic and flexible: Result: low unemployment." Nickell (1997), however, concludes that the received wisdom is only partially right, and that some (but not all) labor market regulations in Europe cause higher unemployment. Blanchard and Katz (1997) take a similar view, and argue that restrictions to firing workers increase unemployment duration and workers' flows, but do not "necessarily led to a higher rate of unemployment (p. 59)."

In analyzing the effects of labor market regulations, some authors have focused on their effects on the *dynamics of unemployment*, and in particular on its degree of persistence. For example, in their analysis of European and U.S. unemployment patterns, Blanchard and Summers (1986) argue that due to greater rigidities, and in particular because of the more active role of unions, unemployment has been more persistent in Europe than in the United States. They argue further that the extent of unemployment persistence is affected by the state of the economy, with unemployment being more persistent in "bad times" than in "good times."

Because of the major reforms of the last thirty years, Chile provides a unique opportunity for analyzing the effects of changing labor regulations on unemployment and other labor market outcomes *within a particular country*. If the "regulations hypothesis" is correct, we would expect that Chile's labor market would exhibit a greater degree of flexibility and fluidity in the post reforms period. In this section we use aggregate data to explore this proposition. In particular, we follow Blanchard and Summers (1986) and focus on the degree of unemployment *persistence* as a measure of labor market flexibility. According to the Blanchard-Summers model, unemployment persistence is a direct result of the existence of *insiders* and *outsiders* in the labor market. To the extent that membership to the insiders' "group" is related to those workers that are currently employed, unemployment will tend to exhibit persistence. This is because, under most plausible objective functions, members of the "insiders group" will negotiate labor contracts that protect their status, tending, thus, to perpetuate the employment

---

data set (known as CASEN) is only available since the 1990s.

(unemployment) status quo.[33] This perpetuation of current conditions will, in turn, be translated into unemployment persistence.

Traditional labor market regulations – and in particular employment protection legislation and rules granting significant power to unions -- play an important role in this framework. First, as pointed out by Blanchard and Summers themselves, powerful unions will have a greater capacity to manipulate contracts in a way that will protect the interest of their members currently holding jobs. Within the context of this framework we would expect that, to the extent that labor market reforms alter the "membership rules" and increase the degree of labor market flexibility, there should be a reduction in the degree of unemployment persistence in the post reform period. In the extreme case when the reforms abolish the distinction between insiders and outsiders all together, unemployment persistence will tend to disappear.[34] Second, the existence of job protection, such as Chile's 1966 *"inamovilidad"* law, will help restrict "membership" to those currently holding a job, and protected by the legislation. This possible (positive) effect of job security on aggregate unemployment, may however be offset by the fact that this type of legislation discourages firings. At the end, whether job protection affects aggregate unemployment positively or negatively is, as so many things in this area, an empirical issue.

We begin our analysis of unemployment persistence in Chile by considering a simple process that relates the current rate of unemployment to its lagged value and to the deviations of the rate of growth of the GDP from its long term trend:

$$(10) \qquad u_t = \alpha + \beta\, u_{t-1} + \gamma\,(g_t - g^*_t) + \varepsilon_t,$$

where u_t is the aggregate rate of unemployment in period t, g_t is the rate of growth of real GDP in period t, g^*_t is the trend rate of growth of GDP, α, β and γ are parameters, and ε_t is an error term. At this point we do not restrict the characteristics of ε_t and allow

[33] See Blanchard and Summers (1986) for a formal derivation of this proposition.

[34] Notice, however, that there are some theoretical models that predict that more powerful unions and more centralized bargaining systems will lower the rate of aggregate unemployment. See Flanagan (1999) for a review of this literature.

it, in principle, to follow alternative processes. The presence of the GDP growth gap distinguishes equation (10) from the simple processes estimated by Blanchard and Summers (1986) for the U.S. and a group of European countries.[35] We would expect γ to be negative, reflecting the fact that higher-than-trend rates of growth will result in a decline in the rate of unemployment. In the steady state, however, g will be equal to g*, and the rate of unemployment will converge to its "natural" rate u*:

$$(11) \qquad u^* = \alpha / (1 - \beta).$$

In this setting the degree of persistence in unemployment will be given by β: the higher its value, the more persistent is unemployment. In the limit, a value of one suggests the presence of hysteresis, where past shocks will be permanently incorporated into the rate of unemployment. Furthermore, for given values of α, a higher degree of persistence (that is, a higher β) will also result in a higher natural rate of unemployment.

The estimation of equation (10), using national unemployment rates for Chile for 1966-1997, yielded the following point estimates (t-statistics in parentheses): $\alpha = 1.16$ (1.48); $\beta = 0.87$ (10.7), and $\gamma = -0.32$ (-4.7). Interestingly enough, our estimated AR coefficient is not very different from those estimated by Blanchard and Summers for the U.K. (0.93) and the U.S. (0.90) for a much longer time period.

There is no reason, however, to believe that these coefficients will be constant through time. In fact, to the extent that labor legislation experiences drastic changes, as was the case Chile, we would expect that the coefficients in equation (10) would change significantly through time. More specifically, if the reforms achieved their intended goal of increasing the degree of labor market flexibility, and, thus, reducing the degree of persistence, we would expect that β would be significantly lower during the post-reform period. Notice that this specification also allows us to investigate the more restrictive hypothesis that the reforms affected the level of unemployment. If, as has been argued by the OECD (1994) among others, lower labor restrictions result in a lower equilibrium

[35] Blanchard and Summers (1986) fit ARMA(1,1) processes to their data for the U.K. and the U.S. (see their tables 6, 7 and 10). In our case, however, we found out that an augmented AR(1) process fits the

level of unemployment we would expect that α would also be lower in the post-reforms period, as would $u^* = \alpha / (1 - \beta)$.[36]

In Table 7 we present the results from χ^2 likelihood ratio stability tests for equation (9). As may be seen, the null hypothesis of no breakpoint in 1980 – the first year of the reforms—is rejected at conventional levels. The null that there were no breakpoints in 1980 *and* 1990 is also rejected. Finally, and interestingly enough, the null of no breakpoint in 1974 (the first year of the military dictatorship) cannot be rejected at conventional levels.

In Table 8 we present results from the estimation of (9) using dummy variables that allow for changes in coefficients α and β for the period after the military labor reform was implemented. *Dumref* is a dummy variable that takes the value of one from 1980 through 1997, and a value of zero otherwise. As before, $(g_t - g^*_t)$ was computed as the difference between the actual rate of growth of real GDP, and the long term trend growth of GDP calculated using the Hodrick and Prescott (1997) procedure. The most important results in this table are: First, until 1979 unemployment indeed exhibited a considerable degree of persistence. In fact, according to equations (10.3) and (10.4) it is not possible to reject the hypothesis of hysteresis.[37] Second, the degree of unemployment persistence declined significantly after the reforms were implemented. The coefficient of the reforms dummy interacted with lagged unemployment is significantly negative, with a point estimate ranging between –0.15 and –0.28. Third, the estimate of the reform dummy for the constant term is not significant, and while it is negative in one of the regressions, in the other it is positive. And fourth, the coefficient of deviations of growth from its long term trend is always significantly negative, with a very stable coefficient of around –0.3.

We interpret these results as providing some evidence in support of the hypothesis that the Chilean labor reforms increased the degree of labor market flexibility, as defined by a decline in the degree of unemployment persistence. At the same time, these break

---

Chilean data better.

[36] We thank Steve Nickell for suggesting estimating a unemployment dynamic equation, constraining the natural rate to be constant. However, the results obtained from this formulation were highly unstable and difficult to interpret.

point regressions do not support the view that the reforms, of and by themselves, reduced the equilibrium level of unemployment (there is no clear cut effect on estimated the value of α).

Although the very small number of observations does not allow us to look in detail for multiple break points, we can still investigate for the presence of two break points – one corresponding to each reform – in the unemployment dynamics equation. Table 9 contains the results from such a regression. *Dum8090* is a dummy variable that takes a value of 1 for period 1980-90 and zero otherwise, while *Dum9097* takes a value of one during 1991-97 and zero for the rest of the period. The results obtained tend to confirm those reported above. While the dummy for the constant is barely significant the estimated coefficient for both interactive dummies indicate a decline in the degree of labor market persistence in the period following the reforms.

The regressions reported in tables 8 and 9, allow for at most two discrete break points in Chile's unemployment process. This limited number of breaks is the result of both the small number of observations, and of the fact that break point models are not able to handle a large number of jumps (Hamilton 1994). In principle, however, changes in the degree of persistence may be gradual and smooth, rather than discrete. In order to investigate this possibility we estimated equation (10) using a stochastic time varying parameters technique (Hamilton 1994). The specific model estimated is:

$$u_t = \alpha_t + \beta_t u_{t-1} + \gamma (g_t - g^*_t) + \varepsilon_t, \quad (12)$$

$$\alpha_t = \alpha_{t-1} + \xi_t \quad (13)$$

$$\beta_t = \beta_{t-1} + \zeta_t, \quad (14)$$

where ξ_t and ζ_t are zero-mean and constant variance error terms. In equation (12), then, both the constant and the AR term are allowed to vary through time, while the coefficient of the growth gap term is assumed to be constant. Figure 6 depicts the estimated values

[37] According to both ADF and Phillips-Perron tests it is not possible to reject the hypothesis of unit root. These tests, however, have very low power in the presence of break points in the series. Moreover, their reliability with only 31 observations is low.

of alpha and beta.[38] As may be seen, these time varying coefficient estimates indicate, very strongly, that the autoregressive term in the unemployment dynamics equation declined after the labor reforms were implemented in Chile. These estimates suggest that already one year after the reform had been implemented the point estimate of the persistence coefficient had declined by 0.1, and that three years after the reforms it had experienced a drop to almost one half of its pre reform level.[39] Interestingly enough, these Kalman filter estimates suggest that after increasing sharply during 1974-82, the constant coefficient alpha also experienced a deep decline in the post reform period. Moreover, according to these estimations the steady state equilibrium rate of unemployment also declined – although not by too much -- after the reforms were implemented. See Figure 7 for the estimated long run rate of unemployment calculated from these equations.

How much did each of the reform components -- job security and collective bargaining, in particular -- contribute to the improvement of labor market outcomes? The importance of this question stems from the fact that, as noted in sections III and IV, the effect of these reforms on the aggregate rate of unemployment is theoretically ambiguous. We address this issue by analyzing whether our job –protection and collective bargaining indexes can explain the evolution of unemployment persistence through time. More specifically, we ran regressions of the following form:

$$(15) \qquad \textit{Persistence}_t = \gamma_0 + \gamma_1 \log (\textit{Collective Index})_t + \gamma_2 \log (\textit{Protection Index})_t + \varepsilon_t .$$

Where *Persistence* is defined as the time-varying (Kalman Filter) estimate of β reported in Figure 7. A higher value of this variable denotes a more sluggish rate of unemployment, and a less flexible labor market. *Collective Index* and *Protection Index* are indexes that measure the degree of restrictiveness (and centralization) of collective

[38] In order not to lose some valuable degrees of freedom we extended the unemployment series back until 1960, using the Greater Santiago Area unemployment data to calculate national unemployment rates for 1960-65.

[39] In order to sharpen the visual presentation, estimated coefficients are depicted without the standard errors. These however show that zero was clearly outside of the 95% confidence interval in 1966-79. After the reforms, however, the value zero belonged to the interval.

bargaining and union legislation, and the cost of job protection legislation respectively. This approach to investigating the (possible) effects of the reforms on aggregate unemployment can be though of, as a time series extension of the cross-country tests implemented by Layard, Nickell and Jackman (1991) for a group of industrialized countries.[40]

In the actual estimation of equation (15), we used four alternative definitions for the *Collective Index*: (1) The index of the degree of centralization of the bargaining process constructed in Section IV. This is called *Bargaining Index*, and as explained, a higher value means a more centralized process. (2) The index of union activities, also constructed in Section IV and presented in Figure 4 above. A higher value of the index means a higher level of strike activity and/or a higher average cost per strike. We called this index *Union Index*. (3) An index that combines, as a simple average, the previous two indexes of centralization and strike activities. This index was called *Collective1*. And (4) a smoothed version of the *Collective1 Index*. The Hodrick-Prescott procedure was used to smooth the series. This index was called *Collective.*

With respect to the *Protection Index*, we used two alternative measures: First, we used the index on the cost of job security legislation constructed in Section III, and presented in Figure 5. And second, we used the cost of dismissing an individual with 20 years tenure in the firm (cost-twenty).

The results obtained from the estimation of equation (15) are presented in Table 10, and are quite interesting. First, the coefficients of the indexes the degree of centralization of the bargaining process are always positive. Moreover, the coefficients of the log of *Collective*, *Collective1* and *Bargaining* are highly significant. This suggests that a more centralized collective bargaining process (that is, one that gives greater power to unions) has increased the degree of unemployment persistence. Another way of saying it, these results suggest strongly, that the reforms to the wage bargaining process increased the degree of flexibility and fluidity of the labor market. Second, the coefficients for the job *Protection Index* are negative, with rather small point estimates (in

[40] In that study the authors used pooled cross section and time series data to estimate estimated structural equations of unemployment for a group of 19 countries. In the second stage of the analysis they regressed

absolute value). In only two of the five regressions (15.1) and (15.4) they are significant at conventional levels. This results are somewhat ambiguous, and suggest that job security had either no effect on aggregate unemployment – a result consistent, for example, with Pages and Montenegro's (1999) results for the urban Santiago area --, or that it had a small negative effect.

The results presented in Table 10 can be used to estimate the actual contribution of these reforms to the reduction in unemployment persistence in Chile. As the calculations reported in Table 11 show, the estimates in equation (15.1) suggest that our model explains most of the reduction in persistence between 1966-1970 and 1993-97. These estimates can also be used, in conjunction with the Kalman Filter estimates of the dynamics of unemployment (equation 12), to gain some insights on the extent to which the reforms affected the long run rate of unemployment. For example, the results from equation (15.2) suggest that, while the job security reform had no effect on long run natural rate of unemployment, the collective bargaining reform reduced the long term rate of unemployment in 1.5 percentage points.[41]

To summarize, the results presented in this section indicate that in the post reforms period, Chile's labor market experienced, both a reduction in persistence and in the natural rate of unemployment. Our analysis also indicates that while, the collective bargaining reform contributed greatly to increasing flexibility and lowering unemployment, the reform to job security had a either a negligible, or a negative, effect on these variables.

VII. Concluding Remarks

In this paper we have analyzed the overall process of labor reforms in Chile from the period of the military (1973-89) to the present. The analysis has centered on the three fundamental aspects of these reforms: (a) the reduction in the extent of job security; (b)

---

the coefficients from the unemployment equations on indexes that capture the most important properties bargaining institutions in each country.

[41] This calculation was made by comparing the average estimated u* for 1966-70 with a hypothetical u* for 1993-97. The latter is computed as the estimated average α for that period, divided by $(1 - \beta^*)$, where β^* is calculated as the 1966-70 β, corrected by the estimated effect of the reforms. These, in turn, are obtained from equation (15.2).

the decentralization of collective bargaining, and the related reduction in unions' power; and (3) the privatization of social security. We concluded that the reforms accomplished the following objectives: (1) They reduced the (cash) cost to firms of dismissing workers. We reached this conclusion after analyzing the evolution of several indexes of the cost of job security. We argue, however that, from an international comparative perspective, Chile continues to have a relatively restrictive job security legislation. (2) The reforms reduced the degree of centralization of the wage bargaining process. They also reduced the power of labor unions, and the cost of labor conflicts. Our comparative analysis suggests clearly that Chile moved from institutions based on the European tradition to a U.S.-type decentralized model. And (3), the social security reform resulted in a significant reduction in payroll taxes.

Our analysis also suggests that (some of the components of) the reforms had an impact on both the dynamic and long term aggregate level of unemployment. Our conclusions in this area can be summarized as follows: (1) Simulation exercises based on the model developed in Section V suggest that the social security reform contributed to reducing unemployment in about 1 to 1.5 percentage points. (2) The regression analysis presented in Section VI -- including the Kalman Filter estimates of unemployment dynamic equations -- indicate that in the post reforms period, Chile's labor market experienced both a reduction in persistence and in the natural rate of unemployment. (3) The reductions in unemployment persistence, and in the natural rate of unemployment, appear to have been largely the result of the reforms to the collective bargaining process. And (4), the reform to job security legislation appears to have had a negligible – or maybe even a small negative – effect on the aggregate rate of unemployment. It is important to emphasize, however, that this last finding does not mean that job security provisions have no effects whatsoever. In fact, Pages and Montenegro (1999) have recently presented persuasive results suggesting that this particular reform had an important effect on the level and composition of employment.

Chile's labor reforms have not been without critics. Some observers have, in fact, argued that the market-oriented reforms and, in particular the new legislation on job security, has caused an increased level of precariousness in the job market. There is,

however, no evidence in support that the reforms – either labor or other – affected social conditions negatively. In fact, between the mid 1980s and the mid 1990s Chile experienced a very dramatic decline in the poverty headcount. Also, according to the World Bank (1997) the Gini coefficient moved from 0.470 in 1969 to 0.455 in 1996.[42]

[42] The World Bank (1997) calculations also indicate that the Gini coefficient experienced a significant increase between 1985 and 1990.

REFERENCES

Alvarez, Fernando and Marcelo Veracierto (1999): "Equilibrum Search and Labor Market Policies," Paper presented at the 14th Annual Macroeconomics Conference NBER, Cambridge MA.

Baeza, Sergio and Raul Burger. 1995. "Calidad de las Pensiones del Sistema Privado Chileno". In Baeza, Sergio y Francisco Margozzini C. eds. *Quince Años Después: Una Mirada Al Sistema Privado De Pensiones.* Santiago: Centro de Estudios Públicos (CEP).

Barría, Jorge S. (1971a) *El Movimiento Obrero en Chile* Santiago: Trigono. Universisdad Técnica del Estado.

Barría, Jorge S. (1971b) *Historia de la CUT*. Santiago: Ediciones Prensa Latinoamericana.

Basch, Miguel and Ricardo D. Paredes. 1992. "Segmentacion laboral en Chile: Nueva evidencia a partir de estimaciones de cambio de regimen". *Colección Estudios CIEPLAN*; 0(36).

Bentolila, Samuel (1997): "Las Decisiones Judiciales sobre Despidos en España: Una perspectiva Económica," *Cuadernos de Información Económica #128-129 (Nov.) :* 170-79.

Bentolila, Samuel and Gilles Saint Paul. 1992. "The Macroeconomic Impact of Flexible Labor Contracts, with an Application to Spain". *European Economic Review 36(5).*

Bertola, G. 1990. "Job Security, Employment and Wages". *European Economic Review, 34(4).*

Blancard, O. and L. F. Katz. 1997. "What We Know and Do Not Know About the Natural Rate of Unemployment". *Journal of Economic Perspective.*

Blanchard, O. and L. Summers. 1986. "Hysterisis and the European Unemployment Problem". *NBER Macroeconomic Annual.*

Bosworth, Barry P., Rudiger Dornbusch and Raul Laban 1994. "The Chilean Economy: Policy Lessons and Challenges: Introduction". In Bosworth, Barry P., Rudiger Dornbusch and Raul Laban eds. *The Chilean Economy: Policy Lessons and Challenges*. Washington, D.C.: Brookings Institution.

Cheyre, Hernan. 1988. *La Previsión En Chile Ayer Y Hoy: Impacto de una Reforma.* Santiago: Centro de Estudios Públicos (CEP).

Coymans, Juan Eduardo and Yair Mundlak. 1993. *Sectoral Growth in Chile 1962-82.* Washington DC: International Food Policy Research Institute.

Dertouzos, James and Lynn Karoly (1992): *Labor Market Responses to Employer Liability*. Santa Monica CA: RAND.

Diamond, P. and S. Valdes-Prieto. 1994. "Social Security Reforms". In Bosworth, Barry P., Rudiger Dornbusch and Raul Laban eds. *The Chilean Economy: Policy Lessons and Challenges*. Washington, D.C.: Brookings Institution.

Dornbusch, R. and S. Edwards. 1990. "Macroeconomic Populism". *Journal of Development Economics 32(2).*

Edwards, Sebastian. 1995. *Crisis and Reform in Latin America: From Despair to Hope.* New York: Oxford University Press.

Edwards, Sebastian. 1996. "The Chilean Pension Reform: A Pioneering Program". *NBER Working Paper 5881*.

Edwards, Sebastian. 1998a. "Chile: Radical Change Towards a Funded Pension System". In Siebert, Horst ed. *Redesigning Social Security*. Institut fur Weltwirtschaft an der Universitat Kiel.

Edwards, Sebastian. 1998b. "The Chilean Pension Reform: A Pioneering Program". In Feldstein, Martin ed. *Privatizing Social Security.* The University of Chicago Press.

Edwards, A Cox (1993) *Labor Market Legislation in Latin America and the Caribbean.* The World Bank. Latin America and the Caribbean Technical Department. Regional Studies Program. Report #31.

Edwards, A. Cox. 1995. "Labor and Economic Reforms in Latin America and the Caribbean". *Regional Perspectives on the World Development Report*. Washington DC: The World Bank.

Edwards, A. Cox. 1999. "Labor Market Reform and Modernization of Labor Relations in Chile". *Southwestern Journal of Law and Trade in the Americas* (forthcoming).

Edwards, Sebastian and Daniel Lederman. 1998. "The Political Economy of Unilateral Trade Liberalization: The Case of Chile". *NBER Working Paper* No. W6510.

Edwards, Sebastian y Alejandra Edwards. 1991. *Monetarism and Liberalization: The Chilean Experiment*. Chicago, Ill.: University of Chicago Press.

Edwards, Sebastian and Alejandra Cox Edwards (1999): "Social Security Reform and Labor Markets: The Case of Chile," Manuscript, August.

Feres, Maria Ester. 1997. “Sindicalismo y Negociacion Colectiva”. In *La Negociación Colectiva en Chile.* Santiago: Editorial Gestión.

Flanagan, Robert J. (1999): “Macroeceonomic Performance and Collective Bargaining: An International Perspective,” *Journal of Economic Literature 27 (September): 1150-75.*

Grubb, D. and W. Wells. 1993. “Employment Regulation and Patterns of Work in EC Countries”. *OECD Economic Studies, 21*

Gruber, Jonathan. 1997. “The Incidence of Payroll Taxation: Evidence from Chile”. *Journal of Labor Economics;15(3).*

Hamilton, J. 1994. *Time Series Analysis.* Princeton University Press.

Hodrick, Robert J. and Edward C. Prescott. 1997. “Postwar U.S. Business Cycles: An Empirical Investigation”. *Journal of Money, Credit, and Banking*; 29(1).

Houseman, Susan. 1991. *Industrial Restructuring with Job Security: The Case of European Steel.* Cambridge University Press.

IDB. 1996. *Progreso Económico y Social en América Latina: Cómo Organizar con Éxito los Servicios Sociales.* Washington DC: Inter-American Development Bank (IDB).

ILO. 1994. *Las Relaciones Laborales en Chile.* Informe Relasur. Coleccion Informes OIT 41.

Larrain, Felipe y Patricio Meller. 1990. “La experiencia socialista-populista chilena: La Unidad Popular, 1970-73”. *Cuadernos de Economía;27(82).*

Layard, Richard G.; Stephen Nickell, and Richard Jackman (1991): *Unemployment: Macroeconomic Performance and the Labor Market.* Oxford and NY: Oxford U. Press.

Lazear, Edward P. 1990. “Job Security Provisions and Employment”. *Quarterly Journal of Economics; 105(3).*

Lorz, O. 1998. “Social Security and Emplyment”. In Siebert, H. ed. *Redesigning Social Security.* Institut fur Weltwirtschaft an der Universitat Kiel.

Marquez, G. and Carmen Pages (1998): “Ties that bind” Inter American Development Bank Working Paper.

Mizala, A. 1998. “La Regulacion del Mercado Laboral en Chile”. *Perspectivas, 2.*

Nickell, Stephen. 1997. “Unemployment and Labor Market Rigidities: Europe vs. North America”. *Journal of Economic Perspectives, 11(3).*

OECD. 1994. *OECD Job Study*. Vols. I and II. Paris: OECD.

Pages, Carmen and Claudio Montenegro. 1999. “Job Security, Tenure and Employment Dynamics: Theory and Evidence from Chile”. Inter American Development Bank Working Paper #398 (September).

Pinera, Jose. 1990. *La Revolucion Laboral en Chile.* Santiago: Zig-Zag.

Schmidt-Hebbel, Klauss. 1997. “Pension Reform, Informal Markets and Long-Term Income and Welfare”. *Documento de Trabajo del Banco Central de Chile.*

Siebert, H. 1997. “Labor Market Rigidities: At the Root of Unemployment in Europe”. *Journal of Economic Perspectives 11(3).*

Torche, Aristides and Gert Wagner. 1997. “Prevision Social: Valoracion Individual de un Beneficio Mandatado”. *Cuadernos de Economia*; 34(103).

Ureta, Manuelita. 1998. “Incidencia y duracion del Desempleo en Areas Urbanas del Paraguay”. *Estudios de Economia 25(1).*

Vittas, Dimitri. 1995. *Strenghts and Weaknesses of the Chilean Pension Reform.* Washington DC: The World Bank.

World Bank. 1997. *Chile: Poverty and Income Distribution In a High-Growth Economy, 1987-1995.* Report 16377-Ch., Washington DC.

APPENDIX

Social Security Reform and the Labor Market:

A Segmented-Market Model

In this appendix we provide a generalization of the model presented in Section V. assume that, as is the case in many developing and transitional economies, the labor market is segmented. There is a *"modern"* or *"covered"* sector subject to a minimum wage and to social security coverage, and an "*informal"* or "*unprotected"* sector with no social security coverage, and competitively determined wages. With other things equal, workers will rather be employed in the "protected" sector. There are not enough jobs in that sector; individuals that apply for a job in the modern sector face a probability (p) of obtaining it, and a probability (1-p) of being unemployed. In equilibrium, and under the assumption of risk neutrality, the wage rate obtained in the *informal* segment is equal to the expected (take home) wage rate in the *protected* sector. We further assume that every period employment in the modern sector turns over fully, so that the probability of getting a job there is equal to the ratio of openings to applicants.[43]

We also assume that prior to the reform workers in the *protected* sector are subject to a payroll tax – whose purpose is to fund the social security system—equal to T_1. We also assume that there is a disconnect between social security contributions and benefits. More specifically, we assume that social security contributions are considered by individuals to be fully a tax. Notice, however, that the analysis that follows would not be affected by the assumption that only a fraction of the contribution was considered to be a tax. Workers employed in the modern sector receive a "take home" wage rate equal to the minimum wage (W_{min}). The cost of labor to firms operating in this sector is equal to minimum wage rate plus the payroll tax. Equations (A.1) - (A.4) describe the wage determination process in this economy. Equation (A.1) establishes that in equilibrium the wage rate in the informal sector (W_I) is equal to the expected (net of taxes) wage rate in the modern sector E (W^N_M). According to equation (A.2) the probability of finding a job in the modern sector is equal to the ratio of openings – that is employment in that sector

(L_M) – to applicants. The latter is given by the sum of openings plus the total number of unemployed ($L_M + U$). It is assumed, for simplicity, that the unemployed received an income equal to S. Equation (A.3) says that the cost of labor in the modern sector is equal to the minimum wage inclusive of the payroll tax (T_1). In equation (A.4) we present the demand for labor equations in the modern and informal sectors. P_M and P_I are good prices in each sector, f ( ) and g( ) are physical marginal productivity of labor functions, and K_M and K_I are the stock of capital used in the modern and informal sector.

(A.1) $$W_I = E(W^N_M) = p\, W_{min} + (1 - p)\, S$$

(A.2) $$p = [L_M / (L_M + U)]$$

(A.3) $$W_M = W_{min}(1 + T_1)$$

(A.4) $$W_M = P_M f(L_M, K_M); \quad W_I = P_I\, g(L_I, K_I).$$

Equation (A.5) is the resource constraint in the labor market, and establishes that employment in the modern sector, plus employment in the informal sector plus unemployment has to be equal to total labor supply (L_s). According to equation (A.6), labor supply is a positive function of real wages; O represents "other" factors affecting the supply of labor.[44] Equation (A.7) define the aggregate price index and the aggregate wage rate. In order to simplify the analysis, in equation (A.8) we have assumed that the modern sector corresponds to tradable goods and that, as a consequence, P_M is given by international prices (P_M^*).[45] Equation (A.9) establishes that product prices in the informal sector are a positive function of wages in that sector. We further assume that an increase in W_I, will have a less than proportional effect on prices of goods produced in I.

(A.5) $$L_M + L_I + U = L_S$$

---

[43] This mechanism is similar to the one consider in migration models of the Harris-Todaro type. In our model, however, there is no migration. The assumption of risk neutrality is not essential; all the results will follow if individuals have a constant degree of risk aversion.

[44] We have abstracted from intertemporal issues. Although our results will still go through in an explicit intertemporal context, the computations would become significantly more complex.

[45] This simplification allows us to maintain product prices in the modern sector constant. An alternative assumption, and one that would not affect the basic aspect of the analysis, is that the modern sector is

(A.6) $L_S = h\,(W/P,O); \quad h' > 0.$

(A.7) $P = P_I^{\beta}\, P_M^{(1-\beta)}; \quad W = W_I^{\theta}\, W_M^{(1-\theta)}$

(A.8) $P_M = P_M^{*};$

(A.9) $P_I = z\,(W_I); \quad z' > 0.$

Equation (A.10) is the resource constraint for capital, and says that the sum of capital used in each sector has to equal the total stock of capital. Equation (A.11) says that the allocation of the capital stock across sectors will depend on the relative product prices. Notice that in order to simplify the computations, and to focus on the issues at hand, we have assumed that there is no net investment.

(A.10) $K_M + K_I = K$

(A.11) $K_M = j\,(P_M/P_I); \quad K_I = v\,(P_M/P_I).$

Formally, the model given by equations (A.1) - (A.11) can be solved to obtain the effects of a social security reform, on a number of variables, including informal sector wages (W_I), the volume of unemployment (U), and product prices of in the informal sector (P_I). In order to simplify the exposition, we follow a long tradition in international trade theory – the Ricardo-Viner approach – and we assume that capital is fixed in its sector of origin. We begin with the effects of changes in the tax component of the social security contribution (d log T) on informal sector wages (d log W_I):

(A.12) $$d \log W_I = \Delta^{-1} \{ - [\alpha_U\,(U/(L_M + U))\,(1/\eta_M)] - [(U/(L_M + U)\,\alpha_M\,(1/\eta_M)]\}\,(T_1/(1+T_1))\; d \log T.$$

Where,

(A.13) $$\Delta = -\alpha_U - [\alpha_I\,(U/(L_M + U))\,(1/\eta_I)\;(\mu - 1)]$$

---

comprised of both tradable and non-tradable goods. In this case, we would need a product market clearing condition for modern sector goods.

$$- [(U / (L_M + U)) \phi (\alpha_I + \mu \beta)].$$

α_I, α_M and α_U are the shares of employment in the informal sector, employment in the modern sector, and unemployment in the labor resources constraint (A.5). η_I and η_M are the inverse of the elasticities of the demand for labor with respect to wages in the I and M sectors, respectively, and are negative.[46] ϕ is the supply elasticity of labor, and is positive. μ is the elasticity of the price of informal sector goods (P_I) with respect to the wage rate in that sector, and is greater than zero and smaller than one. It follows from equation (A.13), then, that Δ is negative. Consequently, according to equation (A.12), the following result holds.

$$(d \log W_I / d \log T) < 0.$$

This means that a social security reform that reduces the pay roll tax, will unambiguously generate an increase in the wage rate in I, the sector that is not covered by the by the social security system. Notice that, by construction, net (take home) wages in the modern sector are not affected by the reform. This is because we have assumed that the minimum wage is set in take-home bases, and that the reform does not affect it. The more general case where the reform generates an increase in net wages in the M sector is discussed below.

The effect of the reform on aggregate unemployment (U), is given by:

$$(A.14) \quad d \log U = \Delta^{-1} \{ (\alpha_I / \eta_I) - [\alpha_I (U / (L_M + U)) (1 / \eta_I) (1 / \eta_M) (\mu - 1)] - [(U / (L_M + U)) \phi (\alpha_I + \mu \beta) (1 / \eta_M)]\} (T_1 / (1+T_1)) \; d \log T.$$

The sign of equation (A.14) is undetermined. It follows from this that within the framework developed in this paper, a reduction in the payroll tax in the modern sector will have an ambiguous effect on the number of unemployed. Whether the level of unemployment will increase or decline will depend on two basic factors: the supply

[46] That is, $\eta_I = (d \log W_I) / (d \log L_I)$.

elasticity of labor in the economy -- parameter ϕ in equation (A.14) --; and the demand elasticity of labor demand in the informal sector. The more elastic is the supply for labor and the more inelastic is the demand for labor in the informal sector, the more likely it is that the reform will result in an *increase* in the level of unemployment.

Equation (A.15) gives the effect of the reform on product prices in the informal sector, and is positive:

$$(A.15) \qquad d \log P_I = \Delta^{-1} \{ - (U / (L_M + U)) \ (\alpha_M / \eta_M) - \alpha_U \ (U / (L_M + U)) (1 / \eta_M)\} (T_1 / (1 + T_1)) \ d \log T.$$

The results in equations (A.12) – (A.15) assume that there is no change in the take-home wage in the modern sector. In Chile, however, the government mandated an increase in take-home wages equal to 10 percent, for those that opted for the privatized regime. In the context of our model, an increase in the take-home wage in the sector covered by social security can be modeled as an exogenously determined increase in the minimum wage rate. Formally speaking, then, this more general policy package corresponds to a situation where both the minimum wage (W_{min}) and the payroll tax, change (in opposite directions). In this case the change in the wage rate in the informal sector will be given by:

$$(A.16) \quad d \log W_I = \Delta^{-1} \{[- [\alpha_U (U / (L_M + U)) (1 / \eta_M)] - [(U / (L_M + U) \alpha_M (1 / \eta_M)]] \{ T_1 / (1 + T_1)) \ d \log T + d \log W_{min} \}.$$

The change in the level of employment, in turn, will now be given by:

$$(A.17) \quad d \log U = \Delta^{-1} \{ (\alpha_I / \eta_I) - [\alpha_I (U / (L_M + U)) (1 / \eta_I) (1 / \eta_M) (\mu - 1)] - [(U / (L_M + U)) \phi \ (\alpha_I + \mu \beta) (1 / \eta_M)]\} \{(T_1 / (1+T_1)) \ d \log T + d \log W_{min}\}.$$

TABLE 1: The Evolution of Labor Market Regulations

PHASE/ YEARS	*Union representation and collective bargaining*	*Wage Policy*	*Job Security*	*Payroll Taxes*
Initial Conditions 1931-1965	Tripartite system of collective bargaining and conflict resolution. 1931 labor code focuses on conflict resolution. While the legislation favored collective bargaining at the firm level, and this form of negotiations was dominant, the mechanisms of conflict resolution projected negotiations beyond the enterprise. With time, sector-wide negotiations spread throughout the economy.		Dismissal without expression of cause with a month's notice. Severance payment of a month's wage per year of tenure for "white collar workers.	The main component of payroll taxes are social security contributions. Chile started a Social Security System in 1924, building from a set of privately established pensions systems that covered specific groups of workers or sectors of economic activity. These programs finance retirement, invalidity and family survivor benefits, a public health care system, the payment of family allowances, and an unemployment subsidy. In addition, there was a 1 % contribution to fund public training programs.
Phase I 1966-73	Increased polarization of the labor movement	Generalized use of wage indexation.	**Ley de inamobilidad.** Dismissals require expression of "just" cause, or severance payment of a month's wage per year of tenure	In spite of very high nominal contribution rates, by 1970 the public sector spent 20.5 percent of its budget to cover the deficits in the health and pensions systems along with its own contributions.
Phase II Economic Liberalization with a highly intervened labor market 1974-1979	Decree Law 670 of October 1974 substituted the earlier legislation that defined the tripartite commissions, giving them a consultative character. They were understood to be a transition mechanism, while a new policy towards the labor market was developed, and while union activities were banned..	Economy-wide wage adjustments imposed by decree	Dismissal without expression of cause reinstated in 1978 for all new hires. Employers pay a severance of a month's wage per year of tenure to all dismissed workers, unless there is "just cause," which includes "economic cause."	A number of partial changes brought down contributions from a 60 percent at their peak in 1974, to the order of 33 percent in 1980. Rates varied according to the specific plan at which an employee was affiliated, but all the plans were guaranteed by the state. For example, in 1976, the 1% contribution earmarked to fund training program was eliminated.
Phase III Labor Reforms 1980-1990	Union affiliation becomes voluntary. Decentralized collective bargaining. Labor negotiations opened to market forces. Strikes without job guarantees after sixty days.	minimum wage setting	Starting in 1981, dismissals of any worker, new or previously hired, can take place without expression of cause, and as long as severance is paid.	In 1980, a reform lowered social security contributions to just above 20 percent (10 % towards retirement, 7% towards health and about 3% towards dissability). New entrants to the labor force would contribute

	No intervention of the government in the affairs of unions or the collective bargaining process, except for a wage floor guaranteed by law. The wage floor was eliminated in 1982, and as a byproduct, the necessary conditions to replace striking workers were eroded.		Severance payments are open to negotiations. In the absence of an explicit agreement the minimum severance would be a month wages per year of tenure with a 5 months ceiling. A 1984 reform established that the minimum severance agreed by the parties could not be less than the severance established by law. Furthermore, "economic cause" for dismissal is not "just cause" anymore.	to a new old-age program based on a mandated individualized savings plan, to be managed by private administrators (AFPs). Old contributors could to opt out of the traditional pay-as-you-go system. In the case of health care contributions, both old contributors and new entrants were given the choice to opt out of the public system (FONASA) and use the 7 percent towards a health care insurance policy provided by an authorized private health insurer (ISAPRES). A basic pension, the unemployment insurance, and the family allowances programs would be fully financed by the central government budget
Phase IV Consolidation of Labor Reforms 1991 onwards	The new law eliminated the sixty days period for the legal strike, which allowed employers to dismiss striking workers without severance. The new law also reinstated stricter conditions for workers replacements in case of strike Labor negotiations can take place at the sector level if both workers and employers agree to it.	minimum wage setting	Dismissals require an expression of "cause". Severance of one month wages per year of tenure applies to dismissals with "economic cause." Severance would be paid with a 20% surcharge if the employer cannot prove an alleged "economic cause." No severance obligation in case of dismissals with "just cause." Dismissal ceiling on severance payment raised to 11 month wages. Separate treatment for domestic workers based on individualized accounts.	

TABLE 2

Employment Protection in Chile, Rest of Latin America, Selected European Countries, and the United States in the mid 1980s*				
	Chile	Rest of Latin America	Selected European Countries	United States
1. Cause for Dismissal	10	10	29	31.5
2. Tenure-based severance (3 years)	4	12	23	37
3. Probationary Period	17.5	20.2	20.8	37
4. Severance at 20 years	26	18.5	21.6	37
5. Reinstatement	23	21.3	13	23
6. Overall Protection Index	11.5	12.8	22.7	37

See text for details.
The indexes rank countries from most protective (1) to least protective (37).
Based on detailed data from Marquez and Pages (1998).

TABLE 3

The Nature of Collective Bargaining: Chile, Selected European Countries, and the United States							
	Chile			Selected European Countries		USA	
	1970-73	1985-89	1995-96	1980	1994	1980	1994
1. Union Density	34.7%	8%	15%	53%	40%	22%	16%
2. Bargaining Level	2+	1	1	2+	2	1	1
3. Bargaining Coordination	2+	1	1	2+	2+	1	1
4. Federation Involvement	4	1	1+	2+	2	1	1
5. Government Intervention	3	2	1	2+	2+	1	1

Categories defined by Flanagan (1999)

Notes

Union Density = Proportion of wage and salary workers who are union members.
Bargaining Level = (1) Plant-level bargaining; (2) Industry level bargaining; (30 Centralized bargaining.
Bargaining Coordination = Range is from uncoordinated bargaining (=1) to highly coordinated bargaining (3).
Federation Involvement = Union and/or employer federations are: (1) Uninvolved in setting wages in any of the subsequent ways; (2) Participate in formulation of wage demands for all affiliates; (3) Negotiate non-wage benefits; (4) Negotiate a part of the wage agreement (e.g. cost-of-living-adjustement); (5) Represent affiliates in mediation with centralized ratification; (6) Represent affiliates in arbitration; (7) Negotiate national wage agreement without peace obligation; (8) Negotiate national wage agreement with peace obligation.
Government Involvement = (1) Sets minimum wage only; (2) Mandates adjustments; (3) Role in tripartite negotiations.

Table 4: Strike Activity in Chile: 1960-1996

(Yearly averages)

	(1) Number of Strikes (average per year)	(2) Number of strikes per 100,000 employed workers	(3) Days-worker lost per strike (average per strike)	(5) Average number of days per strike	(4) Percentage of labor force affiliated to unions
1960-70	279	9.9	2,549	22	n.a.
1985	42	1.2	n.a.	21	8
1986	41	1.1	n.a.	15	5
1987	81	2.0	n.a.	14	8
1988	72	1.7	1,215	14	7
1989	101	2.3	2,956	16	13
1990	176	3.9	1,393	15	18
1991	224	4.9	3,276	12	23
1992	247	5.1	1,355	12	17
1993	224	4.4	1,393	12	14
1994	196	3.8	1,592	13	10
1995	187	3.6	1,872	12	17
1996	183	3.5	1,282	10	18

Source: Feres (1997), Instituto Libertad y Desarrollo (1997).

Table 5

Parameters Values to Simulate Labor Market Effects

Of Pension Reform

PARAMETER	*PARAMETER VALUE*
F (Thousand of people)	3,700
L_c (Thousand of People)	1,850
L_N (Thousand of People)	1,450
U (Thousand of People)	400
η_N	-0.5 / -0.7
η_C	-0.4 / -0.6
T_0	0.26
T_1	0.05

Source: Edwards and Edwards (1991), Coeymans and Mundlak (1993).

Table 6: Simulation Results

	High Case Scenario	**Low Case Scenario**
Employment Creation	96 thousand jobs	61 thousand jobs
Percentage change in wages in non-protected sector	6.2 percent	3.7 percent

Source: see text

Table 7: Break-Point Test for Unemployment Dynamics Equation

	1974	1980	1980 & 1990
χ^2	5.65 (0.26)	10.815 (0.029)	13.26 (0.048)

P-values in parenthesis

TABLE 8: ***<u>Unemployment Dynamics Equations</u>***

Coefficient	Eq. 1.1	Eq. 1.2	Eq. 1.3	Eq. 1.4
Constant	1.167 (1.480)	1.471 (1.792)	1.038 (1.3591)	0.088 (0.781)
u_{t-1}	0.866 (10.861)	0.888 (10.952)	0.985 (10.221)	1.065 (8.265)
$g_t - g^*_t$	-0.315 (-4.718)	-0.321 (-4.834)	-0.338 (-5.276)	-0.347 (-5.271)
dumref	-	-0.858 (-1.215)	-	1.547 (1.001)
dumref* u_{t-1}	-	-	-0.151 (-2.097)	-0.284 (-1.973)
R^2	0.824	0.833	0.845	0.850
N	31	30	31	31
D.W.	1.792	1.906	2.017	2.067

Table 9: Unemployment Persistence: Testing for Two Breakpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
($g_t - g^*_t$)	-0.351025	0.064304	-5.458866	0.0000
UNEMP(-1)	1.067799	0.125893	8.481779	0.0000
DUM8090*UNEMP(-1)	-0.467489	0.200750	-2.328713	0.0283
DUM9097*UNEMP(-1)	-0.813395	0.385122	-2.112047	0.0448
C	0.073158	1.097515	0.066658	0.9474
DUMREF	4.211344	2.320239	1.815048	0.0815
R-squared	0.862895	Mean dependent var		8.900000
Adjusted R-squared	0.835474	S.D. dependent var		4.385354
S.E. of regression	1.778781	Akaike info criterion		4.161719
Number of Observations	31	Schwarz criterion		4.439265
Log likelihood	-58.50665	F-statistic		31.46831
Durbin-Watson stat	1.956933	Prob(F-statistic)		0.000000

TABLE 10 : Unemployment Persistence and Labor Market Reform [a]

	EQ 15.1	*EQ 15.2*	*EQ 15.3*	*EQ 15.4*	*EQ 15.5*
Constant	0.241 (2.125)	0.244 (1.899)	0.225 (2.660)	0.399 (3.081)	0.439 (2.870)
Log (Collective)	0.822 (15.067)	0.791 (5.603)	_	_	_
Log (Bargaining)	_	_	0.493 (11.608)	0.557 (10.143)	_
Log (Union)	_	_	0.050 (1.590)	0.044 (1.540)	_
Log (Collective1)	_	_	_	_	0.417 (3.842)
Log (Protection Index)	-0.244 (-4.802)	_	-0.125 (-1.840)	_	-0.180 (-1.370)
Log (Cost-Twenty)	_	-0.107 (-1.824)	_	-0.118 (-2.364)	_
AR(1)	_	0.512	_	_	_
DW	1.58	2.03	1.65	1.54	1.58
R^2	0.89	0.86	0.91	0.85	0.36
N	31	31	31	31	31

Notes: t-statistics in parenthesis

[a.] A dummy variable that took the value of one during the years of the military regime was also included.

TABLE 11: Explaining Changes in Unemployment Persistence

Change between 1966-70 and 1993-97	
Change in Persistence Coefficient	- 0.468
Change attributed to collective bargaining reform	- 0.480
Change attributed to job protection reform	+ 0.066
Unexplained change in persistence	- 0.054

Source: Authors' calculations. See text for details.

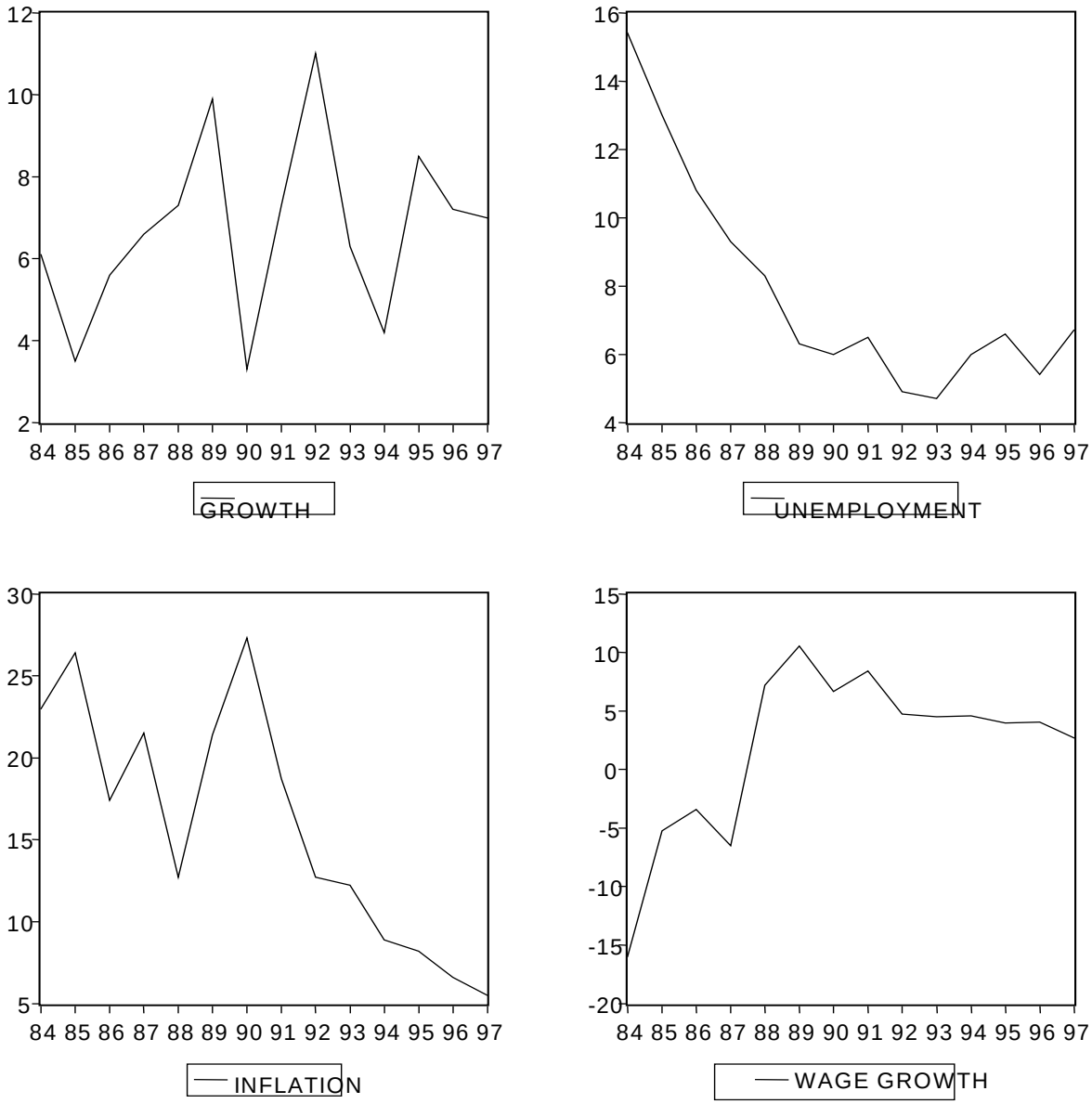

Figure 1: Selected Macroeconomic Indicators

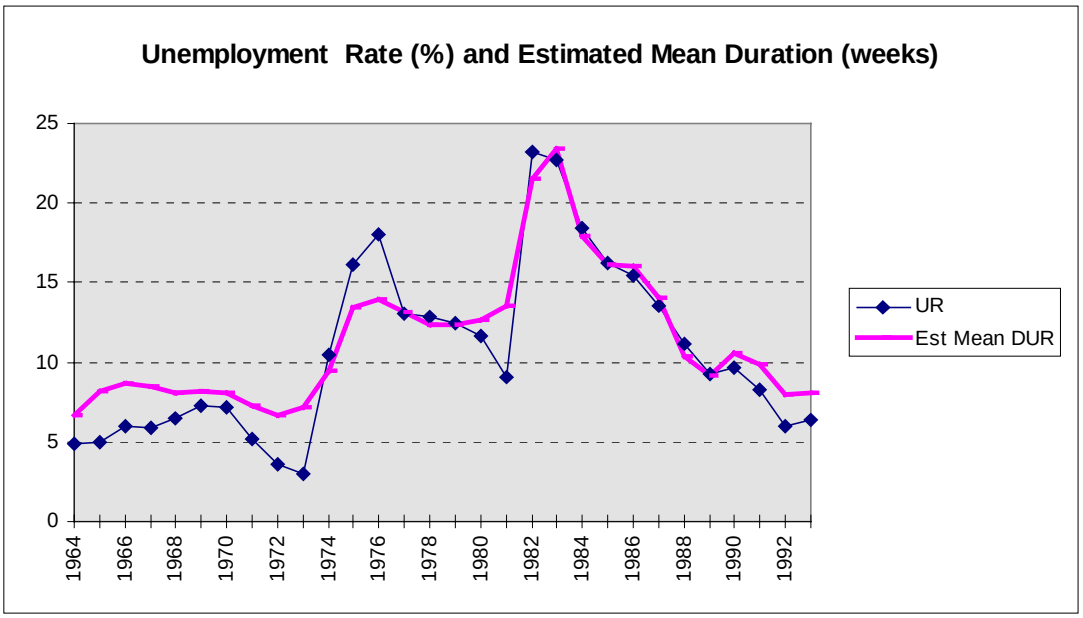

Figure 2: Rate of Unemployment and Unemployment Duration

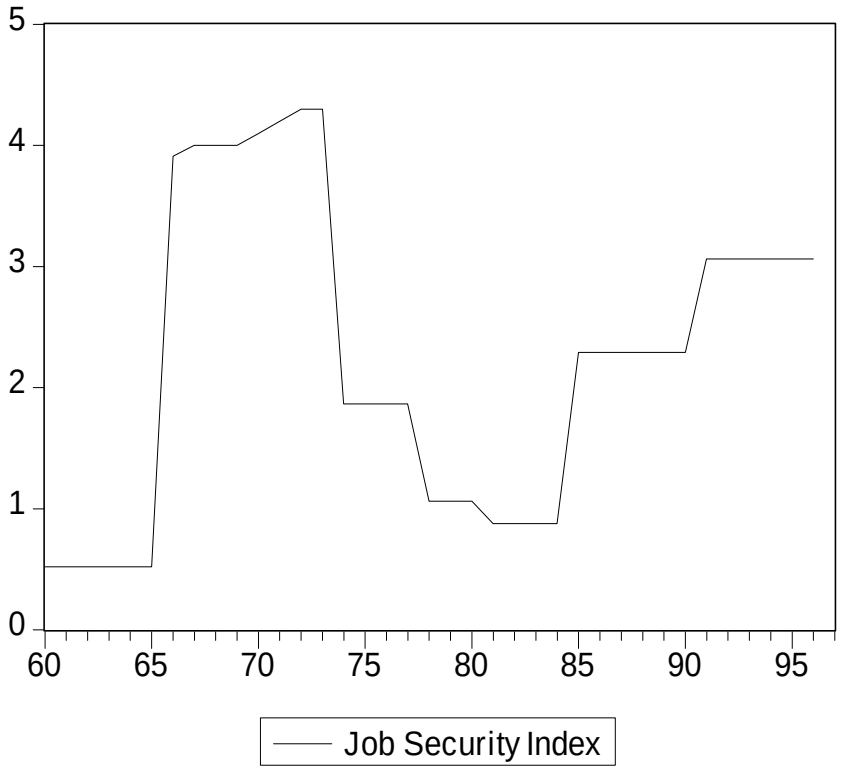

Figure 3: Job Security Index

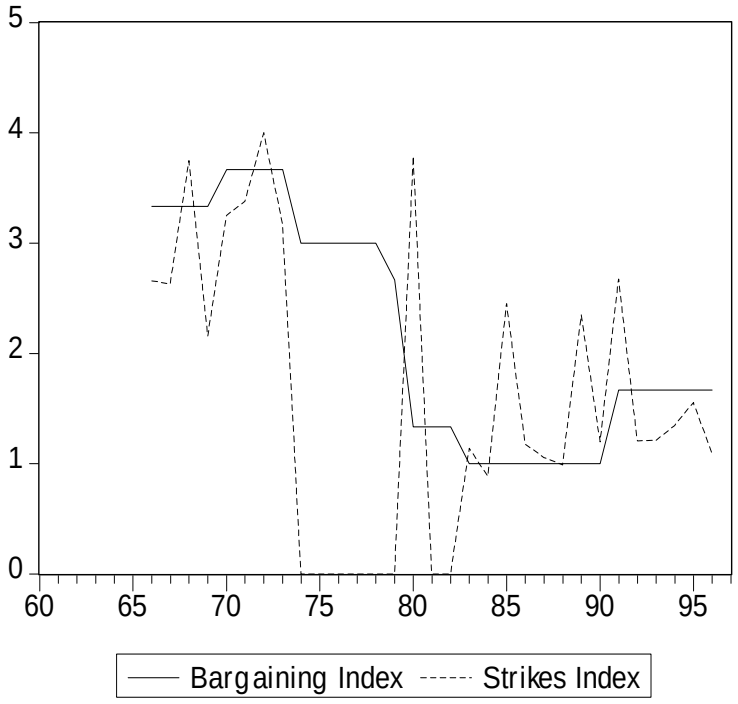

Figure 4: Collective Bargaining and Union Activities Indexes

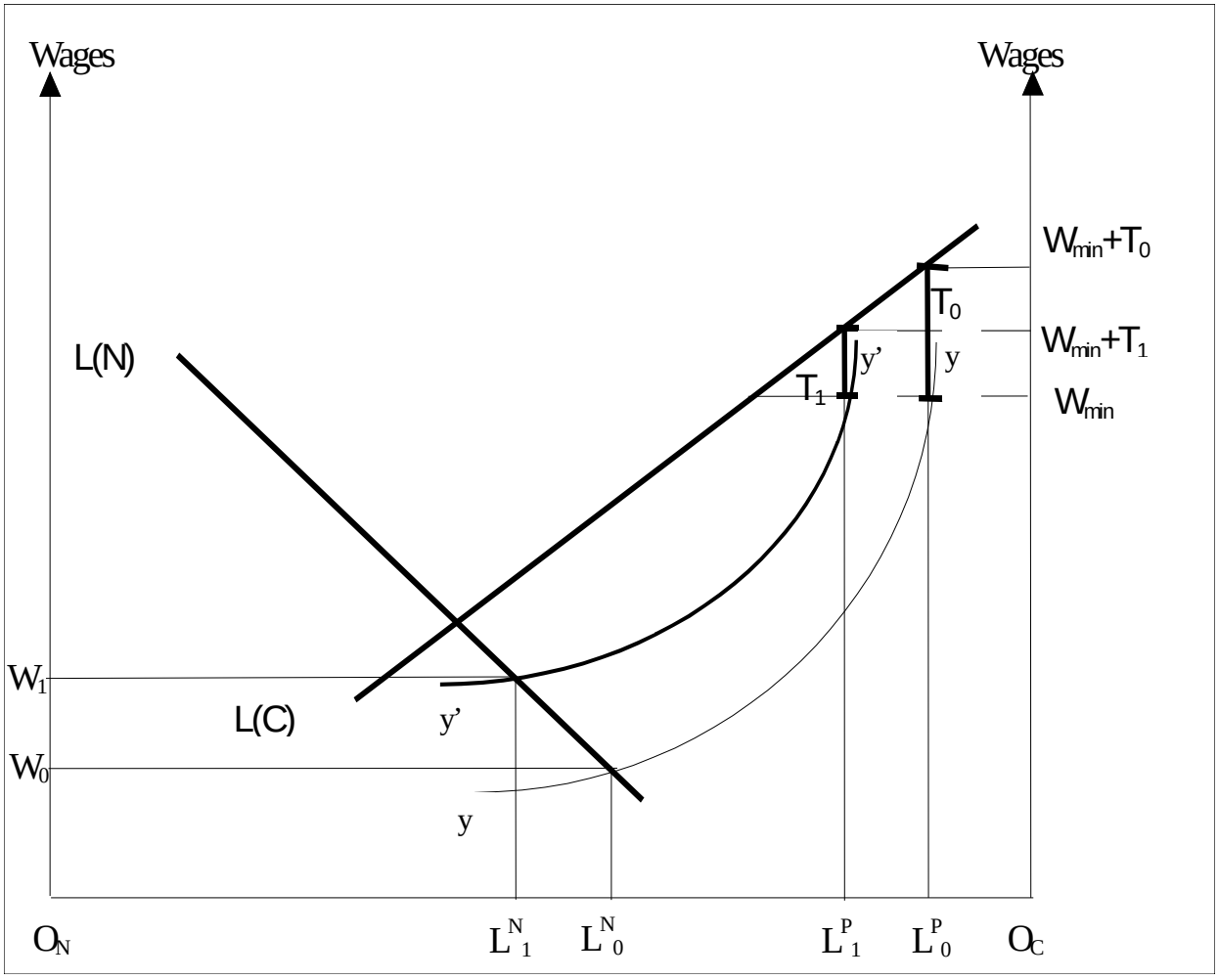

Figure 5: The Labor Market Effect of Pension Reform

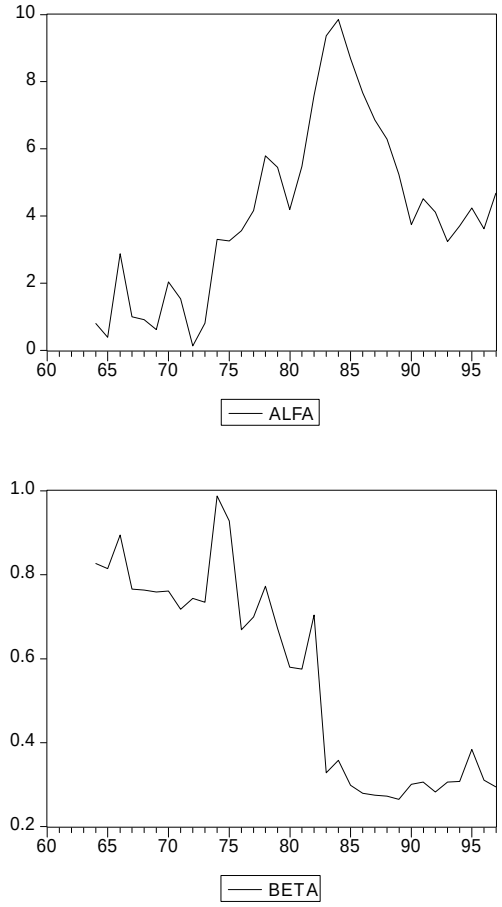

Figure 6: Time Varying Coefficient Estimates

of
Unemployment Dynamics Equation

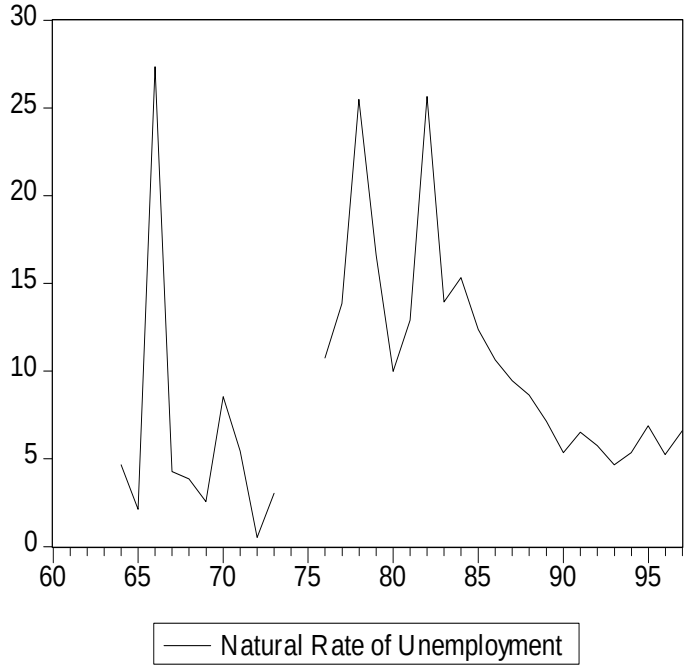

Figure 7: Estimated Natural Rate of Unemployment