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## From Severance Pay to Self-Insurance: Effects of Severance Payments Savings Accounts in Colombia

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February 2002

# From Severance Pay to Self-Insurance: Effects of Severance Payments Savings Accounts in Colombia

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## ABSTRACT

### **From Severance Pay to Self-Insurance: Effects of Severance Payments Savings Accounts in Colombia\***

In 1990 Colombia replaced its traditional system of severance payments with a new system of severance payments savings accounts (SPSAs). Although severance payments often are justified on the grounds that they provide insurance against earnings loss, they also increase costs for employers and distort employment decisions. The impact of severance payments depends largely on how much of the costs to employers can be shifted to workers. The theoretical analysis in this paper shows that, in contrast to a traditional system of severance payments, the system of SPSAs facilitates the shifting of severance payments costs to workers in the form of lower wages. Empirical results using the Colombian National Household Surveys indicate that the introduction of SPSAs shifted around 80% of the total severance payments contributions to wages and had a positive effect on weekly hours. Results using the 1997 Colombian Living Standards Measurement Survey suggest that, although SPSAs in part replaced employer insurance with self-insurance, SPSAs continue to play a consumption smoothing role for the non-employed.

JEL Classification: E2, H2, J3, J6

Keywords: Distortions, tax shifting, unemployment insurance, consumption smoothing, crowding out

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# 1 Introduction

In Latin America, much as in Europe, high severance payments and other dismissal costs often are blamed for the rigidity of labor markets and for high unemployment rates. At the same time, severance payments received upon separation are workers' main source of protection against temporary income shocks during unemployment in Latin America because the UI system there is not well developed. While some countries have UI systems, many do not, and in countries with UI, coverage is incomplete.

The consensus among economists is that severance payments distort the behavior of firms and workers and generate rigidities in the labor market. On the firm side, government-mandated severance paid at the time of separation distorts incentives to hire and fire, when such schemes cannot be undone by private transfers from workers to firms in the form of lower wages.<sup>1</sup> As for workers, severance payments probably increase reservation wages and reduce exit rates out of unemployment.

Despite these possible distortions, severance payment and other social insurance programs often are justified on the grounds that private insurance markets may not exist because of problems of adverse selection and because workers may not be able to self-insure by borrowing.<sup>2</sup> Moreover, even if workers are able to save for periods of non-employment, this may be less efficient than getting insurance from others; those who do not end up separating from their jobs may inefficiently reduce today's consumption. Studies for developed countries in fact provide evidence of liquidity constraints on workers and of failures in private insurance markets.<sup>3</sup> Evidence from developing countries also suggests failures in formal credit and insurance markets, justifying the need for social insurance programs including severance payments.<sup>4</sup> However, government-mandated severance payments in developing countries

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<sup>1</sup>Lazear (1990) was the first to propose that any government-mandated severance payment could be undone by a 'voluntary' transfer from workers to firms. Lazear also explains why government-mandated severance payments may be hard to undo in practice.

<sup>2</sup>Bertola (1999) presents a model in which job security provisions provide insurance to risk-averse workers and increase welfare, without necessarily reducing productive efficiency. Acemoglu and Shimer (1999) present a model in which UI not only improves risk sharing but also increases output.

<sup>3</sup>See Hamermesh (1982), Zeldes (1989), Attanasio and Davis (1996), Gruber (1997), and Browning and Crossley (2001).

<sup>4</sup>See Murdoch (1990), Deaton (1992), Paxson (1992), Rosenzweig and Wolpin (1993), and Townsend (1994, 1995).

only apply to formal sector jobs, leaving workers in the large informal sector uninsured with limited ability to smooth consumption.

In 1990, Colombia introduced a labor market reform that decreased severance payments in the formal sector with the goal of reducing distortions and increasing insurance coverage. In particular, the reform introduced a system of fully-funded Severance Payments Savings Accounts (SPSAs) for formal workers hired after January 1, 1991. The SPSAs required employers to deposit a percentage of wages into guaranteed individual accounts available to workers in the event of job separation.

This paper asks whether the introduction of SPSAs reduced distortions in the labor market while continuing to play an insurance role. The theoretical section of the paper uses a matching model to illustrate the effects of a shift from a traditional system of severance payments to a system of SPSAs. The model shows that SPSAs facilitate the shifting of severance payments' costs to workers in the form of lower wages. Moreover, the more risk averse or more imperfectly insured workers are, the larger the wage cut they are willing to accept when SPSAs are introduced. SPSAs also reduce employment distortions in the labor market by partially neutralizing government-mandated transfers.

The empirical part of the paper looks at wages and hours of work of formal and informal workers (i.e., workers covered and not covered by severance payments) who were hired before and after 1990. Using data from the National Household Surveys (NHS) for 1988-96, I find that the introduction of SPSAs reduced the wages of covered workers hired after the implementation of the reform by 6.5%; that is equal to 78% of the contribution made by employers into the savings accounts. This result suggests that there was additional shifting compared to the situation with traditional severance payments. Moreover, consistent with a reduction in labor costs per hour under the new system, the results suggest an increase in employment measured by weekly hours after the introduction of SPSAs.

In addition, using data from the Living Standards Measurement Survey (LSMS) for 1997, I also examine the insurance role of the new system. While SPSAs generate substantial shifting of government-mandated severance payments from firms to workers and reduce costs for employers, the new SPSA system should provide insurance for non-employed workers in the form of forced precautionary savings. The results for consumption expenditures indicate that an increase of 1,000 pesos in severance payments increased the consumption of non-employed heads of households by 240 pesos, for those

hired both before and after the reform. Although the results suggest that severance payments play a consumption smoothing role, the fact that each peso of severance pay did not translate one-for-one into consumption suggests that SPSAs crowd out other forms of insurance. Results on the impact of the policy change on other forms of insurance suggest crowding out of in-kind and monetary transfers from relatives, as well as of government-mandated transfers.

The rest of the paper proceeds as follows. Section 2 describes the introduction of SPSAs in Colombia and contrasts SPSAs with Unemployment Insurance Savings Accounts (UISAs).<sup>5</sup> Section 3 presents a model illustrating the effects of a change from a standard severance payments system to a system of SPSAs. Section 4 presents the empirical evidence on the effects of SPSAs on wages, hours, and consumption. Section 5 concludes.

## 2 Background

### 2.1 The Introduction of SPSAs in Colombia

In 1990 Colombia introduced a major labor market reform that changed its system of severance payments. To understand the change, however, it is important first to understand the system of severance payments that was in place prior to the reform. Prior to the 1990 labor market reform, the system of severance payments in Colombia resembled the traditional system in many countries, requiring employers to pay severance at the time of separation.

Before the reform, employers were required to provide severance pay equal to one month per year worked, based on the salary at the time of separation (specifically 8.3% of the salary). The exceptions were self-employed, family workers, and workers in firms with less than five employees, and domestic workers, who were entitled to only half of 8.3%.<sup>6</sup> Moreover, the legislation allowed covered workers to borrow from their severance pay for investments in housing and education, by deducting the amount from the payment at the time of separation.<sup>7</sup> Prior to the reform, the loans were credited in

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<sup>5</sup>For a discussion of UISA's see Feldstein and Altman (1998) and Hopenhayn (2000).

<sup>6</sup>In practice, many workers are employed by firms that do not comply with labor legislation and thus are not covered by severance payments. Employment in such informal sector firms accounts for around 50% of total employment in Colombia.

<sup>7</sup>The total amount that could be borrowed was limited to the severance payments the worker had earned up until that date.

nominal terms and not appropriately adjusted for inflation. In a country like Colombia with high rates of inflation, this accounted for a substantial extra cost.<sup>8</sup> On the other hand, firms about to go bankrupt could simply not pay severance or could negotiate a package substantially below what was owed in severance payments.

The 1990 reform introduced two major changes with respect to severance payments. First, it reduced the amount of severance payments. Second, it changed the traditional system into a system of severance payments savings accounts (SPSAs) for new contracts. Two adjustments effectively reduced the amount of severance payments after the 1990 reform. First, employers were no longer required to pay one month per year worked out of the salary at the time of separation. Instead, they were now required to pay one month per year worked based on the salary at each point in time. Since salaries increase with tenure, this adjustment reduces severance payments. Second, workers could continue to borrow from their severance, but the 1990 reform introduced proper adjustments of the loans to inflation.

The most important change introduced by the reform was the system of guaranteed SPSAs which replaced the traditional system of severance payments. In particular, the system of SPSAs automatically applied to any new contract signed after January 1st, 1991. The new system required employers to make a monthly payment into an individual savings account for each worker equal to 8.3% of salary at each point in time. The new system also imposed fines of 12% of the severance payments on employers who failed to make monthly deposits into individual accounts. Moreover, the 1990 reform established administrative agencies to monitor and invest the money deposited into the individual accounts. The agencies were required to insure that the accounts earned at least the average return on three-month treasury bonds, based on an average determined by the Central Bank every quarter. As before, employed workers were allowed to withdraw funds from the individual savings accounts for investments into housing and education. Also, unemployed workers and retired workers had unrestricted access to all funds in their savings accounts.

The reform also established that the monthly contribution of 8.3% of the salary had to be paid by the employer. But the fact that the SPSAs are

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<sup>8</sup>According to Ocampo (1987), the fact that prior to the reform, loans were credited in nominal terms implied an additional 35% of total severance payments in the manufacturing sector. That is, according to Ocampo's estimates, the improper crediting of loans raised severance costs by an additional 2.9% of the yearly salary in the manufacturing sector.



guaranteed may allow employers to shift part of the payment to workers in the form of lower wages. When severance payments are guaranteed, workers should be more willing to accept wage cuts to assume part of the costs of severance payments. Further, when workers pay for part of the severance cost and are faced with liquidity constraints, the system replaces employer insurance with self-insurance against temporary income shocks: workers reduce consumption while employed to save for periods of non-employment.

## 2.2 Parallel between SPSAs, UI and UISAs

The system of SPSAs resembles traditional unemployment insurance, which requires employers to pay a payroll tax contribution into a fund. However, there are some basic differences. First, SPSAs and traditional UI differ in their degree of experience rating. Traditional UI systems often provide “incomplete experience-rating [in the sense] that employers are not charged the full UI costs of a layoff” (Anderson and Meyer, 2000). SPSAs provide full experience-rating, in the sense that workers receive exactly what is contributed by employers into the accounts. Second, in traditional UI systems workers receive monthly benefits for a limited time. SPSAs, instead, allow workers to withdraw all funds at once after a separation. Finally, unlike the traditional UI system which deposits contributions into a general fund, SPSA deposits go into guaranteed individual accounts with interest accruing to workers. The first feature of SPSAs reduces distortions compared to traditional UI. The second and third features increase the likelihood of private transfers from workers to firms in the form of lower wages, causing workers to internalize the cost of insurance.

The SPSA system is similar to the Unemployment Insurance Savings Accounts system (UISA) proposed by Feldstein and Altman (1998) and Hopenhayn (2000). UISAs require employers to deposit a portion of workers’ wages into special accounts to be used in the event of unemployment. Positive balances in the accounts earn the return on risk-free assets; negative balances either are charged that same rate or are forgiven. Positive balances remaining at the end of the working life are turned into retirement income.

The advantage of this system, according to proponents, is that it internalizes the cost of unemployment benefits, thus substantially improving incentives to work, in contrast to the traditional unemployment insurance system. The extent to which UISAs provide employer insurance, or self-insurance, depends on the rate contributed by workers and employers into

the accounts. At one extreme, when workers make all the contributions, the system forces them to self-insure. At the other extreme, when employers make the entire contribution, the resultant distortions are greatest unless the costs can be offset.

Similarly, as the rate of contributions by employers into the SPSAs falls, employer insurance is replaced with self-insurance, and the incentives for both firms and workers improve. At one extreme, when severance payments are shifted fully to workers, there is no employer-insurance but rather forced savings; distortions in the behavior of firms and workers disappear. At the other extreme, when employers provide 100% of contributions to the accounts, the system is closer to the traditional system of severance payments which provides employer insurance and the distortionary effects of severance payments are larger.<sup>9</sup>

The next section examines whether the introduction of SPSAs encouraged shifting severance payments from employers to workers in the form of lower wages, and whether this helped to neutralize the distortions introduced by government-mandated severance payments.

### 3 Theoretical Consequences of SPSAs

I explore the theoretical impact of introducing SPSAs using a matching model. By including frictions and idiosyncratic shocks, this model allows for endogenous separations and limited bonding possibilities. The model is in the spirit of Mortensen and Pissarides (1994), but includes severance payments, the probability of bankruptcy, and allows for new jobs to be as good as any other job. The model illustrates the effects of severance payments on wages and employment in the presence of risk-aversion.<sup>10</sup>

Firms have to pay a state-mandated severance payment,  $T$ , to workers whenever there is a separation. These are pure transfers, rather than waste

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<sup>9</sup>While employer insurance is better than self-insurance when workers are faced by idiosyncratic shocks – because it allows risk to be pooled across workers who do and do not separate from their jobs – self-insurance is clearly better when the shock occurs at the level of the firm (such as firm bankruptcy). The optimal shifting rate depends on the consumption smoothing gains of the old system over the new system as compared to the distortions induced to firm and worker behavior under the old system.

<sup>10</sup>As in Bertola (1999), workers cannot transfer resources across periods and states of nature, and consumption is equal to current labor income or income from severance payments.

going to third parties, and are received by workers who are dismissed or quit. The only way for firms to avoid paying severance payments is to declare bankruptcy, but not all firms are able to declare bankruptcy. In particular, firms are unable to declare bankruptcy with probability  $\xi$  conditional on a worker separation.<sup>11</sup>

There is free-entry, so the number of vacancies is determined by the condition,  $V = 0$ , where  $V$  is the present discounted value of a vacancy. Firms holding a vacancy have a flow cost,  $C$ . It takes time for firms and workers to find each other in the market; the matching occurs with a technology  $m(v, u)$ , where  $v$  denotes the number of job vacancies and  $u$  the stock of unemployed. Thus, the arrival rate of job applicants is  $q(\theta)$  and the arrival rate of job offers is  $\theta q(\theta)$ , where  $\theta = \frac{v}{u}$  and  $q'(\theta) < 0$ . Production depends on a match-specific component,  $x$ , which comes from a distribution  $G(x)$  and may change at each point in time with probability  $\lambda$ . Wages are determined by Nash-bargaining and set to split the surplus in fixed proportions as follows:

$$\beta(J(x) - (V - T)) = (1 - \beta)(W(x) - (U + u(T))),$$

where  $T$  is the severance payment transfer;  $u(T)$  is the worker's utility out of the severance payment, where  $u'(\cdot) > 0$  and  $u''(\cdot) < 0$ ;  $\beta$  is the bargaining power of workers; and  $J(x)$ ,  $V$ ,  $W(x)$ , and  $U$  are the present discounted values of a job with match productivity  $x$ , of a vacant job, of a worker with match productivity  $x$ , and of an unemployed worker, respectively. The value of the filled job is:

$$rJ(x) = x - w(x) + \lambda(E_x[J(x)] - J(x)),$$

where the expected value of the job is given by:

$$E_x[J(x)] = \int_{\tilde{x}}^{\bar{x}} J(x)g(x)dx + G(\tilde{x})(V - \xi T),$$

and  $\tilde{x}$  is the critical value of the match productivity that triggers a separation. The value of a vacancy, of an employed worker, and of an unemployed worker are:

$$rV = -C + q(\theta)(E_x[J(x)] - V),$$

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<sup>11</sup>In a country like Colombia a substantial share of firms operate in the informal sector and are not subject to severance payments. However, since these firms were not directly affected by the introduction of SPSAs, the model concentrates on the impact of SPSAs on formal sector firms.

$$rW(x) = u(w(x)) + \lambda(E_x[W(x)] - W(x)),$$

and

$$rU = \theta q(\theta)(E_x[W(x)] - U),$$

where the expected value of an employed worker is,

$$E_x[W(x)] = \int_{\tilde{x}}^{\bar{x}} W(x)g(x)dx + G(\tilde{x})(U + \xi T).$$

The wage is obtained by substituting the value functions into the Nash-bargaining condition:<sup>12</sup>

$$(1 - \beta)u(w) + \beta w = \beta(x + \theta C) + (\theta q(\theta) + r)[(1 - \beta)u(T) + \beta T].$$

The wage equation shows that government-mandated severance payments raise the wage in the formal sector because they increase the value of an unemployed worker. In addition, while the bankruptcy probability does not enter directly into the wage equation, it does raise the labor tightness parameter,  $\theta$ , and increases the wage the firm has to pay.<sup>13</sup>

For completeness, the equilibrium is determined by solving for the job destruction (JD) condition, which is given by a separation rule, and for the job creation (JC) condition, which is given by the free-entry condition (see the Appendix for details). Figure 1.a shows that a reduction in state-mandated severance payments increases job destruction rates,  $\lambda G(\tilde{x})$ , and has an ambiguous effect on job creation rates,  $\theta q(\theta)$ . Figure 1.b shows the impact of a reduction in severance payments on unemployment when job creation rates increase. Although the figure shows the case where unemployment is unchanged, the effects on employment and unemployment are generally ambiguous.

The next section illustrates how the introduction of a system of SPSAs, like a reduction in state-mandated severance payments, reduces wages but has ambiguous effects on employment, while still providing insurance for workers.

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<sup>12</sup>See Appendix for details.

<sup>13</sup>Garibaldi and Violante (1999) construct a matching model with unlimited bonding possibilities, where severance payments have no impact on the labor market. This is because in the Garibaldi and Violante (1999) model, workers cannot move directly from unemployment into jobs higher up the ladder and, thus, their framework assumes that the value of the unemployed is not affected by severance payments.

### 3.1 The Introduction of SPSAs

The replacement of severance payments at the time of separation with a system of SPSAs essentially turns severance payments from fixed one-time costs into variable costs like a payroll tax. Instead of paying the amount  $T$  at the time of separation, firms now contribute a portion  $t$  of wages every period into the severance payments savings accounts. The fact that severance payments now are a per-period payment guaranteed for the future, instead of a fixed transfer from firms to workers paid upon separation, facilitates shifting severance payments towards workers in the form of lower wages.

The value of a job with SPSAs is now:

$$rJ^A(x) = x - w^A(x)(1+t) + \lambda(E_x[J^A(x)] - J^A(x)),$$

where the expected value of the job is given by:

$$E_x[J^A(x)] = \int_{\tilde{x}^A}^{\bar{x}} J^A(x)g(x)dx + G(\tilde{x}^A)V^A,$$

and the value of a vacancy, value of an employed, and value of an unemployed continue to be as before. Now the payment is received with certainty upon separation though and the amount the worker gets at the time of separation is the total contribution into the account,

$$T = \frac{w^A t}{(\lambda G(\tilde{x}^A) + r)}.^{14}$$

As before, wages are determined by Nash-bargaining, but now the firm's surplus is lower and the condition modified:

$$\beta(J^A(x) - V) = (1 - \beta)(W(x) - (U + u(T))).$$

Wages are now,

$$(1 - \beta)u(w^A) + \beta w^A = \beta(x + \theta^A C) + (1 - \beta)(\theta^A q(\theta^A) + r)u(T) - \beta(\lambda G(\tilde{x}^A) + r)T.$$

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<sup>14</sup>The main similarities and differences between SPSA and traditional UI systems can be seen in the context of the model. Under traditional UI systems firms contribute  $wt$ , where  $t$  will be a function of past separations of the firm. However, the amount received by the worker upon separation will be  $\frac{\pi wt}{\max[\theta q(\theta), (\frac{1}{\bar{x}})]}$ , where  $\pi$  is a fraction of total contributions indicating the incomplete experience-rating and  $\bar{x}$  is the maximum length of the unemployment spell for which the worker is entitled to UI.

These wages are lower than under the standard severance payment system because now workers are willing to pay for part of the severance payments costs in the form of lower wages. There are a number of reasons why workers are willing to accept lower wages when there are severance payments savings accounts. First, workers will receive the present discounted value of the foregone wages in the future because the interest rate on the savings accrues to them. Second, under the traditional system firms only pay severance when there is a separation and the firm has not declared bankruptcy, but under the system of SPSAs the firm pays no matter what.

The wage equation above also shows that the more risk-averse or more imperfectly insured workers are, the larger the wage cut they will be willing to take when SPSAs are introduced. This is because, although the traditional system is better at insuring against idiosyncratic shocks, it leaves workers completely unprotected against firm bankruptcy. In contrast, the system of SPSAs is better at insuring against firm-level shocks (e.g., firm bankruptcy), but does not leave workers without protection against idiosyncratic shocks. Consequently, risk-averse workers are willing to pay the actuarially fair insurance premium (implicitly through lower wages) to insure against firm-level shocks when SPSAs are introduced.

Figures 2.a and 2.b show the impact of SPSAs on employment. The introduction of SPSAs, like a reduction in severance payments, shifts the JC and JD curves to the right. The introduction of SPSAs thus generates similar effects to a reduction in severance payments: an increase in job destruction rates, but ambiguous effects on job creation rates and unemployment.

To summarize, the analysis shows that the introduction of SPSAs facilitates the shift of severance payments to workers in the form of lower wages and that higher degrees of risk-aversion make possible larger wage cuts. Moreover, while the switch from the traditional system to the system of SPSAs essentially turns employer insurance into self-insurance, both systems play a consumption smoothing role. However, the results show that SPSAs have ambiguous effects on employment and unemployment. In addition, although the reduction in the fixed costs of employment should reduce hours of work, the reduction in wages attributable to shifting should increase hours of work.

## 4 Empirical Evidence on the Effects of SPSAs

This section uses data from the Colombian National Household Surveys to evaluate the effects on wages and hours of work of the switch from the traditional system of severance payments to the system of SPSAs introduced in 1990. The Living Standards Measurement Survey then is used to examine the impact of the change on consumption.

### 4.1 The Effects of SPSAs on Wages and Hours of Work

#### 4.1.1 The National Household Surveys

The analysis for wages and hours of work uses data from the June Surveys of the National Household Surveys (NHS) for the years 1988, 1992, and 1996. These data are useful because the NHS covers the periods both before and after the reform, allowing me to exploit the temporal variation in the legislation.

In June, the NHS includes questions about employment in the formal sector (i.e., taxable and covered by regulations) and the informal sector (i.e., not taxed and essentially unregulated). Since employers who comply with one part of labor legislation are likely to comply with all elements of labor legislation, the NHS uses information on whether the employer made social security contributions as a proxy for whether an employee is a formal worker. This variable is then used to identify whether workers were covered by severance pay legislation. The June surveys also include information on tenure which can be used to identify who was hired before and after the reform and to distinguish between workers covered by traditional severance payments and those covered by SPSAs.

To determine the effect of SPSAs on wages, I use the log of real hourly wages as the dependent variable. This variable is constructed by dividing weekly wages in the main job by the average number of hours worked per week, then deflating to 1998 prices using the consumer price indexes by city. The CPIs come from the National Department of Statistics for June of 1988, 1992, and 1996. The controls used in the hourly wage and weekly hours regressions include dummies for sex and marital status; education dummies for primary, secondary, high-school degree, university, and postgraduate ed-

education; potential experience and potential experience squared;<sup>15</sup> tenure and tenure squared; year dummies; a formal or severance pay coverage dummy (constructed as described above); firm size dummies for firms between 2-5 employees, firms between 5-10 employees, and firms with more than 10 employees; and eight industry dummies and six city dummies (the data includes information on the seven largest metropolitan areas in Colombia, i.e., Barranquilla, Bucaramanga, Bogotá, Manizales, Medellín, Cali, and Pasto). Table 1 presents summary statistics of the variables used in the analysis for the three survey years, by severance pay coverage status.

#### 4.1.2 Differences-in-Differences-in-Differences Specification

To examine the effect on hourly wages and weekly hours of the change from the traditional system to a system of SPSAs, the estimation exploits temporal and cross-sectional variation. The temporal variation comes from comparing the pre- and post-1990 periods. The cross-sectional variation comes from two sources: (1) comparing workers covered and not covered by severance pay legislation (i.e., formal and informal sector workers); and (2) comparing those hired before and after 1990 in the formal sector during the post-reform period (i.e., those covered by the traditional severance pay system and those covered by SPSAs). The following regression provides differences-in-differences-in-differences estimates of the effects of switching from the traditional severance pay system to the system of SPSAs:

$$\begin{aligned} \ln Y_{it} = & \alpha + \beta_1 X_{it} + \beta_2 T_i + \beta_3 d_{i92} + \beta_4 d_{i96} + \beta_5 SP_i + \beta_6 T_i * d_{i92} \\ & + \beta_7 T_i * d_{i96} + \beta_8 T_i * SP_i + \beta_9 SP_i * d_{i92} + \beta_{10} SP_i * d_{i96} \\ & + \beta_{11} SP_i * POST90_t * SHORT TENURE_i + \varepsilon_{it}, \end{aligned} \quad (1)$$

where the dependent variable is either the log of hourly wages or the log of weekly hours,  $X_{it}$  is a vector of covariates,  $T_i$  are the tenure variables,  $d_{i92}$  and  $d_{i96}$  are year dummies,  $SP_i$  is a dummy that takes the value of 1 if the person was covered by severance pay legislation either before or after the reform,  $POST90_t$  takes the value of 1 for individuals observed after 1990 and 0 for individuals observed before 1990, and  $SHORT TENURE_i$  is a variable which takes the value of one for those with short tenures (less than

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<sup>15</sup>This experience variable was constructed in the standard way as age minus years of education minus 6.



6 years when comparing 1990 to 1996, and less than 2 years when comparing 1990 to 1992). The tenure variables control for time-invariant differences in wages and hours of work attributable to the effects of firm-specific human capital and other factors ( $\beta_2$ ); the year dummies control for time-series changes in wages and hours of work (e.g., macroeconomic shocks) affecting all workers ( $\beta_3$  and  $\beta_4$ ); and the severance pay dummy controls for any time-invariant factors affecting workers covered by severance pay legislation ( $\beta_5$ ). The second-level interactions control for time-varying effects of tenure ( $\beta_6$  and  $\beta_7$ ), the time-invariant effects of tenure on workers covered by severance pay legislation ( $\beta_8$ ), and the changes over time for workers covered by severance pay legislation whether hired before or after 1991 ( $\beta_9$  and  $\beta_{10}$ ). The third-level interaction ( $\beta_{11}$ ) captures all variation in wages and hours of work specific to treatment workers, hired after 1991 (i.e., observed after 1990 and with less than 2 years of tenure in 1992 and less than six years of tenure in 1996) relative to the controls hired before 1991 (i.e., observed before 1990 or observed after 1990 but with more than 2 years of tenure in 1992 and more than six years of tenure in 1996), and covered by severance pay legislation relative to those not covered by severance pay legislation. These coefficients are the DDD estimates of the effects on wages and hours of work of switching from the traditional severance payments system to the system of SPSAs.

If there was no shifting under the old system, full shifting of the costs of severance payments costs to workers after the introduction of SPSAs would imply a coefficient  $\beta_{11}$  of -0.083; this corresponds to the 8.3% of wages deposited by employers into the individual savings accounts. An insignificant coefficient on the third-level interaction instead would imply that the guaranteed individual savings accounts did not change the incentives for firms and workers to establish voluntary contracts to neutralize government-mandated severance payments. In the hours regression, a negative (positive) coefficient would imply that the reduction in fixed costs was more (less) important than the reduction in variable labor costs, and an insignificant coefficient would indicate that the two effects cancel each other out.

### 4.1.3 Results

Panel A of Table 2 presents the estimates of the third-level interaction,  $\beta_{11}$ , from the wage regression. The first three columns show the results for the entire sample, while columns (4)-(6) present the results for the sample of permanent workers and columns (7)-(9) present the results for the sample

of temporary workers. Column (1) presents results without any controls, except for fixed effects and second-level interactions. These are equivalent to differences-in-differences-in-differences estimates calculated from simple comparisons of means. Columns (2) and (3) show the results of controlling for observables that affect wages. The coefficient for all workers shown in the first row of Column (3) indicates that wages fell 4.2% for workers hired after 1990 and thus covered by SPSAs. This is equivalent to a shift of 50.6% of the total contribution made by employers into the accounts. If there had been no shifting at all under the old system, then this estimate would imply less than full shifting. However, since there could already have been some shifting under the traditional severance payments system, it may be more appropriate to interpret this as additional shifting of severance payments after the introduction of the system of SPSAs. Moreover, if workers value some employer insurance, they may be unwilling to change to a system of self-insurance altogether by accepting full shifting of the severance payments costs.

The next two rows separate the effects in 1992 from those in 1996. While the wages of workers covered by SPSAs are not significantly different from those of workers not covered in 1992, the wages of covered workers were lower than those of uncovered workers by 6.5% in 1996. This is probably because by 1996 enough time had elapsed for employers to hire under the new system. The 1996 results indicate a shift equivalent to 78% of the total contributions made by employers, which is closer to full shifting.<sup>16</sup>

The next six columns present results for the separate samples of permanent and temporary workers. Since temporary workers are not entitled to severance payments, the reform should not have generated shifting for temporary workers. Columns (4)-(6) show consistently negative effects for

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<sup>16</sup>The only other empirical examination on the incidence of severance payments on wages is the work by Bertola (1990). Bertola (1990) uses aggregate data and finds that, contrary to insider-outsider theories, wages are lower in countries with higher severance pay. Related work on the incidence of UI and other payroll taxes and mandated benefits on wages are also broadly consistent with the findings in this section. Anderson and Meyer (1997) find substantial shifting of UI market-level taxes to workers in the form of lower earnings. A subsequent study by Anderson and Meyer (2000), which exploits the introduction of experience rating in Washington state in 1984, finds that UI market-level taxes are largely passed on to workers in the form of lower earnings. Using worker-level data and temporal as well as cross-section variation in firms' costs, Gruber (1994) and Gruber and Krueger (1991) also find that most of the costs of mandated maternity health benefits and workers' compensation are shifted to workers as lower wages.

permanent workers, although less precise than for the entire sample. On the other hand, Columns (7)-(9) show positive or negative but insignificant coefficients for temporary workers.

Panel B in Table 2 shows the effects on weekly hours of the switch from a traditional system of severance payments to a system of SPSAs. As indicated above, the decrease in the fixed cost of employment caused by the change from a one-time payment at separation to a per-period payment should reduce weekly hours. On the contrary, the reduction in hourly wages found in Panel A should increase weekly hours. The estimates for all workers show positive and significant effects of SPSAs on weekly hours, indicating that the later effect dominates. As for wages, the effects are greater in 1996 than in 1992. When the sample is separated, the effects on permanent workers are positive and significant while the effects on temporary workers are not significantly different from zero.

#### Potential Composition Biases

The results in Table 2 may be subject to composition biases. If as the model predicts formal firms are less likely to retain unproductive matches after the reform, then the results in Table 2 may underestimate the shifting generated by SPSAs and may generate a positive bias on hours of work. Kugler (1999) suggests that the reform increased turnover by about 1%, so it is possible that such a downward bias exists. On the other hand, if low skill workers are more likely to be covered by severance pay legislation after the reform because there is more hiring after the reform, the results in Table 2 could overestimate the shifting generated by the introduction of SPSAs and generate a downward bias on weekly hours.

Table 1 suggests that the distribution of observable characteristics changed similarly between the pre- and post-reform periods in the covered and uncovered sectors and the change was towards an improvement in the composition of the workforce in both sectors (e.g., higher education). In addition, the hourly wages of uncovered workers in the upper quarter of the distribution were close to the median hourly wage of covered workers during the pre-reform period (i.e., 168 pesos versus 157 pesos in 1988 terms), suggesting that the movement of marginal workers from the uncovered to the covered sector is unlikely to account for the observed reduction in wages of newly hired covered workers during the post-reform period. Finally, the weak explanatory power of the observables in a regression of the third-level interaction term suggests that composition biases are unlikely to be very

important.<sup>17</sup> Moreover, the results from this regression indicate that, if anything, more skilled workers are more likely to be hired after the reform in the covered sector, thus suggesting that the results in Table 2 probably underestimate the extent of shifting and generate a positive bias in the hours regression.

## 4.2 SPSAs and Consumption

As discussed above, if severance payments are shifted to workers as lower wages then there are implications in terms of whether insurance is employer or worker provided. The analysis above suggests at least partial shifting of severance payments to workers and indicates that part of the employer insurance under the old system was replaced by self-insurance after the introduction of SPSAs. The empirical analysis that follows examines the consumption smoothing role of severance payments under the old system and under the new system of SPSAs.

### 4.2.1 Living Standards Measurement Survey

Using data from the 1997 Living Standards Measurement Survey (LSMS), I analyze the effects of severance payments on the consumption of those subject to the traditional severance pay system versus those subject to SPSAs. Although the temporal variation in the legislation cannot be exploited to examine the effects on consumption because the LSMS only has been conducted once in Colombia, the data allows comparing workers who received and did not receive severance payments and workers likely to have been hired before and after 1990. The survey does not include information on tenure in the current job, but it does allow for measuring experience and using it as a proxy for whether the worker was hired before or after the reform.

The Colombian LSMS has the benefit of providing a wealth of information on household consumption of necessities and non-necessities. The monthly consumption variable is constructed by adding monthly expenditures on food and beverages at home and away from home, transportation, cleaning, entertainment, clothing, furniture, electronic devices, car services and parts, jewelry, utilities, and rent and mortgage. In addition, the LSMS allows for constructing measures of other forms of insurance including in-kind and non-

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<sup>17</sup>The  $R^2$  in this regression is around 0.1.

etary transfers from relatives and other transfers, such as disability insurance and workers' compensation insurance against work injuries.

In addition to the detailed consumption information, the LSMS also includes information on whether individuals received severance payments. The consumption regressions are estimated for heads of households and include the following controls: dummies for sex and marital status, education, age, number of persons in the household, monthly income of the household, and seven dummies for region.<sup>18</sup> Table 3 presents summary statistics of the various variables by receipt of severance pay.

#### 4.2.2 Consumption Specification: Differences-in-differences

Since the LSMS data is only available for 1997, it is not possible to exploit the temporal variation when analyzing the effect of severance payments on consumption, in contrast to the analysis on wages. The analysis for consumption instead exploits variation in severance payments and variation in coverage by the traditional severance pay system and SPSAs during the post-reform period (i.e., hired before or after 1990). The following consumption regression is estimated for heads of households:

$$C_i = \delta + \varphi_1 Z_i + \varphi_2 E_i + \varphi_3 MSP_i + \varphi_4 MSP_i \times POST90HIRE_i + v_i, \quad (2)$$

where the dependent variable is the monthly consumption level of necessities and non-necessities for a household with head  $i$ ,  $Z_i$  is a vector of household-specific and head-specific covariates,  $E_i$  is potential experience of the head,<sup>19</sup>  $MSP_i$  is monthly severance payments, and  $POST90HIRE_i$  is a dummy that takes the value of 1 if the person entered the labor market (and thus was hired) after 1990 and 0 if the person entered the market prior to 1990.

A test of whether each peso of severance payments is translated one-for-one into consumption (i.e.,  $\varphi_3 = 1$ ), provides evidence on the effectiveness of severance payments as a form of insurance rather than simply as replacement for other forms of insurance. Moreover, a test of whether the marginal propensity to consume out of severance payments is smaller for those hired under the system of SPSAs (i.e.,  $\varphi_4 < 0$ ) is a test of whether the system of SPSAs provides less consumption smoothing than the traditional system of

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<sup>18</sup>These controls are very similar to those included in other analyses of consumption (e.g., Gruber, 1997, 1998; Hamermesh, 1982).

<sup>19</sup>The experience variable is constructed as current age minus the age at which the first job was held.

severance payments. These regressions are run both for the sample of non-employed heads and for the sample of employed heads alone. The regressions on the sample of non-employed heads allow for assessing whether increasing severance payments to a non-employed head relative to another increases his relative consumption (i.e.,  $\varphi_3 > 0$ ). This is in the spirit of the analysis by Gruber (1997, 1998), who examines the consumption smoothing benefits of unemployment insurance.<sup>20</sup>

### 4.2.3 Do SPSAs Smooth Consumption?

The results of estimating equation (2) are presented in Table 4. Panel A presents the results for the sample of non-employed heads. Panel B shows the results for the sample of employed heads only. An increase of 1,000 pesos in severance payments increases consumption by about 240 pesos. The interaction with the post-1990 hire dummy indicates that severance payments deposited into savings accounts do not provide more or less insurance for non-employed heads than the traditional system of severance payments. However, the results in Panel B suggest that there is less consumption among employed heads covered by SPSAs. This indicates that SPSAs essentially turn employer insurance into self-insurance by generating forced savings from lower consumption during employment and by increasing consumption during periods of non-employment.

The rest of Table 4 presents similar results for different measures of consumption, including food at home, food away from home, entertainment, clothing, housing services, housing durables, utilities, and mortgage and rent payments. The consumption smoothing effect of severance payments is

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<sup>20</sup>The main difference between this analysis and Gruber’s is that, since there are no household panel data sets for Colombia, this analysis relies on a cross-section and examines the effect of severance payments on the consumption levels of the non-employed. Further, Gruber uses as a regressor unemployment insurance replacement rate eligibility rather than actual UI benefits received to avoid the problem of potential endogeneity of UI receipts. The present analysis instead uses variation in severance payments received, which is driven by employment in the formal or informal sector, by type of worker (i.e., family worker, self-employed, domestic worker, or wage earner), by type of contract (i.e., permanent or temporary), and by differences in previous earnings levels. Since higher wage earners and higher income individuals are likely to save more and to suffer a smaller consumption drop during non-employment, there could be upward biases in the estimates of  $\varphi_3$  and  $\varphi_4$ . The analysis here, however, controls for household income (including, earnings) in the consumption regressions and this should mitigate these upward biases.

greater for necessities (i.e., food at home, utilities, and housing services) than for non-necessities (i.e., food away from home, entertainment, clothing, and housing durables).<sup>21</sup> Also, as with total consumption, consumption of both necessities and non-necessities drops during employment and rises during non-employment after the introduction of SPSAs. This indicates that employed workers self-insure by saving for non-employment.

The results in Table 4 indicate that each additional peso of severance payments translates much less than one-for-one into consumption. So, severance payments may be crowding out other forms of insurance against non-employment. Table 5 presents evidence on the effects of severance payments on in-kind and monetary transfers from relatives, on other government-mandated transfers (such as disability insurance and workers' compensation insurance against work injuries), and on wealth flows (including interest payments on loans, savings accounts, and treasury bonds; dividends on stocks; and income flows from lease or sale of property).

In-kind transfers from relatives appear to be crowded out for non-employed heads by severance payments deposited into savings accounts. In particular, an increase of 1,000 pesos in severance payments reduces the value of in-kind transfers by 43 pesos. Moreover, the results suggest that monetary transfers from relatives are crowded out by severance payments during non-employment, specially after SPSAs are introduced. While an increase of 1,000 pesos in severance payments provided by the employer reduces transfers from relatives by 18 pesos, the same increase in severance payments provided by forced savings reduces transfers from relatives by about 685 pesos. There is also evidence for employed workers after the reform of crowding out of other government-mandated transfers. This may reflect more policing by employers in the provision of other benefits when they cannot avoid paying severance by declaring bankruptcy or because of economic difficulties. Finally, there is no evidence of crowding out of wealth flows.<sup>22</sup> At the mean levels of transfers and severance pay in our sample, these findings are suggestive of substantial crowding out of family and other transfers by severance payments.<sup>23</sup>

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<sup>21</sup>This is consistent with Gruber's (1998) evidence using the PSID, who finds that UI plays a greater role in smoothing consumption of necessities than of non-necessities.

<sup>22</sup>The data, however, does not allow to measure wealth stocks and to examine the effect of severance payments on wealth.

<sup>23</sup>The apparent crowdout of transfers from relatives and other government-mandated transfers contrasts with the findings in Gruber (1998) showing no crowdout of these types

## 5 Conclusion

This paper assesses the impact of the introduction of a system of severance payments savings accounts (SPSAs) in Colombia after the 1990 Labor Market Reform. A similar system of unemployment insurance savings accounts has been proposed by Feldstein and Altman (1998) and Hopenhayn (2000) to reduce the distortionary effects of unemployment insurance benefits. However, even though savings accounts systems have less distortionary effects on the labor market, they substitute employer insurance with self-insurance.

The Colombian case offers a unique opportunity to study the labor market consequences of savings accounts. The paper first theoretically examines whether the introduction of guaranteed savings accounts allow private transfers from workers to firms to neutralize government-mandated severance payments. The theory suggests that, in contrast to the traditional severance pay system, the system of SPSAs facilitates shifting the costs of severance payments to workers in the form of lower wages, reducing distortion in the labor market. The analysis also shows that the more workers require insurance or the more risk-averse they are the larger is the effect of SPSAs on shifting.

Next, the paper turns to an empirical examination of the effects on wages of the introduction of SPSAs in Colombia. Do SPSAs allow firms to shift part of the severance payments to workers as lower wages? The results suggest that the introduction of SPSAs shifted around 80% of firms' contributions into the accounts towards workers as lower wages. This shifting of severance payments towards workers should have reduced costs for employers as well as employment distortions. The results show an increase in hours of work after the introduction of SPSAs for those workers affected by the reform.

The analysis of wages indicates at least partial shifting of severance payments to workers and suggests that employer insurance was replaced partly by self-insurance after the introduction of SPSAs. While employer insurance is better than self-insurance when workers face idiosyncratic shocks – because it allows for pooling risk across workers who do and do not separate from their jobs –, self-insurance is clearly an improvement when the shocks occur at the level of the pooling universe (for example, firm bankruptcy).

The evidence on the effects of the system of SPSAs on consumption indicates that an increase of 1,000 pesos in severance payments raises con-

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of transfers by UI.



sumption expenditures by 240 pesos during periods of non-employment, both before and after the introduction of SPSAs. Moreover, the reduction in consumption during periods of employment, and the increase in consumption during periods of non-employment for those hired after the reform, suggests that by inducing forced savings the system of SPSAs continues to play a consumption smoothing role. The results also suggest, though, that each additional peso of severance payments translates into much less than one peso of increased consumption; this suggests a crowding out of other forms of insurance. Severance payments indeed appear to crowd out other sources of insurance, in particular, in-kind and monetary transfers from relatives and other government-mandated transfers.

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## Appendix

Derivation of Wage Equation under Traditional System of Severance Payments:

First, simplify the value of a filled job and an employed worker to substitute into the Nash-bargaining condition. Substituting the free-entry condition into the value of a vacancy, I can solve for the expected value of a filled job,

$$E_x J(x) = \frac{C}{q(\theta)},$$

and substituting this into the value of a filled job,

$$J(x) = \frac{x - w + \frac{\lambda C}{q(\theta)}}{(r + \lambda)}.$$

Using the Bellman equation for an employed worker,

$$W(x) = \frac{u(w) + \lambda E_x W(x)}{(r + \lambda)}.$$

Substituting  $J(x)$  and  $W(x)$  into the Nash-bargaining condition,

$$\begin{aligned} (1 - \beta) u(w) + \beta w &= \beta x + \frac{\beta \lambda C}{q(\theta)} - (1 - \beta) \lambda [E_x W(x) - U] \\ &\quad + (1 - \beta) r U + (r + \lambda) [(1 - \beta) u(T) + \beta T]. \end{aligned}$$

To get  $[E_x W(x) - U]$  integrate the Nash-bargaining condition over all values of  $x$  and substitute  $E_x J(x)$  from above,

$$[E_x W(x) - U] = \frac{\left[ \frac{\beta C}{q(\theta)} + (1 - \beta) u(T) + \beta T \right]}{(1 - \beta)}.$$

Then to get  $U$  substitute  $[E_x W(x) - U]$  into the Bellman equation of the unemployed,

$$U = \frac{\theta q(\theta) \left[ \frac{\beta C}{q(\theta)} + (1 - \beta) u(T) + \beta T \right]}{r(1 - \beta)}.$$

Now,  $[E_x W(x) - U]$  and  $U$  can be substituted into the wage equation above simplifying to the following expression,

$$(1 - \beta) u(w) + \beta w = \beta (x + \theta C) + (\theta q(\theta) + r) [(1 - \beta) u(T) + \beta T].$$

Derivation of JD Curve under a Traditional System of Severance Payments:

After shocks are realized and wages set, the firm and worker decide to separate if their joint surplus becomes negative, i.e., if the match-specific productivity falls below a critical value  $\tilde{x}$ . Consequently, the job destruction (JD) condition is given by the following separation rule:

$$(J(\tilde{x}) - (V - T)) + (W(\tilde{x}) - (U + u(T))) = 0.$$

Substituting the Nash-bargaining into the separation rule,

$$\begin{aligned} J(\tilde{x}) &= -T, \\ \frac{\tilde{x} - w(\tilde{x}) + \frac{\lambda C}{q(\theta)}}{(r + \lambda)} &= -T. \end{aligned}$$

Then, substituting for the wage the JD relation in  $(x, \theta)$  space is given by,

$$\left[ \frac{\lambda}{q(\theta)} - \theta \right] \beta C - (\theta q(\theta) + r) (1 - \beta) u(T) + (\lambda - \theta q(\theta)) \beta T + (1 - \beta) u(w) = 0.$$

The slope of the JD curve is obtained by totally differentiating the above condition with respect to  $\tilde{x}$ ,

$$\left[ \frac{\lambda q'(\theta)}{q(\theta)^2} + 1 \right] \beta C \frac{d\theta}{d\tilde{x}} + (q(\theta) + \theta q'(\theta)) [(1 - \beta) u(T) + \beta T] \frac{d\theta}{d\tilde{x}} = (1 - \beta) u'(w) \frac{dw}{d\tilde{x}}.$$

Taking the derivative of the wage equation with respect to  $\tilde{x}$ ,

$$\frac{dw}{d\tilde{x}} = \frac{\left(1 + C \frac{d\theta}{dx}\right) \beta + (q(\theta) + \theta q'(\theta)) [(1 - \beta) u(T) + \beta T] \frac{d\theta}{dx}}{[(1 - \beta) u'(w) + \beta]}.$$

Substituting  $\frac{dw}{dx}$  and solving for  $\frac{d\theta}{dx}$ ,

$$\frac{d\theta}{d\tilde{x}} = \frac{(1 - \beta) u'(w)}{\left[ (\theta q(\theta) + r) ((1 - \beta) u(T) + \beta T) + \beta C + \frac{\lambda C ((1 - \beta) u^0(w) + \beta) q^0(\theta)}{q(\theta)^2} \right]} > 0.$$

So, the JD curve has a positive slope.

To show that a decrease in  $T$  shifts the JD curve to the right, totally differentiate the JD condition above with respect to  $T$  holding  $\theta$  constant,

$$- (\theta q(\theta) + r) ((1 - \beta) u'(T) + (\lambda - \theta q(\theta)) \beta) + (1 - \beta) u'(w) \frac{dw}{dT} = 0.$$

Then, differentiating the wage equation with respect to  $T$ ,

$$\frac{dw}{dT} = \frac{\left[ \beta \frac{d\tilde{x}}{dT} + (\theta q(\theta) + r) ((1 - \beta) u'(T) + \beta) \right]}{((1 - \beta) u'(w) + \beta)},$$

and substituting,

$$\frac{d\tilde{x}}{dT} = - \frac{(\theta q(\theta) + r) u'(T) + (r + \lambda) u'(w)}{u'(w)} < 0.$$

Derivation of JC Curve under a Traditional System of Severance Payments:

Using the free-entry condition,

$$E_x J(x) = \frac{C}{q(\theta)},$$

and substituting for  $E_x J(x)$ ,

$$\int_{\tilde{x}}^{\bar{x}} \left[ \frac{x - w + \frac{\lambda C}{q(\theta)}}{(r + \lambda)} \right] g(x) dx = \frac{C}{q(\theta)} + \xi G(\tilde{x}) T.$$

This condition determines the JC relation in  $(x, \theta)$  space.



The slope of the JC curve is obtained by totally differentiating the above condition with respect to  $\tilde{x}$ ,

$$-(1 - \xi) Tg(\tilde{x}) - \frac{(1 - G(\tilde{x}))}{(r + \lambda)} \frac{dw}{d\tilde{x}} - \frac{rCq'(\theta)}{(r + \lambda)q(\theta)^2} \frac{d\theta}{d\tilde{x}} = 0,$$

Substituting  $\frac{dw}{d\tilde{x}}$  from above and solving for  $\frac{d\theta}{d\tilde{x}}$ :

$$\frac{d\theta}{d\tilde{x}} = \frac{-(1 - \xi) Tg(\tilde{x}) - \frac{\beta(1 - G(\tilde{x}))}{(r + \lambda)((1 - \beta)u^0(w) + \beta)}}{D_1} < 0,$$

where  $D_1 = \frac{[(1 - G(\tilde{x}))q(\theta)^2\beta C + (q(\theta) + \theta q^0(\theta))((1 - \beta)u(T) + \beta T) + ((1 - \beta)u^0(w) + \beta)rCq^0(\theta)]}{(r + \lambda)((1 - \beta)u^0(w) + \beta)q(\theta)^2}$ .  
The JC curve is thus always downward sloping.

To show that a decrease in  $T$  shifts the JD curve to the right, totally differentiate the JD condition above with respect to  $T$ , holding  $\theta$  constant,

$$-(1 - \xi) Tg(\tilde{x}) \frac{d\tilde{x}}{dT} - \frac{(1 - G(\tilde{x}))}{(r + \lambda)} \frac{dw}{dT} = \xi G(\tilde{x}).$$

Substituting  $\frac{dw}{dT}$  and solving for  $\frac{d\tilde{x}}{dT}$ ,

$$\frac{d\tilde{x}}{dT} = - \frac{\xi G(\tilde{x}) + \frac{(1 - G(\tilde{x}))(\theta q(\theta) + r)((1 - \beta)u^0(T) + \beta)}{(r + \lambda)((1 - \beta)u^0(w) + \beta)}}{D_2},$$

where  $D_2 = \left[ (1 - \xi) Tg(\tilde{x}) + \frac{(1 - G(\tilde{x}))\beta}{(r + \lambda)((1 - \beta)u^0(w) + \beta)} \right]$ .

Figure 1.a shows the job destruction and job creation curves in  $(x, \theta)$  space. Figure 1.b shows the job creation curves and the Beveridge curves (BC) in  $(u, v)$  space, where the Beveridge curve is obtained from the following steady state condition:

$$\lambda G(\tilde{x}) (1 - u) = \theta q(\theta) u.$$

Derivation of Wage Equation under SPSA's System:

First, simplify the value of a filled job and an employed worker to substitute into the Nash-bargaining condition. Substituting the free-entry condition into the value of a vacancy, I can solve for the expected value of a filled job,

$$E_x J(x) = \frac{C}{q(\theta)},$$

and substituting this into the value of a filled job,

$$J(x) = \frac{x - w(1 + t) + \frac{\lambda C}{q(\theta)}}{(r + \lambda)}.$$

Using the Bellman equation for an employed worker,

$$W(x) = \frac{u(w) + \lambda E_x W(x)}{(r + \lambda)}.$$

Substituting  $J(x)$  and  $W(x)$  into the Nash-bargaining condition,

$$\begin{aligned} (1 - \beta) u(w) + \beta w(1 + t) &= \beta x + \frac{\beta \lambda C}{q(\theta)} - (1 - \beta) \lambda [E_x W(x) - U] \\ &\quad + (1 - \beta) rU + (r + \lambda) (1 - \beta) u(T). \end{aligned}$$

To get  $[E_x W(x) - U]$  integrate the Nash-bargaining condition over all values of  $x$  and substitute  $E_x J(x)$  from above,

$$[E_x W(x) - U] = \frac{\left[ \frac{\beta C}{q(\theta)} + (1 - \beta) u(T) \right]}{(1 - \beta)}.$$

Then to get  $U$  substitute  $[E_x W(x) - U]$  into the Bellman equation of the unemployed,

$$U = \frac{\theta q(\theta) \left[ \frac{\beta C}{q(\theta)} + (1 - \beta) u(T) \right]}{r(1 - \beta)}.$$

Now,  $[E_x W(x) - U]$ ,  $U$ , and  $w$  can be substituted into the wage equation above simplifying to the following expression,

$$(1 - \beta) u(w) + \beta w = \beta (x + \theta C) + (\theta q(\theta) + r) (1 - \beta) u(T) - \beta (\lambda G(\tilde{x}) + r) T.$$

Derivation of JD Curve under SPSA's System:

After shocks are realized and wages set, the firm and worker decide to separate if their joint surplus becomes negative, i.e., if the match-specific productivity falls below a critical value  $\tilde{x}$ . Consequently, the job destruction (JD) condition is given by the following separation rule:

$$(J(\tilde{x}) - V) + (W(\tilde{x}) - (U + u(T))) = 0.$$

Substituting the Nash-bargaining into the separation rule,

$$\begin{aligned} J(\tilde{x}) &= 0, \\ \frac{\tilde{x} - w(\tilde{x}) + \frac{\lambda C}{q(\theta)}}{(r + \lambda)} &= 0. \end{aligned}$$

Then, substituting for the wage the JD relation in  $(x, \theta)$  space is given by,

$$\left[ \frac{\lambda}{q(\theta)} - \theta \right] \beta C - (\theta q(\theta) + r) (1 - \beta) u(T) + (\lambda G(\tilde{x}) + r) \beta T + (1 - \beta) u(w) = 0.$$

The JD curve under SPSAs is to the right of the JD curve under the traditional system of severance payments, because the third term is bigger, thus requiring a higher  $\theta$  to satisfy the condition. The slope of the JD curve is obtained by totally differentiating the above condition with respect to  $\tilde{x}$ ,

$$\left[ \frac{\lambda q'(\theta)}{q(\theta)^2} + 1 \right] \beta C \frac{d\theta}{d\tilde{x}} + (q(\theta) + \theta q'(\theta)) (1 - \beta) u(T) \frac{d\theta}{d\tilde{x}} = (1 - \beta) u'(w) \frac{dw}{d\tilde{x}} + \lambda g(\tilde{x}) \beta T.$$

Taking the derivative of the wage equation with respect to  $\tilde{x}$ ,

$$\frac{dw}{d\tilde{x}} = \frac{\left(1 + C \frac{d\theta}{d\tilde{x}}\right) \beta + (q(\theta) + \theta q'(\theta)) (1 - \beta) u(T) \frac{d\theta}{d\tilde{x}} - \lambda g(\tilde{x}) \beta T}{[(1 - \beta) u'(w) + \beta]}.$$

Substituting  $\frac{dw}{d\tilde{x}}$  and solving for  $\frac{d\theta}{d\tilde{x}}$ ,

$$\frac{d\theta}{d\tilde{x}} = \frac{(1 - \beta) u'(w) + \lambda g(\tilde{x}) \beta T}{\left[ (\theta + \theta q'(\theta)) ((1 - \beta) u(T) + \beta C + \frac{\lambda C ((1 - \beta) u'(w) + \beta) q'(\theta)}{q(\theta)^2}) \right]} > 0.$$

So, the JD curve has a positive slope.

Derivation of JC Curve under SPSA's System:

Using the free-entry condition,

$$E_x J(x) = \frac{C}{q(\theta)},$$

and substituting for  $E_x J(x)$ ,

$$\int_{\tilde{x}}^{\bar{x}} \left[ \frac{x - w + \frac{\lambda C}{q(\theta)}}{(r + \lambda)} \right] g(x) dx = \frac{C}{q(\theta)}.$$

This condition determines the JC relation in  $(x, \theta)$  space. The JC curve with SPSAs is to the right of the JC curve under the traditional system of severance payments, because the right hand side of the equation is lower thus requiring a higher  $\theta$  to satisfy the condition.

The slope of the JC curve is obtained by totally differentiating the above condition with respect to  $\tilde{x}$ ,

$$- \left( x - w + \frac{\lambda C}{q(\theta)} \right) g(\tilde{x}) - (1 - G(\tilde{x})) \frac{dw}{d\tilde{x}} + \frac{Cq'(\theta) (\lambda G(\tilde{x}) + r)}{q(\theta)^2} \frac{d\theta}{d\tilde{x}} = 0,$$

Substituting  $\frac{dw}{d\tilde{x}}$  from above and solving for  $\frac{d\theta}{d\tilde{x}}$ :

$$\frac{d\theta}{d\tilde{x}} = \frac{\beta (1 - G(\tilde{x})) (1 - \lambda g(\tilde{x})T)}{D_A} < 0,$$

where  $D_A = (1 - G(\tilde{x})) (q(\theta) + \theta q'(\theta)) (1 - \beta) u(T) + \beta C (1 - G(\tilde{x})) - \frac{((1-\beta)u^0(w)+\beta)(\lambda G(\tilde{x})+r)Cq^0(\theta)}{(r+\lambda)q(\theta)^2}$ . The slope of the JC curve is ambiguous, but it decreases with  $T$ . Thus, the JC curve with SPSAs is downward sloping for high values of  $T$ .

Figure 2.a shows the job destruction and job creation curves in  $(x, \theta)$  space. Figure 2.b shows the job creation curves and the Beveridge curves (BC) in  $(u, v)$  space, where the Beveridge curve is given by the following steady state condition:

$$\lambda G(\tilde{x}^A) (1 - u) = \theta^A q(\theta^A) u.$$

Figure 1.a: Effects of Reduction in SPs on JC and JD Curves

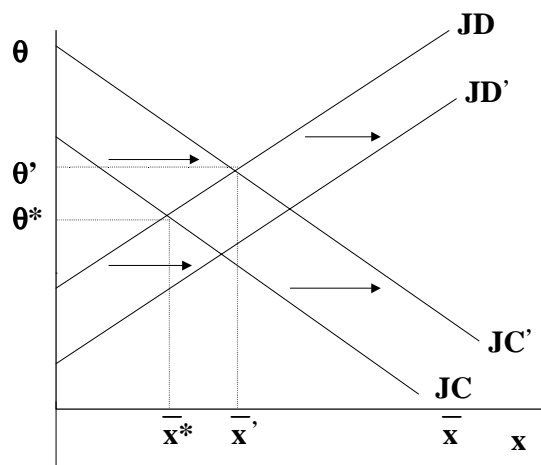


Figure 1.b: Effects of Reduction in SPs on Stocks of Vacancies and Unemployed

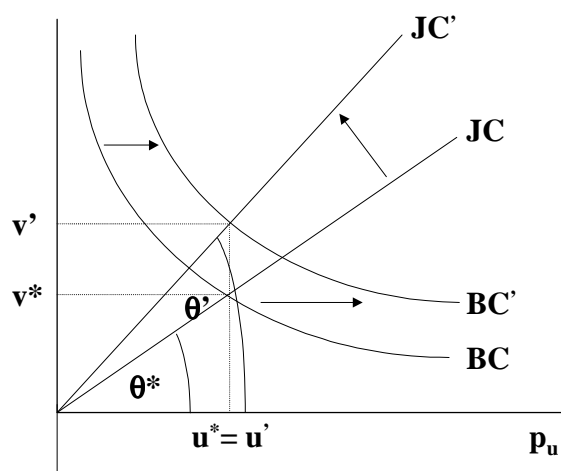


Figure 2.a: JC and JD Curves under SPSAs

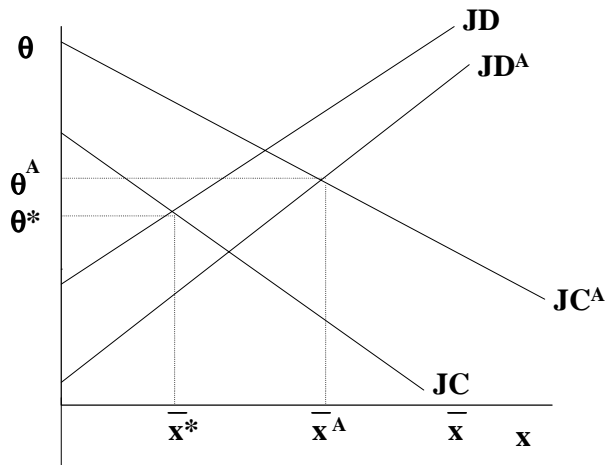
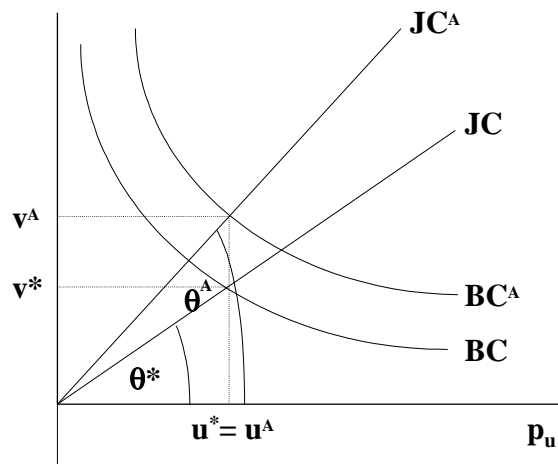


Figure 2.b: Effects of SPSAs on Vacancies and Unemployment



**Table 1: Descriptive Statistics, NHS Data**

Variable	1988		1992		1996	
	Covered by SP	Not covered by SP	Covered by SP	Not Covered By SP	Covered by SP	Not covered by SP
Real Hourly Wage	2,580.01 (3,898.44)	1,663.05 (2,795.95)	2,576.88 (3,389.69)	1,602.71 (2,521.63)	2,970.49 (6,020.07)	1,859.16 (5,614.86)
Weekly Hours	49.33 (11.92)	50.68 (17.12)	49.77 (12.53)	50.13 (18.32)	49.52 (12.86)	49.45 (18.22)
Tenure	5.61 (6.15)	4.52 (6.34)	5.34 (5.73)	4.4 (6.09)	5.32 (6.47)	4.69 (6.82)
% Men	68.7	69.6	66.63	67.19	63.3	67.95
% Married	69.9	68.0	73.06	71.37	73.0	73.0
Education	8.97 (4.29)	6.1 (3.69)	9.59 (4.21)	6.53 (3.72)	9.89 (4.15)	6.82 (3.8)
Experience	20.57 (12.71)	23.92 (14.98)	20.0 (11.9)	23.74 (14.48)	20.24 (12.07)	24.05 (14.44)
% Permanent Employees	90.74	77.64	89.77	75.25	88.17	73.71
% Self-employed	4.7	42.05	5.62	41.55	9.43	44.23
% Firm Size 2-5 Employees	11.06	35.73	11.17	35.0	13.14	31.76
% Firm Size 6-10 Employees	9.45	10.0	8.36	8.89	8.52	8.34
% Firm Size > 10 Employees	74.79	12.21	74.84	14.58	68.91	15.67
N	7,756	8,279	7,264	7,096	7,848	6,057

Notes: The table reports means and percentages. Standard deviations are in parentheses. See text for definitions of workers covered and not covered by severance payments.

**Table 2: Effects of SPSAs on Hourly Wages and Weekly Hours,  
Differences-in-differences-in-differences Estimates**

	All Workers			Permanent			Temporary		
Third-level Interaction with SP and Short Tenure	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A. Wage / Hour									
Post-1990	-0.064 (0.045)	-0.035 (0.038)	-0.042 (0.037)	-0.041 (0.048)	-0.012 (0.04)	-0.019 (0.04)	-0.004 (0.209)	0.036 (0.178)	0.010 (0.176)
1992	-0.027 (0.041)	-0.034 (0.035)	-0.032 (0.034)	-0.005 (0.046)	-0.036 (0.038)	-0.035 (0.038)	0.096 (0.124)	0.154 (0.109)	0.132 (0.108)
1996	-0.096 (0.055)	-0.051 (0.046)	-0.065 (0.046)	-0.088 (0.059)	-0.042 (0.05)	-0.054 (0.049)	-0.029 (0.238)	0.039 (0.192)	-0.003 (0.188)
B. Weekly Hours									
Post-1990	0.034 (0.019)	0.03 (0.018)	0.031 (0.018)	0.021 (0.018)	0.019 (0.018)	0.019 (0.018)	-0.011 (0.103)	0.006 (0.101)	0.009 (0.099)
1992	0.006 (0.019)	0.007 (0.018)	0.01 (0.018)	-0.013 (0.019)	-0.01 (0.018)	-0.009 (0.018)	-0.049 (0.071)	-0.016 (0.067)	-0.021 (0.066)
1996	0.062 (0.022)	0.055 (0.218)	0.055 (0.022)	0.051 (0.022)	0.046 (0.021)	0.046 (0.021)	0.036 (0.11)	0.036 (0.107)	0.044 (0.105)
Other Covariates	NO	YES	YES	NO	YES	YES	NO	YES	YES
City Dummies	NO	NO	YES	NO	NO	YES	NO	NO	YES
Industry Dummies	NO	NO	YES	NO	NO	YES	NO	NO	YES

Notes: The table reports the coefficient on the third-level interaction in equation (1). The rows labeled Post-1990 report results of specifications including third-level interactions with a Post-1990 dummy which takes the value of one if the individual is observed in 1992 or 1996 and zero otherwise. The rows labeled 1992 and 1996 report results of specifications including third-level interactions with separate 1992 and 1996 dummies. All regressions include main effects and second order interactions. The additional covariates in Columns (2), (3), (5), (6), (8) and (9) include: dummies for sex and marital status, education, experience and experience squared, firm size dummies for firms with 2-5 employees, 6-10 employees, and more than 10 employees, and a permanent dummy for the pooled specification. Robust standard errors are in parentheses.



**Table 3: Descriptive Statistics, LSMS Data**

Variable	Received SP	Did Not Receive SP
Monthly Consumption	317,004.2 (351,138.2)	187,267.5 (356,938.8)
Monthly Food Consumption at Home	129,780.2 (151,318.8)	66,461.16 (109,115.2)
Monthly Consumption in Food Away from Home & Entertain.	8,859.75 (34,220.8)	5,015.03 (35,962.03)
Monthly Consumption in Clothes	8,930.79 (21,948.53)	2,991.46 (16,069.77)
Monthly Expenditures in Housing Services	25,470.24 (123,513.7)	16,106.14 (113,352.5)
Monthly Expenditures in Housing Durables	4,163.31 (27,286.25)	3,600.18 (74,282.71)
Monthly Expenditures in Utilities	49,354.54 (68,297.18)	41,904.91 (82,997.22)
Monthly Expenditures in Mortgage Payments & Rent	90,445.39 (174,853.6)	51,188.64 (148,905.4)
Monthly Income	747,778.7 (1,511,827.0)	304,775.1 (855,581.9)
Monthly Severance Payments	174,261.7 (559,768.1)	–
In-kind Transfers from Relatives	1,146.63 (6,680.18)	1,524.7 (9,798.27)
Monetary Transfers from Relatives	93,15.28 (356,628.67)	14,479.1 (70,193.27)
Other Government Mandated Transfers	17,719.91 (171,334.3)	44,690.62 (210,156.2)
Wealth Flows	73,211.6 (356,628.6)	64,963.54 (774,535.3)
% Men	68.72	62.37
% Married	72.26	81.5
Potential Experience	21.08 (11.22)	33.25 (17.67)
Age	37.98 (10.69)	50.28 (17.32)
Education	5.84 (3.45)	4.45 (3.38)
Number of Household Members	2.49 (1.93)	2.2 (2.02)
N	1,347	20,546

Notes: The table reports means and percentages. Standard deviations are in parentheses.

**Table 4: Effects of SPSAs on Consumption Expenditures,  
Employed and Non-employed Heads**

Dependent Variable	(1) Total	(2) Food at Home	(3) Food Away & Entertain.	(4) Clothing	(5) Housing Services	(6) Housing Durables	(7) Utilities	(8) Mortgage & Rent
A. Non-employed Heads								
Monthly SP	0.238 (0.081)	0.107 (0.024)	0.026 (0.017)	0.004 (0.003)	0.01 (0.014)	-0.001 (0.001)	0.081 (0.039)	0.011 (0.012)
Monthly SP x Post-90 Hire	1.443 (1.107)	1.161 (0.552)	-0.042 (0.032)	-0.01 (0.016)	0.263 (0.137)	-0.005 (0.012)	0.097 (0.276)	-0.021 (0.493)
B. Employed Heads								
Monthly SP	0.034 (0.026)	0.028 (0.008)	0.0 (0.001)	0.002 (0.001)	0.044 (0.017)	0.0 (0.001)	-0.003 (0.003)	-0.037 (0.008)
Monthly SP x Post-90 Hire	-0.127 (0.032)	-0.137 (0.013)	-0.009 (0.005)	-0.004 (0.004)	-0.036 (0.02)	-0.007 (0.003)	-0.003 (0.006)	0.069 (0.018)

Notes: The table reports the coefficients on monthly severance payments in monthly severance payments interacted with a post-1990 hired dummy (as specified in equation (2) in the text). Dependent variables are: total monthly consumption expenditures in column (1), monthly food expenditures at home in column (2), monthly expenditures in food away from home end entertainment in column (3), monthly clothing expenditures in column (4), monthly expenditures housing services in column (5), monthly expenditures in housing durables in column (6), expenditures in utilities in column (7), and expenditures in mortgage payments and rent in column (8). All regressions include: dummies for sex and marital status, education, age, experience, number of household members, monthly household income, and a post-1990 hired dummy. Panel A presents estimates for non-employed heads and Panel B presents estimates for employed heads. Robust standard errors are in parentheses.

**Table 5: Effects of SPSAs on Other Forms of Insurance,  
Employed and Non-employed Heads**

Dependent Variable	(1) In-kind Transfers from Relatives	(2) Monetary Transfers from Relatives	(3) Other Govt.- Mandated Transfers	(4) Wealth Flows
A. Non-employed Heads				
Monthly SP	0.0 (0.001)	-0.018 (0.005)	0.103 (0.092)	0.018 (0.053)
Monthly SP x Post-90 Hire	-0.043 (0.017)	-0.685 (0.273)	-1.622 (0.711)	-2.024 (1.846)
B. Employed Heads				
Monthly SP	0.0 (0.0)	0.0 (0.0)	0.012 (0.012)	-0.007 (0.015)
Monthly SP x Post-90 Hire	0.0 (0.0)	0.0 (0.002)	-0.011 (0.012)	-0.019 (0.018)

Notes: The table reports the coefficients on monthly severance payments and on monthly severance payments interacted with a post-1990 hired dummy (as specified in equation (2) in the text). Dependent variables are: monthly in-kind transfers from relatives in column (1), monthly monetary transfers from relatives in column (2), other monthly government-mandated transfers (i.e., disability insurance, and workers' compensation insurance against work injuries) in column (3), and wealth flows (i.e., interest on loans, savings accounts, or treasury bonds; dividends on stocks; income received from lease or sale of property) in column (4). All regressions include: dummies for sex and marital status, education, age, experience, number of household members, monthly household income, and a post 1990 hired dummy. Panel A presents estimates for non-employed heads and Panel B presents estimates for employed heads. Robust standard errors are in parentheses.

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