# Pension Coverage, Private Saving Decisions and Mandatory Contributions in Chile

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**Abstract**

Twenty-seven years after switching to a fully-funded privately-managed pension system, Chilean lawmakers are concerned that only 58% of the labor force made contributions in 2000.

I develop a dynamic model of the joint husband and wife labor and saving decisions to study whether mandatory contributions affects incentives to choose self-insurance over social insurance. Households face a dual labor market with a covered sector, subject to pension contributions, and an uncovered sector of self-employment and informal jobs. I calibrate the model to a representative sample of Chilean married couples using linked administrative and self-reported panel data on accepted wages, labor sector choices and savings.

The model is used to quantify the elasticity of pension coverage to the contribution rate. I find that the sensitivity of pension coverage is low for rates below 12.5% and significant thereafter.

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# 1 Introduction

This paper analyzes the choice of Chilean workers to participate in the pension system or provide for their own retirement. Chilean policy makers have expressed concerns over the pension program's low coverage rates. In 2000, only 64% of the employed (58.4% of the labor force) were contributing to the system (Arenas de Mesa et al. (2004)). However, salaried workers are mandated by law to contribute 10% of their wages in the system, and about 90% do. The low coverage comes from the dual nature of the labor market. Alongside the covered, salaried jobs, there is a large sector of informal and self employed workers - about 25% of the total number of jobs - that do not have to contribute to the pension system and, in practice, seldom do (Arenas de Mesa et al. (2006)). Thus, the choice of sector is coupled with the participation in the pension system.

The existence of an uncovered labor sector brings considerations of incentive compatibility to the design of system rules. In this paper, I focus on the government's choice of the rate of mandatory contributions. Intuitively, high mandatory contributions might induce workers to avoid the covered sector, affecting pension coverage negatively. In particular, it might happen that mandatory contributions reduce disposable income too much, or that they transfer too much consumption from early working years to retirement years. Low mandatory contributions, however, will increase the state's fiscal commitments in terms of the Guaranteed Minimum pension, if workers fail to accumulate high enough balances on their accounts.

To quantify these effects, I develop a model that captures the labor income opportunities available to workers in each sector, and the incentives to avoid the pension program. Specifically, I follow Todd and Velez-Grajales (2008) in modeling the dual labor market, allowing for sector-specific human capital accumulation, and sector-specific returns to education. However, I augment this framework in two ways. First, in my model, both spouses can decide to work or not and in which sector. I model this joint labor decisions of spouses in order to allow households to adjust their income through the second-earner's labor force participation decision. The model would otherwise overstate the extent to which single-earner households are financially constrained. This would lead to overestimate the disincentives to participate in the system.

Second, I allow households to save privately, both to self-insure against income risk and to supplement pension savings. Among married couples , the median household private savings is close to 5 million pesos, while median pension balances are about 4.2 and 1.3 million pesos for men and women respectively. This suggests the importance of including private savings in order to allow agents to work in the uncovered sector and still save for retirement.

Many papers have analyzed the interactions between labor force participation decisions and social insurance programs using dynamic discrete labor choice models. For example, Rust and Phelan (1997) show how drops in employment at ages 62 and 65 in the U.S. can be traced back to Social Security and Medicare eligibility rules. In recent years, computational improvements have allowed researchers to integrate insights of the incomplete-markets, life-cycle consumption and savings literature (Friedman (1957), Kimball (1990), Deaton (1991), Carroll (1992), Engen et al. (1994), Carroll (1997)...) into this line of research. Thus, papers on optimal unemployment insurance such as Lentz (2009), or Social Security rules such as Van der Klaauw and Wolpin (2008) allow agents to supplement social insurance through private savings. In particular, Van der Klaauw and Wolpin (2008) argue that pure labor choice models can overestimate employment effects of social insurance programs, as labor decisions constitute the only channel through which agents adjust to regulations. In some cases, agents can not only supplement the social insurance program, but also opt for self-insurance if the rules of the program are too constraining or not beneficial. Failing to recognize and model this "outside option" might bias estimates and policy experiments.

A preliminary calibration of the model matches the aggregate joint labor sector choice and the wage ageprofiles well, and does a reasonable job of matching the wealth profile. I simulate the labor decision responses to counterfactual contribution rates and find that the sensitivity of pension coverage increases for rates above 12.5%. However, the model fails to capture the persistence in individual sector choice patterns. I conclude that the model must incorporate additional heterogeneity in observables and unobservables to accurately forecast pension savings accumulation.

The remainder of the paper is organized as follows. I present the model in the next section and the solution method used to solve the model in section 3. Section 4 describes the data. The capacity of the model to fit the data is discussed in the following section and the pension coverage sensitivity to counterfactual contribution rates is analyzed in section 5. A brief conclusion is presented in the last section.

# 2 The Model

The model represents the decision problem of a married couple. The marriage decision is treated as exogenous, and so are education decisions. The problem starts when the Husband is 25. Periods are indexed with the Husband's age thereafter. Spouses are assumed to remain married until they die at (husband's) age 85.

## 2.1 Decisions

Both spouses stop working when the husband turns 65. At each working age $t \in \{25, ...65\}$, households make two decisions: the household consumption decision $c_t$ expressed as a percentage of current wealth, and a joint labor force participation decision $d_t \in \{1, 2, ...9\}$. The 9 options are the combination of the three choices available to each spouse, namely to work in the covered sector, to work in the uncovered sector, or to stay home (see table 1).

## 2.2 Preferences

Preferences are defined over households rather than individuals. Households care about total consumption through a CRRA utility function, and about what sector each spouse works in through sector-specific non-pecuniary benefits ($\delta_i$). The model carries the following state variables, where $H, W$ refers to Husband and Wife and $U, C$ denotes the uncovered and covered labor sectors. The age of the husband is denoted by $t$ and is used to index periods. $a_t$ denotes the non-retirement or private savings at age $t$. They are common to the two spouses. $B_t^H, B_t^W$ are the balances on the retirement accounts of the two spouses at age $t$.

$X^H_{U,t}, X^W_{U,t}, X^H_{C,t}, X^W_{C,t}$ are the four stocks of sector-specific experience. They correspond to the number of years each spouse has worked in each sector up to period $t$. Integrating next period's value function over future shocks, preferences are expressed recursively:

$$\begin{aligned}
V_t(a_t, \{B^i_t\}_i, \{X^i_{j,t}\}_{i,j}) &= \\
\max_{c_t, d_t}\{u(c_t, d_t) &+ \beta E V_{t+1}(a_{t+1}, \{B^i_{t+1}\}_i, \{X^i_{j,t+1}\}_{i,j})\} \\
where \quad u(c_t, d_t) &= \frac{(c_t)^{1-\sigma}}{1-\sigma} + \sum_{i=1}^{9} \delta_i I_{\{d_t = i\}}
\end{aligned}$$

## 2.3 Budget Constraint

Chile's progressive income tax is applied to covered labor earnings net of pension contributions and to capital revenues. Taxes due at period $t$ are denoted $T(a_t, \{w^i_{C,t}\}, d_t)$, where $\{w^i_{C,t}\}$ is the set of covered sector wage offers received by the household (see next section). The interest rate is denoted as $r$ and the borrowing limit as $\bar{a}$. The budget constraint is:

$$\begin{aligned}
c_t &= y_t + a_t \cdot (1+r) - a_{t+1} - T(a_t, y_t, d_t) \\
with \quad a_t &\geq \bar{a} \ , \ c_t \ \geq \ 0
\end{aligned}$$

The balances on spouse $i$'s pension account accrue interests and are augmented by the current period's contribution:

$$\forall i \in \{H, W\},\ B^i_{t+1} \ = \ B^i_t \cdot (1+r) + \tau \cdot w^i_{C,t} \cdot d^i_{C,t}$$

## 2.4 Household Income

Households face a dual labor market with a covered and an uncovered sector. Each spouse receives a stochastic wage offer from each sector, that depends on her sector-specific experiences and the household's age. Thus at each age, the household income is determined by the wage offers available to the husband and wife, and by their sector decision.

The log-wage offers (for spouse $i \in \{Husband, Wife\}$, in sector $j \in \{Covered, Uncovered\}$) are given by:

$$w^i_{j,t} = sr_j + \gamma * I_{i=Wife} + \theta X^i_j + \alpha_0 + \alpha_1 \cdot t + \alpha_2 \cdot t^2 + \epsilon^i_{j,t}$$

where $\epsilon^i_{j,t}$ is sector-specific wage offer shock. The vector containing each period's four wage offer shocks follows an iid process, with potential within-period correlation. $sr_j$ is the skill rental price for sector $j$. The total disposable income for the household is then:

$$y_t = \sum_{i \in \{H,W\}} ((1-\tau) w^i_{C,t} \cdot d^i_{C,t} + w^i_{U,t} \cdot d^i_{U,t})$$

where $\tau$ is the pension contribution rate, and $d^i_{j,t} = 1$ if spouse $i$ works in sector $j$, and 0 otherwise.

### 2.5 Retirement

For simplicity, retirees are not offered the choice to convert their accumulated balances into annuities. Rather, household withdraw the funds from the two individual pension accounts and pool them together with their private savings. Then households run down their total accumulated private and pension savings. Spouses that contributed 20 years or more into the system but failed to accumulate the amount corresponding to the Minimum Guaranteed Pension receive the Minimum Pension in a lump sum in lieu of their accumulated balance. After retirement households are inactive ($d_t = 9$).

## 3 Solution of the Model

I start by solving the problem of the retired household analytically. For working periods, the model is numerically solved by backwards recursion.

## 3.1 Problem of the Retired Household

Denoting $a_t$ the total amount of savings at $t$, pensions included, the problem of the retired household becomes:

$$\begin{aligned}
\forall t \in \{65, ...85\}\ V_t(a_t) &= \max_{a_{t+1}} \{u(c_t, 9) + \beta \cdot EV_{t+1}(a_{t+1})\} \\
where \quad c_t &= a_{t+1} - a_t \cdot (1 + r) \\
c_t &> 0 \\
a_t &\geq \bar{a} \\
and \quad V_{86}(a_{86}) &= 0
\end{aligned}$$

The solution of the problem is characterized by the period budget constraints above, the terminal condition $a_{86} = 0$ and by the Euler Equations:

$$\forall t \in \{65, ...84\} \quad u'(c_t) = \beta \cdot (1 + r) \cdot u'(c_{t+1})$$

Given the CRRA preferences, the Euler equations become:

$$\forall t \in \{65, ...84\} \quad c_{t+1} = (\beta \cdot (1 + r))^{\frac{1}{\sigma}} \cdot c_t$$

Let us iterate this relationship to obtain consumption at each period $c_t$ as a function of consumption at retirement $c_{65}$:

$$\forall t \in \{65, ...84\} \quad c_t = c_{65} \cdot (\beta(1+r))^{\frac{t-65}{\sigma}}$$

A vertical summation of the period budget constraints, premultiplied by $(\frac{1}{1+r})^{t-65}$, yields:

$$a_{65} = \sum_{t=65}^{85} (\frac{1}{1+r})^{t-65} c_t$$

From there, I solve for $c_{65}$ as a function of assets at 65:

$$c_{65} = a_{65} \cdot \frac{1}{\sum_{t=65}^{85} (\beta(1+r)^{1-\sigma})^{\frac{t-65}{\sigma}}}$$

## 3.2 Problem of the Working Household

I adopt an approximation method due to Keane and Wolpin (1994, 1997). The details of the solution procedure are the following. At age 64, a household decides on consumption and labor sectors to maximize the weighted sum of current and future period utilities, denoted by $V_{64}(\overline{S_{64}}, \{\epsilon^i_{j,64}\})$, where the state space, $S_{64}$ , is divided into a deterministic component containing the elements that are not random at the beginning of period 64, $\overline{S_{64}}$, and a shock component containing the vector of random wage shocks drawn at 64, $\{\epsilon^i_{j,64}\}$.

For any given value of the deterministic and shock components of the state space, optimal consumption is obtained by comparing utility on a discretized grid of possible consumption levels, for each of the nine possible choices of labor sectors. The labor decision and associated optimal consumption that maximizes total utility is chosen for that value of the state space. At any deterministic state point, the expected value of $V_{64}$ is obtained by Monte Carlo integration, that is, by taking draws from the (joint) shock vector distribution and averaging to obtain $EV_{64}(\overline{S_{64}})$ . This expectation is calculated at a subset of the deterministic state points and the function is approximated for all other state points by a polynomial regression. I denote this function as $Emax(64)$.

This procedure is repeated at age 63. Using the recursive formulation of the value function, substituting the $Emax(64)$ function for the future component, the optimal decision is computed. Monte Carlo integration over the shock vector at 63 provides $EV_{63}(\overline{S_{63}})$ for a given deterministic state point. A polynomial regression over a subset of the state points provides an approximation to the function, denoted by $Emax(63)$. Repeating the procedure back to the initial age provides the $Emax$ polynomial approximation at each age. The set of $Emax(t)$ functions fully describe the solution to the optimization problem.

# 4 Data

The model is estimated using individual and household wage, labor sector choice and savings data from the Encuesta de Proteccion Social longitudinal survey (EPS) [1] together with the

[1]EPS is a new household survey, conducted in 2002 by the Microdata Center (Centro de Microdatos) of the Department of Economics of the Universidad de Chile. It was initially called HLLS (Historia Laboral y Seguridad Social) and later renamed Encuesta de Proteccion Social (EPS). In 2004 and 2006, two follow-up surveys were administered. The 2008 follow-up survey was administered in the winter of 2008-2009 but is not yet available.

linked administrative records of pension balances and contributions to retirement accounts, obtained from the Superintendencia de Administradoras de Fondos de Pension (SAFP) (the Chilean supervising agency for pension fund administrators). The survey contains information on 17,246 individuals of age 15 or older, including on household characteristics, education, work history, assets, pension plan participation and savings.

The sample used in the analysis is restricted as follows. I define the age of the household as the husband's age. I restrict the sample to cohorts who turned 25 after the 1980 privatization of the pension system to avoid modeling the old system and the transition to the new system. The most recent data is from 2006 so that the cohorts included were born between 1965 and 1981. Agents in the model are subject to and anticipate only the rules and benefits prevailing in the privatized system during the years spanned by the data. In particular, a comprehensive 2008 reform passed by President Bachelet's administration is not modeled. The older cohorts are observed from the age of 25 to the age of 51, while the younger cohorts are observed only one or two years (see table 3).

I make no distinction between married and non-married couples and use the husband/wife terminology in both cases for simplicity. To avoid having to model civil status dynamics, I keep couples that got married or started living together before the husband turned 25 and never separated. The choice of the age of 25 is the result of a trade-off between sample size and the credibility of the assumption that wealth at the initial age is exogenous. Starting the model earlier means excluding older cohorts and couples that got together later, and including individuals who are still acquiring education. The final sample contains $2,680$

couples.

All variables except for pension balances are available for both spouses in years 2004 and 2006. Pension balances are available for the survey's interviewee from 1980 to 2005, but not for his or her spouse. Labor decisions of the survey's interviewee are reported from 1980 to 2006 and his or her wages from 2002 to 2006. Table 2 presents summary statistics of savings, education levels, wages and sector-specific experience for the sample.

# 5 Calibration of the Model

## 5.1 Calibration Methodology

The model's private and pension savings variables represent heterogeneous asset portfolios, with different degrees of risk and returns. Private savings range from checking account balances to real estate. Pension savings are invested in funds made up of different proportions of government and corporate bonds, domestic and foreign stocks. Thus, I set the real interest rate at 3% which is the value used for the risk-free rate by Hubbard et al. (1995) or Gourinchas and Parker (2002). I also fix the borrowing constraint $\bar{a}$ to be 0, thus allowing collateralized borrowing, but not net negative positions.

The rest of the parameters include time and risk preference parameters, labor sector preference parameters, and wage offer parameters. The target moments for the time and risk preference parameters - $\sigma$ and $\beta$ - are the median private savings for six age groups (see table 4).

The labor sector preference parameters - $\delta_i$ - are used to match the fraction of sampled households in each of the 9 possible joint labor sector choices (see table 5). However, I impose the following restrictions. First, households only receive non-pecuniary benefits when one of the spouses is at home:

$$\delta_1 = \delta_2 = \delta_4 = \delta_5 = 0$$

Second, the non-pecuniary benefits do not depend on what sector the other spouse is working in:

$$\delta_3 = \delta_6, \ \ \delta_7 = \delta_8$$

This leaves me with three degrees of freedom to match 9 moments. Namely, non-pecuniary benefits when only the husband is at home, when only the wife is at home, and when both spouses are at home.

The wage offer parameters are comprised of the skill-rental prices $sr_j$, the coefficients on the age polynomial $\alpha_0$, $\alpha_1$, and $\alpha_2$, the returns to experience $\theta$, the gender wage gap $\gamma$, and the standard deviations of the wage offer shocks $\sigma_j^i$. Note that the skill rental price for the uncovered sector is normalized at 0 since it is confounded with the constant of the age polynomial. The corresponding moments are the median wage age-profiles by sector for husbands and wives (see table 6). This corresponds to a total of 2x2x6 = 24 moments for 10 parameters.

Due to the greater number of moments than of parameters, and the interdependence of all moments, I adopt the following procedure. First, I match the sector- and gender-specific wage equations parameters using only agents who always worked and never switched sectors. For these individuals, I expect the difference between accepted and offered wages to be smallest. Given the wage offer parameters, I vary non-pecuniary benefits to best reproduce labor choices. Finally, I vary the risk aversion and intertemporal elasticity of substitution to match the asset distribution. I iterate the procedure to obtain the best overall match.

## 5.2 Calibrated Parameters and Model Fit

The obtained parameters estimates are presented in table 7. I discuss each one in turn.

The magnitude of the non-pecuniary benefits from staying home can be interpreted as the utility from a windfall consumption of 650, 550 and 2500 thousand pesos respectively, to a household that is currently consuming 1000. This is to be compared, for example, to the median wage for men in the formal sector of 2160 thousand pesos. These non-pecuniary benefits exhibit some complementarity as $\delta_9$ (both stay) is slightly larger than the sum of $\delta_3$ (wife stays) and $\delta_7$ (husband stays).

The constant of the polynomial in age corresponds to a base salary of 1212 thousand pesos. The slope is a 1.8% increase by year, and the quadratic term is a reduction of 0.06% per squared year.

The skill rental price for the covered sector can be interpreted as a 10.5% wage premium in the covered sector. Less plausible is the gender wage gap, which corresponds to a 60%

differential between men's and women's wage. Returns to experience are equal 0.89% per year.

The large standard deviations in the covered sector might reflect the possibility of layoffs or involuntary unemployment. The relatively low standard deviations in the uncovered sector suggests that it acts as a residual market with low-paying but readily available job opportunities.

Wage profiles are quite well approximated, despite some isolated divergence in the $50-55$ age group. The number of observations for this age group is quite low, given the cohorts and years sampled. For example, the large discrepancy on median wage in the formal sector for husbands between 50 and 55 is based on only 40 observations.

The model succeeds in matching joint labor sector choice overall, except for the fact that wives almost never work informally in the fitted model. Given the very low accepted wages offered the model does not succeed in rationalizing female informal work.

The model does a reasonable job of matching the private savings profile except for the earlier ages. The main reason is that the approximation algorithm in its current form starts to break down as risk aversion increases, due to the increased curvature in the utility function. For that reason, only low risk aversion values have been explored, which explains the underprediction of wealth levels at early ages, when the precautionary saving motive dominates.

On the other hand, the model does not fully capture the persistence in labor sector choice, especially in the informal sector. In the data, 15% (50%) of the males have only ever worked in the informal (formal) sector. Only 35% of them have switched sector at least once. In comparison, the fitted model predicts that very few males work exclusively in the informal sector, and only 5% of males work exclusively in the covered sector. The vast majority of the simulated husbands work predominantly in the formal sector with some forays into informal employment. One of the consequence is that experience accumulation will not be accurately captured and, in particular, the proportion of agents with more than 20 years of participation in the covered sector, - required to qualify for the Minimum Guaranteed Pension - will not be correctly predicted by the model.

# 6 Effects of Counterfactual Contribution Rates

I use the calibrated model to study how responsive pension coverage is be to the choice of the rate of mandatory contributions.

I simulate the sampled households's labor decisions at counterfactual rates of mandatory contributions, ranging from 5% to 20%. I report the corresponding pension coverage percentages in table 8. The model predicts that the fraction of husbands in the covered sector decreases from 55% to 47% as the contribution rate is raised from 5% to 20%. The fraction decreases slowly (-2%) until the contribution rate reaches 12.5%. Presumably these rates fall below what most households would save for retirement if unconstrained or outside the system. In other words the constraint on saving is non-binding. From 12.5% to 20%, the decrease becomes steeper (-4%). The trend for women is similar though slightly less pronounced. Overall the elasticity of pension coverage to the contribution rate is quite low near Chile's 10% figure.

## 7 Conclusion

This paper documents the saving, labor and pension system participation decisions of households in Chile. I develop a parsimonious dynamic decision model of the household, with a joint saving and labor sector decision. I assess the capacity of the model to account for the wage, labor choice and wealth data from the Chilean EPS longitudinal survey. The model can capture the first moments of the cross-sectional distributions of the main variables. I present a counterfactual exercise in which I vary the contribution rate and report the changes in pension coverage. The sensitivity of pension coverage is small for rates below 12.5% but gets larger beyond. However, the model fails to account for the time-series features such as persistence in labor choice. This limits the capacity of the model to speak to sector-specific experience accumulation, minimum pension eligibility, and the government's pension-related fiscal commitment. The model must be augmented to include observed heterogeneity in education as well as unobserved heterogeneity in ability and/or preferences and possibly sector-switching costs to be able to fully account for the longitudinal patterns in the data.

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Table 1: The labor decision

| Joint Labor decision | | Wife | | |
|---|---|---|---|---|
| | | **Covered** | **Uncovered** | **Inactive** |
| **Husband** | **Covered** | d=1 | d=2 | d=3 |
| | **Uncovered** | d=4 | d=5 | d=6 |
| | **Inactive** | d=7 | d=8 | d=9 |

Table 2: Summary statistics

| | Husband | Wife | Household |
|---|---|---|---|
| **Median private savings (thousand pesos)** | | | |
| | - | - | 4965 |
| **Median pension balance (thousand pesos)** | | | |
| | 4233 | 1339 | - |
| **Education (fraction of the sample)** | | | |
| No High school | 16% | 18% | - |
| High school dropouts | 37% | 37% | - |
| High school graduates | 40% | 40% | - |
| College graduates | 7% | 5% | - |
| **Mean experience at age 50 (years)** | | | |
| Formal sector experience | 18.1 | 6.1 | - |
| Informal sector experience | 6.5 | 2.7 | - |
| **Mean experience at age 35 (year)** | | | |
| Formal sector experience | 7.5 | 2.4 | - |
| Informal sector experience | 3.0 | 1.0 | - |
| **Median annual wages (thousand pesos)** | | | |
| Formal sector jobs | 2409 | 1800 | - |
| Informal sector jobs | 1800 | 1160 | - |

Table 3: Sampled Cohorts

| | **Age of the Husband** | | | | | | |
|---|---|---|---|---|---|---|---|
| **Cohort** | 25 | 30 | 35 | 40 | 45 | 50 | **Total** |
| 1965 | 2,775 | 2,776 | 2,780 | 2,780 | 2,460 | 321 | 13,892 |
| 1970 | 3,282 | 3,280 | 3,280 | 2,888 | 411 | 0 | 13,141 |
| 1975 | 2,840 | 2,840 | 2,499 | 355 | 0 | 0 | 8,534 |
| 1980 | 2,402 | 2,160 | 307 | 0 | 0 | 0 | 4,869 |
| 1985 | 1,621 | 250 | 0 | 0 | 0 | 0 | 1,871 |
| **Total** | 12,920 | 11,306 | 8,866 | 6,023 | 2,871 | 321 | 42,307 |

Table 4: Median Private Savings by Age

| **Median Private Savings** | | |
|---|---|---|
| **Age group** | **Data** | **Model** |
| 25 | *1500* | *381* |
| 30 | *3000* | *1620* |
| 35 | *4840* | *2706* |
| 40 | *5005* | *3443* |
| 45 | *7000* | *6658* |
| 50 | *7800* | *7920* |

Table 5: Joint labor sector choice

| | | **Model** | **Data** |
|---|---|---|---|
| Husband | Covered | *58%* | *62%* |
| | Uncovered | *30%* | *27%* |
| | Inactive | *11%* | *11%* |
| Wife | Covered | *26%* | *21%* |
| | Uncovered | **1%** | **12%** |
| | Inactive | *73%* | *68%* |
| Spouses working | Two | *27%* | *29%* |
| | One | *61%* | *63%* |
| | Zero | *11%* | *8%* |

Table 6: Median Wages by Age, Sector and Gender

| **Median Annual Wages (Thousand of Pesos)** | | | | |
|---|---|---|---|---|
| | | **Age group** | **Data** | **Model** |
| **Husbands** | | | | |
| | **Covered sector** | 25 | *2400* | *2207* |
| | | 30 | *2520* | *2485* |
| | | 35 | *2400* | *2619* |
| | | 40 | *2700* | *2733* |
| | | 45 | *2640* | *2737* |
| | | 50 | *2845* | *2817* |
| | **Uncovered sector** | 25 | *1456* | *1487* |
| | | 30 | *1800* | *1641* |
| | | 35 | *1800* | *1769* |
| | | 40 | *1800* | *1826* |
| | | 45 | *1800* | *1844* |
| | | 50 | *2400* | *1772* |
| **Wives** | | | | |
| | **Covered sector** | 25 | *2040* | *1417* |
| | | 30 | *1800* | *1741* |
| | | 35 | *1800* | *1798* |
| | | 40 | *1800* | *1826* |
| | | 45 | *1800* | *1804* |
| | | 50 | *1880* | *1774* |
| | **Uncovered sector** | 25 | *960* | *997* |
| | | 30 | *960* | *1155* |
| | | 35 | *960* | *1198* |
| | | 40 | *1200* | *1237* |
| | | 45 | *1320* | *1425* |
| | | 50 | *1440* | *1373* |

Table 7: Parameter estimates

| Parameter estimates | | |
|---|---|---|
| **Name** | **Symbol** | **Estimated value** |
| Discount Factor | $\beta$ | *0.948* |
| Risk Aversion | $\sigma$ | *1.3* |
| Value of staying home (only wife) | $\delta_3$ | *0.00302* |
| Value of staying home (only husband) | $\delta_7$ | *0.00267* |
| Value of staying home (both spouses) | $\delta_9$ | *0.00679* |
| Polynomial in age (constant) | $\alpha_0$ | *7.1* |
| Polynomial in age (slope) | $\alpha_1$ | *0.0186* |
| Polynomial in age (quadratic) | $\alpha_2$ | *-0.00056* |
| Skill rental price (Covered sector) | $sr_C$ | *0.1* |
| Gender wage gap | $\gamma$ | *-0.5* |
| Returns to experience | $\theta$ | *0.0086* |
| Std dev of logwage offer shocks (Husband,Covered) | $\sigma_C^H$ | *0.4* |
| Std dev of logwage offer shocks (Husband,Uncovered) | $\sigma_U^H$ | *0.02* |
| Std dev of logwage offer shocks (Wife,Covered) | $\sigma_C^W$ | *0.2* |
| Std dev of logwage offer shocks (Wife, Uncovered) | $\sigma_U^W$ | *0.02* |

Table 8: Changing the Mandatory Contribution Rate

| | **Contribution rate** | **5%** | **7.5%** | **10%** | **12.5%** | **15%** | **20%** |
|---|---|---|---|---|---|---|---|
| **Pension Coverage** | | | | | | | |
| **Husbands** | **(fraction of the sampled households)** | 55% | 55% | 54% | 53% | 51% | 47% |
| **Wives** | **(fraction of the sampled households)** | 25% | 25% | 24% | 24% | 23% | 20% |