

# Pooling, Savings and Prevention: Mitigating the Risk of Old Age Poverty in Chile\*

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**Abstract.** Using data collected in a survey on risk and social insurance in Chile, I find that workers who entered the labor market after the pension reform in 1981 have a higher “*contribution density*” than those that contributed to the social security system prior to reform. Further, the expectation of care from children and the amount spent on their education significantly lowers the likelihood of contribution to the pension system. Workers who have met the contributory requirements to qualify for the minimum pension guaranteed by the government, are significantly less likely to continue making contributions. The likelihood of contributions beyond the eligibility threshold is lowered further the greater the market rental value of respondents’ homes. Further, individuals with a greater tolerance for risk contribute, suggesting that there are retirement security investments in Chile that are perceived as relatively less risky than saving in the reformed pension system. The results presented indicate that housing could be one such investment.

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## I. Introduction

In countries where there are few barriers to participation in social insurance erected by a segmented labor market – that is where covered jobs are not rationed and workers have access to formal cover wherever they may be employed – a substantial portion of the population can still fail to contribute. This may be due to poverty throughout their working lives (insufficient discretionary income to contribute), myopia (an irrational disregard for future needs), moral hazard (rational “gaming” of the system), constrained liquidity (limited access to credit that lowers affordable investment in illiquid assets), or a strong preference for alternative forms of income security.

Identifying which factors shape individual and household decisions with respect to the social insurance system is critical in determining whether low rates of participation are a cause for public concern. More importantly, a better understanding of household strategies to mitigate risks to income security can indicate whether further policy interventions beyond existing mandates would increase welfare or do harm. Greater knowledge of how constraints and preferences shape savings and insurance decisions can offer clues as to how formal social insurance systems might be further reformed to better accommodate the people they are designed to protect.

Earlier work on participation in formal social security among the working population in Latin America, has focussed primarily on whether workers had *access* to formal cover. While the large sample sizes of the data sets employed revealed broad regional patterns, the limitations of those data sets prevented a more thorough research of household choice. In this paper, new survey data from Chile allows a closer examination of the factors that shape *demand* for formal cover, and how this is affected by expectations and perceptions of risk, the availability of alternative (market and household-based) resources of income security in old age, and the implicit set of incentives embedded in a particular social insurance regime.

Following this introduction, Section II outlines the structure of the old-age income security system in Chile, detailing the “rules of the game” in force since the country’s pension reform in 1981. Readers familiar with the Chilean system are encouraged to skip to the next section. Section III introduces a simple analytical framework borrowed from the economics of insurance literature to guide the empirical investigation in later sections. Section IV presents the specific hypotheses to be tested. Section V describes the new data, focusing on previously unavailable variables – an affiliated workers’ *density of contributions* and subjective life expectancy. These data were collected during the PRIESO survey of households in Greater Metropolitan Santiago in December 1999 and January 2000.<sup>1</sup> Section VI (a, b & c) presents and discusses the results of regression analysis using the new data. Section VII concludes.

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<sup>1</sup> For more details on the implementation of the survey and structure of the questionnaire, see Appendices One and Two.

## II. The Structure of Chile's Old Age Income Security System

Table 1 presents the structure of the old age income security (and the closely related health security) system established in Chile by structural reforms in 1981. Chile's social security reform shifted most of the risks to income security in old age - borne primarily by tax payers prior to reform - onto the individual and the private sector. The set of institutional arrangements put in place by the reform is referred to as a "multi-pillar" social security system, in that it distributes risks between both public and private institutions. While the system is not fully administered by the government, it is organized and regulated by government mandate.

The Chilean social security system combines savings, investment and insurance, both public and private. Retirement pensions are financed primarily out of publicly mandated, but privately managed savings in individual retirement accounts. Participating workers contribute 13% of their income to institutional investors (called AFPs<sup>2</sup>) who specialize in managing and investing retirement savings. Workers must contribute an additional 7% of their monthly earnings to either the government administered health service, or to a private health insurance provider,<sup>3</sup> bringing the total contribution to approximately 20% of their income.

Only 10 percentage points of workers' contributions accumulate in their individual retirement accounts as savings. The remaining 3 percentage points pay the fund managers' fees and premia for group level disability and life insurance policies that the fund managers are required to contract for their contributing affiliates.<sup>4</sup> Workers who contribute into an individual retirement account for at least 20 years are guaranteed a minimum annuity benefit (the *minimum pension guarantee*, MPG) from the government, should their savings fall short of a determined amount when they reach retirement age.<sup>5</sup>

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<sup>2</sup> For "*Administradoras de Fondos de Pensiones*".

<sup>3</sup> As in most countries in Latin America prior to reform, social security in Chile combined retirement, disability and survivor benefits with health coverage. The health system was separated from the rest of social security in the early stages of the reform. As was done for old age, disability and death, cover of health risk was partly privatized to give Chilean workers a greater range of choices in health coverage. Most individuals are covered under the publicly administered branch of the health system, FONASA (Fondo Nacional de Salud). However, workers can also opt to purchase coverage from the privately managed ISAPREs (Institutos de Salud y Prevision). Coverage under FONASA is differentiated by income group and can be either fully or partially subsidized for the poor and low income workers. Those who do not qualify for the subsidy make full contributions to the public health service. Although they are decentralized and separate from the government health service, it is relatively difficult to be covered by the private ISAPREs without proof of contribution to an individual retirement account. Contribution to the ISAPREs and to FONASA are often made together with contributions to the pension system.

<sup>4</sup> When analyzing coverage of a system of individual accounts it is important to distinguish between workers who are simply affiliated to the system, and those affiliates who actually make contributions. To be effectively covered, affiliation is a necessary condition, but not sufficient. Affiliates to the pension system in Chile are those workers who are registered in the system and have an individual account. In theory, a Chilean workers can only affiliate with the system once. A worker remains affiliated even if he is not making contributions.

<sup>5</sup> The contributions to the social security regime made by workers who entered the labor market prior to the reform are counted toward eligibility for the minimum guarantee.

Contributing workers, are therefore, not only saving and investing for their retirement on the capital market, but also pooling risks to income: publicly (by accumulating rights toward a minimum retirement annuity guaranteed by the government), and privately (by paying premia on market insurance against shocks to household income from disability and sudden death during their working lives<sup>6</sup>).

As part of the reform and as an incentive to participate in the new system, the authorities in Chile lowered the total rate of pay-roll tax on the income of workers who chose to switch out of the PAYGO regime and open individual retirement accounts. The pure-tax element of mandated salary deductions is lowered further by linking retirement benefits above the MPG directly to contributions. Affiliates must contribute on an income equal to or greater than the legal minimum wage. Since contributions are tax exempt, participants can only contribute up to a ceiling.<sup>7</sup> They can make voluntarily contributions above the required 10% but only on the portion of income up to the contribution ceiling.<sup>8</sup> Although the reform eliminated statutory employer contributions, employers are responsible for depositing contributions on a timely basis to the retirement and to the health systems on their workers' behalf.<sup>9</sup>

Just as under the PAYGO regime that existed prior to the reform, the self employed are exempted from the mandate to contribute to the new system. Those who choose to contribute make their own arrangements directly with the retirement fund managers and private health insurance providers. Having chosen to participate, the self employed must also contribute on a declared monthly income equal to or greater than the legal minimum wage, and up to the contribution ceiling. Chamorro (1992) and Macias and Tarzijan, (1994) show that informal workers – that is employees without a contract – can effectively exercise the same choices and secure minimum coverage without involving their employers, by simply declaring themselves to a fund manager as self employed and contributing on the legal minimum wage. There are, therefore, no explicit, legal barriers between any individual with an income and coverage under the system, although the requirement that participants in the system contribute on declared income at least equal to

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<sup>6</sup> The rights of survivors and dependents of retired affiliates are also protected in the reformed system. Married men who retire put aside funds to cover the survivor pension of their widow and dependent children. The survivor benefit is 60% of what the deceased would have been receiving as a retirement benefit. The exact amount that must be set aside (based on estimates of how much longer survivors will outlive the deceased), is contracted between the affiliate and the private annuity provider. The law does not require the same of married women who are retiring, unless their husband's are disabled. (Cox-Edwards, 2000)

<sup>7</sup> The ceiling on income on which affiliates can contribute is set at of 60 “*unidades de fomento*” or UF's – an accounting unit indexed to inflation.

<sup>8</sup> Conventionally, Chile's retirement savings system operates on an “EET” basis: that is, contributions and the returns from investment are exempt from taxation, but income tax is paid on benefits withdrawn when an affiliate retires.

<sup>9</sup> Several authors have pointed out that late payment of workers' contributions, or even failure to make payments, can leave workers without coverage (Uthoff, 1997, Arenas de Mesa, 1999).

the minimum wage, may be a binding constraint for the relatively low-paid, informal employees.

The minimum age of retirement is 65 for men and 60 for women. Funds can be withdrawn as regular withdrawals, an annuity contracted with a private insurance company, or a combination of both. However, workers who by the age of 55 have accumulated a balance in their individual retirement account sufficient to finance a pension equal to at least 110% of the system's minimum pension guarantee, can begin to draw benefits early. Early retirees can continue to work after they start receiving their retirement annuity without the obligation of making further contributions to the system. However retirees must continue to contribute either to the public FONASA or to a private ISAPRE for health coverage, and can choose to continue contributing to the invested pension funds if they wish. Funds that remain in the retired workers' accounts continue to earn returns from investment.

As mentioned above, workers who reach the contribution threshold of 20 years (240 months) qualify for the minimum pension guarantee. These workers have earned the right to an annuity financed initially out of the funds in their individual accounts. When these funds are exhausted, the shortfall is financed with a transfer from the government. The amount of the minimum pension guarantee is not indexed to inflation, but set by legislation, and in the last ten years has averaged about 80% - 95% of the minimum wage (Arenas de Mesa, 2000, Cox-Edwards, 2000). Both the top-up for the minimum pension guarantee and the social assistance pension, PASIS, are financed from general taxation, primarily from Chile's value added tax.<sup>10</sup>

The architects of Chile's social security reform expected that the combination of private and public coverage of risks to income would not only lower future government liabilities and increase efficiency, but also provide workers with added incentives to save and invest for retirement (Piñera, 1995). Two decades after the introduction of the multi-pillar model in Chile, evidence of an improvement in incentives to participate in the formal old-age security system is mixed. Corsetti and Schmidt-Hebbel, (1994), and Schmidt-Hebbel (1998) find evidence that there has been an increase in the share of the workforce covered by the national pension system since individual retirement accounts were installed. However, Edwards and Edwards (2000) find that in 1997, only 62% of the labor force in Chile was contributing to the reformed system – about the same share of workers who contributed to the PAYGO system prior to reform. Cortazar (1997) and Arenas de Mesa (2000) similarly find no change in the share of contributing workers. Pointing to the fall in the number of affiliates (those who are formally registered in the system) who actually contribute from year to year, Mesa-Lago (2001) and Arenas de Mesa and Sanchez (2001) conclude that the reform has not succeeded in providing workers' with a greater incentive to participate.

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<sup>10</sup> Many authors have pointed out that this contribution-threshold structure for eligibility, reduces the marginal value of contributions beyond the twenty year minimum to zero for workers in the lower levels of the income distribution (Vittas, 1995, Shwarz, 1997, Arenas de Mesa, 1999). Cox-Edwards find that the MPG mainly benefits women since they earn relatively less than similarly qualified men and, because they spend relatively less time working outside the home, contribute to the system for fewer years.

However, as pointed out in Packard (2001), the findings of these studies rely solely on simulations and casual observation of the aggregate data, rather than econometric investigation. The results of the panel analysis in Packard (2001) show a positive incentive effect after the introduction of individual retirement accounts that increases the share of the economically active population who contribute to the pension system, once a “J” curve effect has been taken into account and after controlling for changes in the macroeconomic environment. This said, the numbers of workers who contribute to the formal retirement security system in Chile relative to that in OECD countries is still very low, and guards strongly against complacency. The falling share of contributors among workers affiliated to the reformed system, shown in Figure 1, indicates that the wedge created by the payroll tax to social security prior to reform, was just one of many possible factors that still lead certain groups of workers to ignore government mandated retirement-income protection.<sup>11</sup>

### III. An Analytical Framework: The “Comprehensive” Insurance Decision

A large portion of the literature on social security and private pensions is based on the life-cycle model of savings. However, a more recent literature argues that analysis of the efficiency aspects of public interventions for old age income security, should place greater emphasis on risk and uncertainty (Bodie, 1990, Thaler, 1994, Barr, 1998, 2000, and 2001, Holzmann and Jorgensen, 2000). This recent emphasis on the insurance aspects of pensions is a revival of an earlier focus. The analysis of old age income security was firmly grounded in the realm of risk and uncertainty in four theoretical papers on “*optimal-length-of-working-life insurance*”, by Diamond and Mirrlees (1978, 1982, 1986a, 1986b).

“Workers face uncertainty about the lengths of their working lives... No one knows what work he will be capable of in the future... Uncertainty about earnings ability in the last years of life is particularly great... The burden of this risk to the individual is eased both by private insurance and by the tax and social insurance system.” (Selectively drawn from Diamond and Mirrlees, 1978, 1982, 1986a, and 1986b).

A multi-pillar pension system of the kind emerging in Latin America, combines aspects of social insurance with private insurance, savings and investment. For this reason, neither a simple life-cycle savings or insurance framework is fully satisfactory for modeling the preferences of individuals and households with respect to the new systems. Furthermore, this research focuses on a developing country where there are more opportunities to evade social insurance than in a developed country, and where non-

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<sup>11</sup> It is important to distinguish the contribution ratio shown in Figure 1 – *contributors as a share of affiliates to the AFP system* – from the ratio for Chile included in the panel analysis in Packard (2001) – *contributors to any branch of the social security system as a share of the economically active population*. While the fall in contributors as a share of affiliates is a cause for concern, widely reported inflation in the data on affiliates may exaggerate the problem. Several authors have pointed out that the data on the number of affiliates is flawed since it can show that over 100% of the population is affiliated (Arenas de Mesa, 1999, Cox-Edwards, 2000, Edwards and Edwards, 2000, Mesa-Lago, 2001, Uthoff, 2001). These authors explain that inaccuracy in the affiliation data is due to workers re-affiliating under a different name upon rejoining the formal labor force, or upon switching between pension fund managers. In either case, the inflation in the denominator (affiliates) can exaggerate the fall in the numerator (contributors).

market alternatives may be in greater supply. This feature introduces portfolio aspects to the decision to participate in the formal system – that is, relative to the choices available to workers in developed countries where governments have capacity to enforce the mandate to participate, individuals in developing countries can pick and choose between a range of publicly provided, market and non-market (informal, family based) instruments to mitigate the loss of earnings ability in old age. Thus, an analytical framework that is sufficiently broad to encompass preferences with respect to a variety of instruments is required to motivate this empirical analysis.

Such a framework is available in the early articles on the economics of insurance. In their 1972 paper Ehrlich and Becker combine expected-utility and indifference curve analysis within the context of a “state preferences” approach to behavior under uncertainty. Although their model abstracts from the important inter-temporal life-cycle element of insurance decisions, it provides several predictions of optimal risk-mitigating behavior that lend themselves to empirical tests using cross section survey data.

Their model is straight forward. In the face of a prospective loss, individuals can either insure against the loss, or take steps to lower the likelihood that the loss will occur. The “*comprehensive insurance*” problem of the individual is to determine their optimal expenditure on a set of alternative instruments – “*market insurance*”, “*self-insurance*” and “*self-protection*”.

Both market and self-insurance transfer income from the “good” states to the “bad” states of the world, lowering the size of losses in the bad states. Where it is available, market insurance can be purchased at a price – the “premium”. Self-insurance differs from market insurance in that there is no market for it and therefore no explicit price. However, a shadow price can be imputed from the costs incurred by the individual in self-insuring. The critical difference between the two ways of insuring is that market insurance *pools* risk across individuals, while self insurance does not. Individuals who neither insure through a market nor self insure – whether by choice or because both instruments are missing – must cope with the losses in any bad states that occur. The third instrument, self-protection, reduces the probability of the bad state, although since it does not transfer income from good to bad states, it does not affect the size of the loss should the bad state come about.<sup>12</sup>

Within the Ehrlich and Becker framework, individuals smooth consumption over good and bad states of the world. Where insurance markets are missing the individual smoothes consumption using only self-insurance and self-protection. In a world where the option of both market insurance and self-insurance exist, they are substitutes. Market insurance - available at or near actuarially fair prices<sup>13</sup> - reduces the take up of self-

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<sup>12</sup> The authors admit that, “...it is somewhat artificial to distinguish behavior that reduces the probability of the loss from behavior that reduces the size of a loss, since many actions do both.” (Ehrlich and Becker, 1972, p. 634) However, they find it helpful to separate *self protection* from *self insurance* since the latter clearly performs the insurance function of redistributing income from good to bad states.

<sup>13</sup> Conventionally, the price of market insurance  $\mathbf{p}$  is said to be “actuarially fair” if  $\mathbf{p} = p / 1 - p$ , where  $p$  is the probability of the bad state occurring.

insurance. Market insurance will be preferred to self-insurance for mitigating losses that are rare, because the shadow price of self-insurance does not fall as the probability of loss decreases, while the price of market insurance does. As losses become more rare, and the individual has more to lose, the incentive to insure through the market rises.<sup>14</sup>

Ehrlich and Becker also find that greater coverage of market insurance does not inevitably result in individuals spending less on self protection (moral hazard<sup>15</sup>). If self-protection lowers the likelihood that the bad state will occur, and if this is rewarded by the market in the form of lower premia, market insurance and self-protection become complements, and the risk of moral hazard can be lowered. The authors acknowledge that this result depends critically on how responsive the price of insurance is to the amount of self-protection individuals engage in. Subsequent literature on information asymmetries and market failures explains why the price of insurance does not always respond,<sup>16</sup> but the fundamental structure of incentives faced by individuals with access to a “*comprehensive*” set of risk-mitigation instruments (market insurance, self insurance and self protection) presented by the authors remains unchanged.

Gill and Ilahi (2000) use the Ehrlich and Becker framework to analyze individual preferences when both private and publicly provided instruments are available. They apply the framework to prospective losses from unemployment, analyzing public unemployment insurance (as market insurance or “market-type” insurance, since, even if publicly provided, the risk of job-loss is pooled); precautionary saving (as self-insurance); and investments in human capital (as self-protection). The authors acknowledge that markets frequently fail to provide insurance against certain losses, particularly when the likelihood of the loss is widespread. Barr (1998, and 2001) points to the same failures of private insurance especially when the probability of the bad state occurring cannot be estimated, and is, therefore, an *uncertainty* rather than simply a risk.<sup>17</sup> To compensate for these failures, governments step in to provide social insurance – market-type risk pooling - against losses to which the market does not respond or responds inadequately. Similarly, government action can correct distortions that prevent individuals from achieving optimal levels of self insurance and protection.

I apply the Ehrlich and Becker framework to analyze individual preferences for mitigating poverty in old age where a range of public and private instruments are

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<sup>14</sup> “This is to say that a person is more likely to insure large rather than small losses. On the other hand, the incentive to save for rare losses is small.” Ehrlich and Becker (1972), p. 635

<sup>15</sup> The authors specify “moral hazard” as an alleged deterrent effect of market insurance on self protection that increases the actual probabilities of hazardous events.

<sup>16</sup> Much of the literature that has followed Ehrlich and Becker (1972) has focused on the subject of adverse selection and moral hazard, for example, Marshall (1976), Hirschleifer and Riley (1979) and Coate (1995).

<sup>17</sup> Barr (1998) presents the five basic conditions that must obtain for private markets to pool the risk and cover the losses from a specific bad state. These are that the probability of the bad state occurring be: (i) independent; (ii) less than one (that the bad state cannot be a certainty); (iii) known or estimable (that it not be an uncertainty); and that the dangers to private providers arising from (iv) adverse selection; and (v) moral hazard can be kept to a minimum.



available. In this application *old age* is not a bad state, *per se*.<sup>18</sup> The bad state that individuals (and policy-makers) are concerned with is *poverty in old age*. This is characterized by: the inability to draw sufficient income from work due to the body's natural deterioration - Diamond and Mirrlees' "*loss of earnings ability*"; accompanied by greater likelihood of facing "catastrophic" health expenses; insufficient accumulated savings or other assets to meet consumption needs; and isolation, with no other means of support such as family, friends or tribe.

For simplicity (and to reflect the growing sophistication of the lexicon used in the literature) I have replaced the terms originally used by Ehrlich and Becker, as follows. I refer to "market" and "publicly provided, market-type" insurance as *pooling*;<sup>19</sup> to "self insurance", whether mandated by the government or taken up voluntarily as *saving*; and "self protection" as *prevention*. Pooling redistributes consumption opportunities toward the bad states of the world at a price. Saving redistributes income similarly – cash balances reduce fluctuations in consumption – but does not pool risks. Prevention lowers the probability of the bad state. Either saving, prevention or both can be pursued when pooling is not available. Where pooling is available decisions about the optimal amount of saving to engage in depend on the relative cost of pooling. Thus, the amount an individual will save is a function of the price of pooling, which in turn is determined by the probability of the bad state occurring, and can be expressed as

$$s = f(\mathbf{j}(\mathbf{p}(p(p^e, r)))) \quad (1)$$

in which

- $s$  : amount of saving
- $\mathbf{j}$  : amount of pooling, where  $\mathbf{j}'(\mathbf{p}) > 0$
- $\mathbf{p}$  : the (market) price of pooling, where  $\mathbf{p} = p/(1 - p) + \mathbf{I}$
- $r$  : amount of prevention
- $p^e$  : endowed (exogenous) probability of the bad state occurring
- $p$  : probability of the bad state occurring, where  $p(p^e, r)$  and  $p'(r) < 0$
- $\mathbf{I}$  : loading factor for market pooling, where  $\mathbf{I}'(p) > 0$

As private markets for pooling risks (or the public pooling provider, in the case of social insurance) become more efficient, the market price of pooling should become more

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<sup>18</sup> We all age - although some more than others, as evidenced by significant variation in mortality rates across gender, race and income groups (Pritchett and Summers, 1993, Hurd and McGarry, 1997, Hurd, McFadden and Gan, 1998). It is generally considered a blessing to live a long life, and advances in technology and healthcare have brought longevity to a greater share of the population.

<sup>19</sup> This terminology partly reflects evolution in the literature since the Ehrlich & Becker paper, and is preferred since, as discussed, not all risk pooling arrangements are market based or provided by the government.

responsive to changes in the probability of the bad state occurring. A lower probability of the bad state is translated into a lower market price for pooling.<sup>20 21</sup>

Since every dollar spent on prevention lowers the probability of the bad state, prevention and pooling are compliments, and moral hazard is not an inevitable result of pooling becoming available. However, unlike the market price of pooling, the shadow cost of saving does not fall with lower probability of the bad state. Therefore, as pooling becomes cheaper relative to saving, individuals have greater incentive to pool. Pooling and saving are substitutes. Every additional dollar spent on prevention increases the incentives to pool while lowering the incentives to save. Thus the partial derivatives of (1) are

$$\partial s / \partial r < 0, \quad \partial s / \partial j < 0, \quad \partial j / \partial p > 0, \quad \partial p / \partial p < 0, \quad \partial p / \partial r < 0.$$

If the bad state is described as poverty stemming from the loss of earnings ability in old age, as life-expectancy increases with improvements in health care, the probability that most people will face a period of life in which they will need to consume but be unable to work also rises.<sup>22</sup> This is to say that the endowed component of the probability of the bad state  $p^e$  can rise, raising  $p$ , and increasing the share of the population that faces a relatively predictable loss from disability. Furthermore, as longevity increases (or inversely, as mortality falls), the *incidence* of old age not only becomes more frequent, but the span of the expected period between the loss of earnings ability and death can increase. As  $p$  rises and a period of life without the ability to earn income becomes more likely, the model predicts that rational individuals should increasingly turn to savings to mitigate the risk of poverty in old age, and/or engage in prevention to lower the likelihood of the bad state occurring. That is, individuals will have an incentive to increase  $s$  but also to spend more on  $r$  in order to lower  $p$  at the margin.

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<sup>20</sup> Gill and Ilahi (2000) cite the example of premia for private automobile accident insurance that are typically higher for certain groups of drivers that the market considers more risky – men under twenty-five – and lower for those the market considers less risky – senior citizens. In the case of public, market-type pooling, in the United States the premia employers pay for unemployment insurance is risk-rated, according to industry. Industries characterized by frequent turnover pay higher premia than those were workers loose their job less frequently. A public providers' ability to adjust contributions to social insurance increases with administrative capacity.

<sup>21</sup> The premia for insurance policies are never strictly “actuarially” fair, as shown in framework by the term  $I$ , the loading factor that covers the administration costs and profit of the private provider of insurance. “If  $I$  were independent of  $p$ , so also would be the real price of insurance and  $p$  would have no effect on the incentive to insure... Since apparently rare losses are more frequently insured,  $I$  is presumably positively related to  $p$ , perhaps because processing and investigating costs increase as  $p$  increases.” Ehrlich and Becker 1972, p. 633. This discussion is concerned with a old-age income security system with a market-type, public pooling component, where  $I$  does not vary across the covered population. For this reason, I omit the term from the proceeding discussion.

<sup>22</sup> However, the same advances in technology and health that increase longevity, may also postpone the loss of earnings ability. If workers are able to work longer, the period of life before death that has to be financed when earnings from labor are no longer an option, may not increase, and may even shorten.

However, the predicted complementary relationship between prevention and pooling depends on the formal pooling institution (private insurer or the public pooling provider) having information on the individual with which to correctly set the price of pooling. The formal pooling institution must be able to observe the individual's expenditure on prevention to correctly price pooling. Formal pooling institutions can suffer from asymmetric information and the steps agents take to prevent and thus lower the probability of the bad state are often unobserved.<sup>23</sup> Where markets do not price pooling efficiently or at all, agents may prefer to pool informally. The savings function (1) must then be altered to include both formal (subscript  $F$ ) and informal (subscript  $S$ ) pooling instruments.

$$s_F = f(\mathbf{j}_F(\mathbf{p}_F(p(p^e, r))), \mathbf{j}_S(\mathbf{p}_S(p(p^e, r)))) \quad (2)$$

Informal pooling arrangements tend to exist within (relatively) small social networks (Genicot and Ray, 2000, Fafchamps and Lund, 2000). They generally have better information and mechanisms to monitor the actions of participants in the pool, and can overcome information asymmetries with greater ease. If subscript  $o$  denotes preventive actions taken by individuals that are *observed* by the formal pooling institution as well as the observable component of the probability of the bad state; and subscript  $u$  denotes the preventive actions and the probability that are *unobserved* by the formal pooling provider, but monitored by members of an informal pool, then the savings function (2) can be further augmented to

$$s_F = f(\mathbf{j}_F(\mathbf{p}_F(p_F(p_o^e, r_o))), \mathbf{j}_S(\mathbf{p}_S(p_S(p_{ou}^e, r_u, r_o)))) \quad (3)$$

Where formal pooling institutions are subject to information asymmetries and so fail to respond to the preventive measures taken by individuals to lower the probability of the bad state occurring, informal pooling arrangements may respond with greater efficiency and individuals may substitute formal pooling with informal pooling to mitigate losses.

Just as individuals may look beyond formal market or market-type arrangements for pooling instruments, informal savings may also be available and preferred to formal savings instruments. Augmenting (3) to capture informal savings instruments gives

$$s_F = f(\mathbf{j}_F(\mathbf{p}_F(p_F(p_o^e, r_o))), \mathbf{j}_S(\mathbf{p}_S(p_S(p_{ou}^e, r_u, r_o))), s_S) \quad (4)$$

Table 2 presents the instruments that are typically available to individuals and households to mitigate poverty in old age, categorized by instrument type (*pooling*, *saving*, and *prevention*); whether these are publicly or privately provided; and their degree of “formality” – that is whether the instrument is available through a formal transaction, or through social networks (family, inter- or intra-households).

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<sup>23</sup> Similarly, governments are not immune to the information problems particular to insurance – adverse selection and moral hazard – which can lead to abuse and mounting fiscal pressure on social insurance institutions. Social insurance attempts to overcome moral hazard and adverse selection by mandate, i.e. forcing the “good risk” to pool with the “bad risks”.

The most commonly occurring public intervention to mitigate poverty in old age can be classified as a *pooling* instrument - defined benefit, PAYGO social security arrangements.<sup>24 25</sup> Further interventions that qualify as pooling are inflation indexed securities that can be held and traded by private pension fund managers and insurance companies, similarly indexed public-pension guarantees conditioned on minimum contributions, social assistance benefits to the elderly indigent<sup>26</sup>, and deposit insurance. Reforms to social security in Latin America introduced a formal, public *saving* instrument – mandated retirement accounts. Among the public interventions categorized as *prevention* in this context, are prudent macroeconomic policies and sound financial regulation that can lower the probability of future shocks, as well as mandates that individuals build and maintain certain minimum levels of human capital through publicly provided (or subsidized) education and health that postpone the loss of earnings ability by increasing the length of working life.

Individuals and households in most circumstances pool, save and prevent against poverty in old age on their own. Where the necessary conditions obtain, all three actions can be taken formally through private markets. Individuals can purchase private annuities or life insurance policies (pooling). They can deposit savings in private bank accounts or invest in property (saving). Additionally, they can build their human capital beyond the minimum required by government, as well as extend their earning capacity into old-age by purchasing tools and equipment with which to start small household enterprises (prevention).

Similarly, all three options are often taken informally. Households send and receive transfers to smooth consumption; take in elderly relatives and other extended family that may be recovering from an adverse shock to income; and have large families or invest in their children’s education with the expectation of reciprocity between generations (pooling). Further, individuals may choose to accumulate deposits in their homes rather

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<sup>24</sup> Applying the framework at the aggregate level, pooling risk (with market-type old-age insurance, financed on a PAYGO basis) will become more expensive relative to individual saving as the probability of long-life increases and the “frequency” of old age (relative to working age) in the population increases. The legally set, minimum retirement age keeps the age at which workers declare “loss of earnings ability” constant. Thus, while advances in healthcare can postpone the “loss of earnings ability”, in most countries a legal retirement age that fails to adjust to demographic changes extends the period before death that must be financed. The need to raise pay-roll taxes to finance PAYGO social security systems in countries with “aging” populations, and transfers from general revenues to pay public pensions where contributions fall short, are strong indications of the increasing relative cost of pure-pooling arrangements. The growing preference for defined contribution plans among employer-provided pension schemes around the world, is further evidence of the increasing relative costs of pooling for old age income security as life expectancy increases.

<sup>25</sup> Again at the aggregate level, rising pay-roll taxes needed to finance PAYGO benefits, increase the cost of pooling relative to saving outside the system, and may drive workers into informal employment. In time the burden of pay-roll taxes can even increase political support for a partial or total transition to individual accounts.

<sup>26</sup> Since social assistance benefits that are targeted to the elderly are financed out of general revenue from taxation – in Chile, primarily from the value added tax on consumption – they can be categorized as country-level pooling, by which all tax-payers are members of the pool.

than in a bank, or lend money to family and friends at interest (saving). Finally, individuals can increase their health and delay their loss of earnings ability through good diet and regular exercise (prevention). However, that individuals and households can and often do pool, save and prevent - formally and informally - without the aid of government intervention, does not necessarily suggest that they are fully or even effectively covered against the risk of poverty in old age.

#### IV. Hypotheses

Several insights can be drawn from the Ehrlich and Becker framework and formally stated as testable hypotheses. However, first additional arguments should be added to (4). An individual's bounded rationality will drive a wedge between the objective and the perceived benefits of mitigating the risk of poverty in old age in the formal system. If there is an elderly member of the household receiving a pension, this might demonstrate to the individual the potential benefits from contribution.<sup>27</sup> Further, it is important to account for factors limiting access to formal saving, found to be significant in the analysis of contributions to social security in Packard, Shinkai and Fuentes (2001). These factors can include industry of employment; type of employment; and characteristics of the work place. If  $\mathbf{a}$  captures factors determining access, and  $\mathbf{f}$  the perceived benefits derived from contributing to the formal system, then

$$s_F = f(\mathbf{a}, \mathbf{j}_F(\mathbf{p}_F(p_F(p_o^e, r_o))), \mathbf{j}_S(\mathbf{p}_S(p_S(p_{ou}^e, r_u, r_o))), s_S, \mathbf{f}) \quad (5)$$

If pooling and saving are substitutes, as predicted by Ehrlich and Becker, an increase in the relative price of pooling with the rising probability of old age should increase individual demand for saving. However, the framework also predicts that as the endowed probability of old age increases, individuals will have an incentive to prevent the bad state by taking actions that delay their loss of earnings ability. Since individuals will prefer pooling to saving to mitigate losses that are rare, greater expenditure on prevention should lower the preferred amount of saving and increase the preferred amount of pooling at the margin.

The market (or public pooling provider) only takes account of the probability of the bad state that is observed – in this context, mean life expectancy. To the extent that certain groups in the population do not enjoy increasing life expectancy relative to the mean – workers who engage in risky activities, those who come from families with a history of poor health, the life-time poor and certain minorities – saving may be relatively expensive, and pooling to insure against what still may be a relatively rare incidence of “old age”, may be the preferred instrument. Where PAYGO systems have been eliminated entirely in favor of individual accounts, or if the price of the formal pooling option does not take the lower probability of the bad state into account, it may be more

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<sup>27</sup> Thaler (1994) argues that in the context of saving for retirement the multi-period dynamic maximization problem posed in the life-cycle literature, is complex, there is no chance for learning, and few simple rules of thumb to follow to get it right, but the example of previous generations can provide examples for younger generations to follow.

efficient for these groups to turn away from the formal system altogether, in favor of informal pooling mechanisms.<sup>28</sup>

The hypotheses to be tested in the sections that follow are formally presented below. The term  $s_F$  and  $\mathbf{j}_F$  denote saving and pooling within the formal retirement security system;  $s_S$  and  $\mathbf{j}_S$  refer to saving and pooling outside of the system;<sup>29</sup>

<b>Ceteris paribus...</b>	<b>Null</b>	<b>Alternative</b>
1. Structural factors do not limit access to saving and pooling in the formal system.	$H_0 : \partial s_F / \partial \mathbf{a} = 0$ $H_0 : \partial \mathbf{j}_F / \partial \mathbf{a} = 0$	$H_1 : \partial s_F / \partial \mathbf{a} < 0$ $H_1 : \partial \mathbf{j}_F / \partial \mathbf{a} < 0$
2. A rise in the probability (observable and unobservable) of old-age does not increase the incentives to save in the formal system.	$H_0 : \partial s_F / \partial p_o = 0$ $H_0 : \partial s_F / \partial p_{ou} = 0$	$H_1 : \partial s_F / \partial p_o > 0$ $H_1 : \partial s_F / \partial p_{ou} > 0$
3. Greater unobserved prevention (which lowers the relative cost of pooling), does not lower the incentives to save in the formal system.	$H_0 : \partial s_F / \partial r_u = 0$	$H_1 : \partial s_F / \partial r_u < 0$
4. Formal pension benefits received by elderly household members do not increase the likelihood that individuals save in the formal system.	$H_0 : \partial s_F / \partial \mathbf{f} = 0$	$H_1 : \partial s_F / \partial \mathbf{f} > 0$
5. Individuals do not substitute pooling and saving in the formal system with analogous (informal) risk-mitigating behavior outside the system.	$H_0 : \partial \mathbf{j}_F / \partial \mathbf{j}_S = 0$ $H_0 : \partial s_F / \partial s_S = 0$	$H_1 : \partial \mathbf{j}_F / \partial \mathbf{j}_S < 0$ $H_1 : \partial s_F / \partial s_S < 0$

The combined saving and pooling character of the formal retirement security system in Chile can also be accommodated within the set of testable hypotheses. As explained in Section II, workers who have contributed to the system for 240 months (20 years) become eligible for a minimum pension guaranteed by the government. Contributions up to the 240-month eligibility threshold may be motivated purely or primarily by a preference for pooling. Further contributions to the system beyond the threshold (other than the portion that pays AFP commissions and the premia for disability and life insurance) are primarily savings.<sup>30</sup>

<sup>28</sup> While individuals' increased expenditure on prevention may not be observed by formal pooling providers (public and private), they are likely to be observed by members of an informal pool – neighbors, family members, etc..

<sup>29</sup> In Table 2 pooling and saving (and prevention) instruments, other than those provided publicly, are categorized separately as “formal” (i.e. market-based) and “informal” (i.e. non-market based). Since this research is mainly concerned with individuals' take up of the publicly provided instruments when alternatives are available, I have chosen to economize on notation by bundling market and non-market saving, as well as market and non-market pooling, into a single set of private alternative instruments to the retirement security system.

<sup>30</sup> Readers will recall that only 10 percentage points of workers' contributions accumulate as savings, while 3 percentage points pay the fund managers' commissions and the premia for private disability and life insurance policies.

Thus a different set of incentives prevails once affiliates become eligible for the minimum guaranteed annuity. If additional contributions to the pension system are simply savings, and alternative, perhaps cheaper, more flexible forms of saving (both market and non-market based) are available, individuals may prefer to diversify their retirement portfolios by saving outside the system once they have secured the formal pooled benefit. Admittedly, additional contributions beyond the minimum eligibility threshold are not purely savings, since affiliates are still purchasing pooled coverage against disability and death. However, market based and non-market based pooling instruments to cover death and disability may also be available, and may offer individuals a greater degree of choice as to just how much protection against these contingencies they would like to purchase.<sup>31</sup> If a sufficient number of alternative market and non-market instruments to save and insure were available, additional contributions to the government mandated system might be redundant.

If  $c$  denotes an individuals' contribution history (in months), another hypothesis can be added to take account of the different set of incentives that prevail once affiliates become eligible for the minimum pooled benefit guaranteed by the government.

Ceteris paribus...	Null	Alternative
6. Individuals do not reduce their contributions to the formal system in favor of alternative saving once the formal pooled benefit has been secured.	$H_0 : \partial s_F / \partial s_S = 0$ for affiliates whose $c \geq 240$ months	$H_1 : \partial s_F / \partial s_S < 0$ for affiliates whose $c \geq 240$ months

## V. The Data

Analysis of participation in the reformed social security system in Chile has been, until now, constrained by the limitations of the CASEN survey. Several previously unavailable variables were constructed for this analysis from data collected in a risk and social insurance survey (in Spanish, *Encuesta de Previsión de Riesgos Sociales – PRIESO*) conducted in Santiago, Chile in December 1999 and January 2000. The PRIESO was specifically designed to identify the strategies taken by individuals and households to mitigate a series of risks to income. In addition to traditional questions

<sup>31</sup> Banks and insurance companies in Chile offer a growing selection of savings and insurance products. Term life insurance policies (*seguro de vida con ahorro*), available since 1995, may be a competitive alternative insurance and investment instrument to the pension system. Private insurance companies in Chile report that, while it is likely that the prices of these policies are prohibitive for poorer households, there is considerable demand for these life insurance/savings facilities among middle- and lower-income groups - especially younger age cohorts for whom premiums are low. *Santander* (a private insurance provider) offers a policy (*Super Futuro*), which guarantees a market rate of return on the savings portion that will not fall below UF+4%. Policy holders can insure up to a certain amount in benefits in case of death without having to undergo medical examination. Partial withdrawals can be made from the savings account after three years of paying premia. At the legal age of retirement, the policy holder can withdraw the full balance of his savings. Although premia are taxed, the returns to the savings account and withdrawals are tax exempt. In a casual poll of taxi drivers in Santiago, term life insurance policies were frequently mentioned as alternatives to an AFP retirement account.

dealing with household composition, income and labor market activity, the survey asked for respondents' opinions of the reformed pension system, their preferences for alternative retirement security strategies, their access to credit, perceptions of their own mortality, income shocks and contingent risk-coping strategies.<sup>32</sup> A list of the variables constructed from the PRIESO for the present analysis and their definition, is provided in Table 3 (in alphabetical order). In Table 4, I have categorized those variables related to demand for cover under the current system by their instrument-type: formal and informal pooling, saving, and prevention.<sup>33</sup> Variables controlling for factors affecting individuals' access to the pension system – discussed in Packard, et al (2001)- are shown in the shaded column of Table 4.

Among the sample of workers in Santiago who are affiliated to the pension system, only 62% were making contributions at the time of the survey, approximately the same level as found by Edwards and Edwards (2000) in 1998. Among working men, 64% were contributing. Only 58% of working women made contributions, while among women of working age who were neither working nor searching for a job, 42% received some cover from the system through the contributions of a spouse, leaving 58% without formal coverage. However, contribution to the system at any point in time can underestimate the share of workers who are actually covered, in that the measure does not take account of past contributions nor of disability and life insurance benefits that extend for a period after a worker has stopped contributing.

In an analysis of the coverage of an old-age income security system – especially demand for cover - the only choice variable is an individual's period of contributions to the system as a share of their working lives – their “*contribution density*” (CONDEN in Table 3). This measure has long been unavailable to researchers in Chile and in other developing countries.<sup>34 35</sup> Respondents to the PRIESO were asked the month and year

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<sup>32</sup> Details on the sampling techniques used, as well as excerpts from the field report are provided in Appendix One. The full questionnaire is reproduced in English as Appendix Two.

<sup>33</sup> Readers will note that there are few if any available variables included to act as proxies for formal pooling outside the pension system, informal saving and informal prevention. While there are several questions in the PRIESO questionnaire (see Appendix Two) to elicit data on these instruments, variables constructed from these data were excluded from the empirical analysis mainly because there were too few observations. There is also no proxy for  $p_o$ , the probability of the bad state that is observed. Although, objective life expectancy could act as an acceptable proxy, this is a function of age, making it difficult to unravel the effects on contribution of the observable probability of poverty from the effects of age. Furthermore, due to an element of ambiguity about what is purely saving and what is purely prevention, inherited from the Ehrlich and Becker framework (see quote in footnote 12), it is difficult to definitively categorize variables such as years of education (with both “prevention” and “access” elements). I discuss how this ambiguity is reflected in the interpretation of the results in the next section.

<sup>34</sup> Ironically, while a worker's density of contributions is relatively more important in assessing whether they are covered in a defined contribution system than under a purely PAYGO regime, the private and decentralized structure of the reformed system in Chile has made data on contribution history unavailable to the system's regulators. Only recently have the authorities made an official request to the private fund managers for the contribution history of a sample of affiliates in order to begin assessing whether the system will provide adequate retirement benefits.



that they first contributed to the social security system. They were then asked to estimate the total period in years and months they had failed to contribute for whatever reason – inactivity, unemployment, employment without a contract, self employment – since they started. I constructed the variable “contribution density” by first calculating respondents’ history of contributions in months, and dividing this by their number of months in the labor force, using Mincer’s (1974) formula for labor market experience: (age – years of education – five).

In Figure 2, the sample of affiliated men and women is divided into deciles by their contribution density. Taking eligibility for the minimum pension guaranteed by the government as a measure of minimum level of coverage offered under the (contributory) old age income security system, I divided the required months of contribution for the guaranteed benefit (240, or 20 years) by the average number of working months for men and women. The resulting share is the “contribution density threshold” that affiliates must cross to qualify for the minimum pension guarantee (the bold, horizontal axis in each graph). Assuming that workers will maintain their reported rate of contribution to the system, affiliates whose contribution density places them above the threshold will qualify for (at least) the minimum level of cover, while those below will not. It is immediately apparent that a larger share of affiliated women – about half - lies below the threshold of contributions necessary to be covered. However, many of these women may be entitled to some benefit through the current and past contributions of a husband. What is particularly worrying is that 30% of affiliated men are unlikely to qualify for the minimum contributory benefit.

The PRIESO survey includes a wide range of questions about informal instruments to mitigate poverty in old age, and how these might substitute or complement the formal pension system. In addition to questions as to whether respondents gave (received) help in-kind or in cash to (from) family and friends outside the household (in Table 3, GIVES and GETS); the number of children respondents had and/or intended to have (EXKIDS); and how much they spend on their children’s education every month (LEDKIDS); two questions were posed to capture whether parents expected their children to care for them in their old age and in what way.<sup>36</sup> The responses to these questions are tabulated by the number of children reported by the respondent, and presented separately for those living in urban and rural areas in Tables 5 and 6. Readers will note that these questions were posed even to individuals who did not have children at the time of the survey.

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<sup>35</sup> Cox-Edwards (2000) uses cross-section survey data to estimate longitudinal patterns of contributory behavior and wages. Because information on years of contributions were previously unavailable, Cox-Edwards is forced to create synthetic cohorts to estimate years of contributions. She finds that men typically accumulate forty years worth of contributions from the age of 16 – 65. Women tend to have more interruptions especially the ones with lower levels of education.

<sup>36</sup> I am indebted to John Hoddinott for many of the questions appearing in this module of the PRIESO, and to Ana Maria Arriagada for pointing out that Chileans’ expectations of sons were likely to be very different from their expectations of daughters.

It is difficult to discern a clear pattern to reported expectations from children, other than the rural/urban disparities one might expect from a review of the literature.<sup>37</sup> While 47% of respondents from rural areas expected to live with a son or a daughter in their old age, only 19% of urban respondents held the same expectation. Similarly, rural respondents seem more confident that they would receive some sort of care from their children, with 67% giving an affirmative response, and only 14% unsure. Only 17% of rural respondents did not expect to be cared for by their children. Urban respondents, on the other hand, were more evenly distributed between those that expected care from their children (34%), those that did not (30%), and those that did not know (19%). When asked why they did not expect either a son or daughter to care for them (28% of all respondents), the answer most frequently given by respondents was that they did not want to become a burden. The impact of parents' expectations on the likelihood that they contribute to the formal pension system is examined more closely in the next section.

Finally, respondents to the survey were asked the age at which they expected to die. I use their responses to construct subjective measures of life-expectancy that act as a proxies for the perceived probability of the bad-state.<sup>38</sup> I constructed the subjective life expectancy variable (SLIFEX) by subtracting the respondents age at the time of the survey from their predicted age of death. Similar studies of savings and retirement-income security using data from the United States by Hurd and McGarry, (1997), and Hurd, McFadden & Gan, (1998) also make extensive use of subjective life expectancy.

A brief analysis of what drives respondents' survival expectations is illuminating. Regressions of the dependent variable SLIFEX on a number of explanatory variables, are shown separately for men and women in Table 7. After controlling for the average life expectancy predicted by a mortality table for Chile,<sup>39</sup> respondents with more education expect to live longer. Both objective and subjective indicators of the respondent's health – how many cigarettes they smoke in a month (SMOKER),<sup>40</sup> whether they had been hospitalized in the last two years (HOSP), and their reported likelihood of falling ill

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<sup>37</sup> Alderman and Paxson, (1992), Hoddinott, (1992), Deaton, (1990 and 1997), Cox, Eser and Jimenez, (1998)

<sup>38</sup> A more exact proxy for the perceived probability of the bad state in this context would be respondents' expected period of "retirement", strictly defined as a the period prior to death when they are unable to earn an income from work. The PRIESO asked respondents the age at which they thought they would not longer be able to work, and an "expected retirement" variable can be constructed from the data. However, there is evidence in the data that many respondents took "ability to work" to refer literally to their intentions to work outside the household, and, therefore, that the phrasing of the question may have been biased against inactive women who never considered the possibility. For this reason, while the expected retirement variable behaves similarly to subjective life expectancy in the model, I prefer using the latter.

<sup>39</sup> To calculate the mean "objective" life expectancy I used the World Bank's *Pension Reform Options Simulation Tool* (PROST) and a life table for Chile.

<sup>40</sup> I included the continuous variable SMOKER, guided by Becker and Murphy (1988), Ehrlich and Chuma, (1990), Chaloupka (1991), and Becker and Mulligan (1997) who formalize the a theoretical link between smoking, myopia and future expectations, as well as by the empirical findings of Fuchs (1986) who explores the relationship between inter-temporal choice, myopia, health behavior (smoking), and health status.

(PSICK) – significantly lower the number of years that they expected to live. While not statistically significant for the male sample, women who are concerned with becoming disabled (DISAB) also expected to live a shorter life. Both men and women took strong signals about how long they should expect to live from their parents’ experience. Whether a parent (of the same sex) is alive - or if deceased, the age at which that parent died – has a strong, positive effect on the subjective life expectancy of both sexes. The regressions explain 59% and 62% of the variation among responses from men and women, respectively, suggesting that respondents’ expectations contain a substantial rational component. These results are similar to those reported in the studies using data from the United States, cited above.

## VI. Results

I have separated the empirical analysis of individual preferences to mitigate poverty in old age into two parts. In the first, tobit regressions are performed to show the determinants of reported *density of contributions* (CONDEN): the total number of months respondents have contributed to the social security/pension system, divided by their total number of economically active months.<sup>41</sup> Since the dependent variable in the tobit regressions is constructed from respondents’ recollections extending back to when they first contributed to social security, there are few remaining pre-determined variables (other than age, education and for younger respondents assets held ten years prior to the survey) to act as exogenous regressors. Thus the results of the tobits should be interpreted with caution. For this reason probit regressions – similar to those used in Barrientos (1998), Holzmann, Packard and Cuesta (2000), and Packard, et al (2001) to measure the probability that a respondent is contributing at the time of the PRIESO, are used in the second part of the analysis. Conceptually, “*contribution density*” in the tobit regressions is the integral over the individual’s working life of the binary “*contributes/does not contribute*” in the probits that follow.

Additionally, motivated by the results of the economic experiments discussed in Barr and Packard (2002), the same tobit and probit regressions are estimated on a sample of self employed men, first without and then with the measures of time preference and risk tolerance constructed for the sub sample of PRIESO respondents who participated in the experiment.

### (vi.a) Tobit Regressions on Contribution Density

The results of the tobit regressions on contribution density for men and women are presented in Table 8. It bears repeating that there are a limited number of truly predetermined variables in the PRIESO data that can act as regressors in this model. Since I have chosen to include potentially endogenous right-hand-side variables in the

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<sup>41</sup> Since only those respondents who are affiliated to the pension system can report contributions, and to allow for the possibility that affiliated workers, particularly affiliated women are a self-selected group, I first experimented with a Heckman (1979) two-step procedure. The dependent variable in the first step was a binary equal to 1 if the respondent was affiliated to the pension system, and in the second step the dependent variable was contribution density. However, tests for significant correlation of the error terms in the two regressions rejected the Heckman procedure.

analysis, the results should be interpreted with caution. Variables are included to control for age (AGE); whether the respondent is head of household (HEAD); or married (MARRIED); their years of education (YEDU); whether the respondent has ever been employed outside the home (WORKED);<sup>42</sup> whether their spouse contributes to the pension system (SPCONT); and whether the respondent entered the labor market prior to Chile's pension reform in 1981 (PAYGREG). Additionally, to control for the effect of constrained liquidity management on retirement saving I include a variable equal to one if respondents needed but were unable to get a loan in the year prior to the survey (CREDCON).

The remaining variables in the model are included to capture factors affecting individual and household demand for formal cover. Several variables are included to examine possible substitution between the mandated pension system, other pooling and savings instruments outside the system, as well as formal and informal prevention. These include variables to capture inter-generational household pooling, proxied by expected care from children (EXKIDS, LEDKIDS, FAMEX) and inter household transfers (GIVES, GETS); alternative forms of savings, captured by the log of imputed rent (LRENT), property and financial assets held in 1990 (COLATT, FINASST); and variables representing prevention measures such as investments in machinery and tools for household enterprise (WRKASST). The respondents' subjective life expectancy (SLIFEX), discussed in the previous section, is included to capture the effect on contribution behavior of the *perceived* probability of needing to finance a period of life without earning-ability. Additionally, the (log of) incomes received by the household from contributory (LJUB) and non-contributory (LPASIS) retirement pensions are included to examine how the receipt of different types of benefits by elderly in the household – the benefits of formal pooling - might influence the behavior of the working-age sample.

For both sexes, a cubic polynomial on AGE is preferred, showing an initial increase in contribution density with age at the start of an individual's working life, that flattens midway through, only to increase again just prior to retirement. The negative and significant coefficient on AGE<sup>2</sup> may be evidence of the competing demands of a growing family on discretionary income, or of a preference for investing in home ownership in early adulthood. Being head of a household significantly (10% level) increases contribution density among men, but has no significant effect among women. As in the wider range of countries analyzed in Packard, et al (2001), marriage significantly (10% level) reduces women's contributions to the pension system, since once entering into marriage, women in Chile are still more likely to allocate a greater share of their time to household production (Barrientos, 1998a, Montenegro, 2001).<sup>43</sup>

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<sup>42</sup> Cox-Edwards (2000) finds that the key determinant of gender differences in contribution behavior is affiliation - women are less likely to be affiliated to the system, since they are less likely to have worked, and if they worked, less likely to have ever held a contract job. She concludes that the sample of women affiliates is not a random sample of all women, but a sub-sample of women that have higher attachment of the labor force. The variable "WORKED" is included to control for unobservable factors that determine whether an individual chooses to be employed in activities outside the household.

<sup>43</sup> Several authors have attributed the relatively low incidence of contribution among married women to the structure of most pension systems by which wives are covered against health, disability and the sudden

A respondent's education has a positive and highly significant effect (at 1% level for men and women) on contribution density. This may capture a greater likelihood that individuals with more formal education will enter the covered sector where the returns to education are likely to be higher than in other sectors. The result may also point to a greater propensity to save among individuals with relatively higher life-time incomes, and relatively greater awareness of the importance of saving for retirement. Considering the effect of education on time and risk preferences found by Barr and Packard (2002), the positive impact of education on contribution density may also be evidence of greater patience and understanding of the risks and returns from investing in the pension system.<sup>44</sup>

The negative coefficient on the binary variable PAYGREG (significant at 1% level for men), may reflect a greater apprehension among older workers for the system of individual accounts that substantially increases the portion of retirement income risk borne by individuals. Conversely, the coefficient could be capturing the positive incentives to contribute among workers who entered the labor market after the Chile's pension reform, found at the aggregate level in Packard (2001). Among women the estimated coefficient on the same variable is not significant.

The coefficient on the binary variable controlling for the effects of credit constraints (CREDCON) has a strongly significant (1% level), negative impact on the contribution density of both men and women. An individual's ability to borrow and thus to manage liquidity is an important determinant of whether they are able to invest a portion of their discretionary income in a relatively illiquid asset from one month to the next (Thaler, 1994, James, 1999). Constrained credit is especially relevant to the savings decisions of households with low incomes and the self employed (Holzmann, et al, 2000). Again, this result has to be interpreted with caution as the variable captures credit constraints only in the twelve months prior to the PRIESO, and may be endogenous. Excluding the variable from the regression has no effect on the sign and significance of the estimated coefficients on the remaining variables.

Only one of the variables included as proxies for informal pooling has a significant coefficient in the tobit regressions on contribution density. Among men, the expected number of children has a significantly positive effect (10% level). This could either be evidence that men with a larger number of dependents place a greater value on the disability and survivor coverage that is bundled into the AFP system, or of a bequest motive in contributing to an individual retirement account (the remaining balance of which - after financing survivor annuities - can be left to dependents as part of the

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death of their husbands through the contributions of the male household head (Barrientos, 1996, Schwarz, 1997, Cox-Edwards, 2000). However, the tobit regressions indicate that whether a spouse is contributing or not (SPCONT) has no significant effect on the density of contribution of either men or women in the tobits.

<sup>44</sup> However, since education can also postpone loss of earnings ability, the framework would also predict that respondents with more education might be more inclined to pool rather than to save. This is taken up in the next sub-section where the pooling element of the formal pension system is separated from the saving element.

contributor's estate). In a recent study of household saving in Chile, Butelmann and Gallego (1999) find evidence of such bequest motives. However, the result could also be endogenous or simultaneous as men with covered jobs could decide to have larger families with greater confidence in their income security. On the other hand, among women a larger number of expected children significantly (1% level) lowers contribution density. While this may simply reflect the preference among women who expect to have many children to stay at home rather than work outside the home, it may also indicate that women in Chile expect children to care for them in their old age, preferring informal pooling to formal retirement security arrangements.

Turning to alternative saving instruments, the estimated coefficient on the log of imputed rent is negative and significant (5% level) to contribution density. Home ownership is often cited as a form of retirement savings and investment in Europe and the United States (Barr, 2001, Attanasio and Banks, 2001, Case, Quigly and Shiller, 2001). In Latin America, home property is still the most widely held asset (IADB, 2000) and may be considered a viable alternative to government organized social security. The negative coefficient on the log of imputed rent (LRENT) may be evidence that investment in a home acts as a substitute for contribution to the pension system - one form of savings, substituting for another. However, given the pension system's pooling element, the result may also reflect the predicted preference for savings over pooling among individuals who expect to live longer.<sup>45</sup>

Among the bundles of assets held ten years prior to the survey, only the coefficient on productive and business assets (WRKASST: including tools, machinery, vehicles, own business), a market-based prevention measure that extends earnings capacity into old age, is significant. For men the coefficient is negative and significant (at 1%), while for women, the coefficient is positive and significant (at 5%). While WRKASST is likely to be capturing prevention measures among men, for women the variable may show relatively greater prudence and forethought in managing extra income from a household enterprise, rather than simply acting as a dummy variable for women who have engaged in income earnings activities.<sup>46</sup>

Subjective life expectancy (SLIFEX) is included to control for the behavioral effects of the perceived probability of the bad state. As predicted by the Ehrlich and Becker framework, among male respondents life expectancy has a positive and strongly significant (1% level) influence on how much they choose to save in the pension system. The greater the perceived incidence of longevity, the more individuals are compelled to save for income security in old age.<sup>47</sup> However, the same variable is not significant among women.

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<sup>45</sup> I return to the issue of housing in the next section, where the pooling element of the formal system is separated from the saving element.

<sup>46</sup> The variable WORKED is already controlling for whether a woman has ever worked outside the home.

<sup>47</sup> Alternative specifications of the model in which a variable measuring expected period of retirement (calculated by taking the period between the age at which a respondent thought they would no longer be able to earn an income from work, and the age at which they expected to die), was also positive and highly

The amount of income that the household receives in contributory pensions also has a strong positive effect (significant at 1% level) on the contribution density of men, but no significant effect on that of women. Retirement benefits received by the elderly in the household may have a positive learning impact on the contribution behavior of working-age men, demonstrating the benefits of formal saving and pooling. That the coefficient on the same variable for women is not significant, comes as little surprise. Benefits received by resident elderly women are likely to have been earned through the contributions of a deceased husband, and thus, less likely to have a “learning” impact on the contribution behavior of younger women.<sup>48</sup> If the positive sign on LJUB is capturing a demonstration effect, it would be reasonable to expect a negative and significant coefficient on the amount of *non-contributory* old age benefits received by elderly the household. However, the coefficient on log of household income from social assistance pensions (LPASIS) is not significantly different from zero. This may indicate that social assistance benefits for old age in Chile are efficiently targeted to the elderly poor, or set sufficiently low as to prevent moral hazard among those of working age.

*(vi.b) The Probability of Contribution at a Point in Time*

In the set of regressions discussed in this sub-section, I have excluded inactive men and women – those without work who were not looking for employment – as well as the unemployed.<sup>49</sup> Many of the variables included in the regressions presented in Tables 9 and 10, are carried over from the probits on contribution to social security, presented in Packard, et al (2001). These variables control for factors that might limit individuals’ access to the pension system (labor market insertion; firm size; hours worked; industry of employment). The dummy controlling for access to credit (CREDCON) is also included as a control for factors determining access. Including these variables in the probits helps ensure that the variables constructed from the PRIESO data capture *demand-side* factors only – individuals’ portfolio decisions with respect to their expectations and available options to pool and save outside the system.

To variables used in the tobits discussed above, I have added a larger set of household composition variables (SHYKIDS, SHKIDS, SHOLDM, SHOLDW, NYFEM, RESFAM) to better capture preferences for informal pooling;<sup>50</sup> whether the respondent

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significant to contribution density. A related variable, the difference between the objective life expectancy as predicted by Chile’s life table and respondents’ expectations, was similarly positive and significant. However, the simple subjective life-expectancy SLIFEX is preferred to avoid suspected biases discussed in an earlier footnote, and because it is less correlated with age and lowers the risk of biases from multicollinearity.

<sup>48</sup> If anything, one might expect a significantly negative coefficient on this variable for women of working age.

<sup>49</sup> Including inactive men and women in the sample, along with a binary variable to capture their choice to stay out of the labor market, does not change the sign of the significant coefficients in either regression. However, as might be expected, the significance of several coefficients is increased from leaving inactives out of the sample. Since it has been demonstrated elsewhere that inactive respondents are significantly different from those who entered the labor market, I prefer to exclude them.

<sup>50</sup> These household composition variables were not included in the tobits out of concern for possible endogeneity.

was contributing to the pension system during the CASEN 1998 (CONT98) twelve months prior to the PRIESO; and whether the respondent has met the contributory requirements (240 months of contributions) to be eligible for the minimum pension guarantee from the government (MPG<sup>51</sup>) – the contributory pension system’s remaining pooling element against the risk of poverty in old age.<sup>52</sup> Further, I have included contribution density (CONDEN) as a right-hand-side variable. CONDEN should control for a host of possibly omitted variables affecting the decision to contribute over respondents’ working lives, and CONT98 for autocorrelation in contributions between consecutive periods.

The results of the probit regressions on the sample of men are shown in Table 9. Those on the sample of women in Table 10. Each table includes two specifications. The estimated coefficients in PROBIT 1 for men and women are discussed first.

After controlling for age, education, position in the household, and factors that could determine individuals’ access to the pension system, household composition significantly affects the probability that men and women are contributing, albeit in very different ways. The share of children in the household does not have a significant effect on the participation of men, however, every additional child aged 10 to 13, significantly (1% level) increases the likelihood that women are contributing by 0.7%. This may be evidence of older children taking on household responsibilities, leaving mothers free to enter the labor market. The positive significance of the number of other women of working age (14 – 60) in the household (NYFEM, significant at 10% level), may reflect a similar intra-household allocation of labor. The estimated coefficients on these variables may, therefore, be capturing yet another factor determining access rather than a preference for informal pooling arrangements.

The share of elderly men in the household increases the likelihood that men of working age contribute (by 0.07%), while the share of elderly women lowers the likelihood of contribution (by 0.4%). Neither variable is significant in the sample of women. The positive impact of resident elderly men may be related to the learning effect captured by income from contributory pension benefits discussed in the previous section – as might the share of elderly women, in that this may be evidence of traditional, family based pooling arrangements that differ according to gender. However, in the probit, the estimated coefficient on the contributory pension variable LJUB is negative. Removing the share of elderly men and women one at a time from the probit does not change the sign or significance of LJUB. Given the strong positive significance of LJUB in the tobit

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<sup>51</sup> The MPG variable is a binary that equals 1 if the respondents reported months of contributions are equal to or greater than 240. This is different from the “threshold” ratio discussed in the previous section, where it was assumed that a respondent would qualify for the minimum benefit if they maintained the same rate of contributions for the remainder of their working lives.

<sup>52</sup> It is worth pointing out again, that two government-organized pooling devices to insure against poverty among the elderly remain in Chile after the 1981 reform: the minimum pension guarantee, conditional on contributions, and the means tested PASIS.



regression on contribution density, the negative coefficient on the same variable in the probit may indicate multicollinearity arising from including CONDEN as a regressor.

Resident extended family in the household lower the likelihood that women are contributing by 48%. Again, while this may simply reflect the need for women with more dependents to stay at home rather than work outside the home, it may also indicate, that women in Chile still count on informal (reciprocal) pooling arrangements for care in their old age.

Unlike in the tobits, the number of children men expect to have, has no significant effect on whether they contribute. However, men who expect to live with their children or who otherwise expect to be cared for in their old age are significantly (5% level) less likely to contribute to the pension system. Expecting care from children lowers the likelihood that a male respondent is contributing by 8%. Expecting care from children has no significant effect on the likelihood that women contribute.

Market-based alternatives to the formal pension system, are less significant in the probit than in the tobit regressions on contribution density. While the sign on the log of imputed rent is still negative in the probit it is not statistically significant. Holding property in 1990 increases the likelihood that men contribute, but this may simply reflect the effect of higher incomes. None of the variables for market based instruments were significant among women.<sup>53</sup>

After controlling for autocorrelation in contributions between consecutive periods (with the variable indicating whether individuals contributed at the time of the CASEN in 1998, CONT98), greater contribution density (CONDEN) strongly increases the likelihood that both male and female respondents are still contributing. Every additional percentage point increase in contribution density, increases the likelihood that men are contributing by 42%, and that women are contributing by 81%. The strong, positive effect of a greater density of contributions, provides evidence of positive duration dependence in contributing behavior. Thaler (1994) cites evidence from the United States of similar duration dependence in retirement savings – once people in the U.S. start depositing money into a voluntary individual retirement account, they are more likely to continue to do so. However, as widely hypothesized in the literature (Vittas, 1996, Schwarz, 1998, Cox-Edwards, 2000, Arenas de Mesa, 2001) men who have met the contribution threshold to qualify for the minimum pension guarantee from the government, are significantly (5% level) less likely to still contribute. Crossing the eligibility threshold lowers the likelihood that men make further contributions by 13%.

Since workers who reach the age of 55 and have accumulated a balance sufficient to purchase a private annuity equal to 110% the minimum guarantee are exempted from contributing further, I re-ran the regressions on progressively smaller samples of younger workers. The estimated coefficient on MPG remains negative and significant until the sample is restricted to respondents under 40 years of age. As the sample becomes

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<sup>53</sup> The variable controlling for financial assets was dropped from the model for predicting contribution perfectly among the sample of women – respondents may have declared their individual account as a financial asset.

younger, the coefficient on one of the informal pooling variables – monthly expenditure on children’s education (LEDKIDS) – becomes negative and significant to the probability of contribution. Since contributions up to the MPG threshold may be motivated by a preference for pooling, this may be evidence of younger workers substituting the pooling component of the formal pension system with informal pooling.

In the second probit (PROBIT 2), I separate the Chilean system’s pooling element from its saving element by interacting each regressor with the dummy variable MPG (the binary variable equal to 1 if the respondent had contributed to the system for at least 240 months), to capture the different set of incentives that obtain once affiliates become eligible for the pooled annuity guaranteed by the government. The only interacted variable that was not dropped during a general to specific procedure was the interaction of MPG with the log of imputed household rent (LRENT). Including the interacted variable influences the significance of other variables in the model. The estimated coefficient on firm size (FSIZE) in the regression on the male sample that was negative and significant (10% level) in the first probit, is no longer significant. The coefficient on (log of) monthly expenditure on children’s education (LEDKIDS) that was not significant on the full sample of men in the first probit, significantly (10% level) lowers the likelihood men are contributing to the pension system in the second.

In the regressions on the sample of women, including the interacted term also changes the results. Female heads of household are significantly (10% level) more likely to contribute in the second specification. However, women in rural areas and those working in the agriculture industry are significantly (both at 10% level) less likely to contribute. Like men, women who cross the eligibility threshold for the minimum pension guarantee are 46% less likely to continue contributing to the pension system.

The estimated coefficients on the interactions of MPG and LRENT in the model for men and women are very revealing. For men, the likelihood of making additional contributions beyond the minimum required for the guaranteed annuity, is significantly (1% level) lower the greater the rental value of their home. Since contributions to the system beyond 240 months are mainly a form of saving, men who cross the threshold and become eligible for the pooled benefit may prefer to substitute saving in the pension system with saving outside the system in the form of housing. The negative coefficient on the interacted variable becomes statistically significant for samples of working men aged 49 and older. The opposite is true for women, although the result is less significant (10% level). The greater the rental value of the homes of women who have crossed the contribution threshold for the minimum benefit, the more likely they are to make additional contributions. Since the coefficient on MPG in the same regression is negative and significant (10% level), it is likely that the coefficient on the interacted term is capturing the positive effect of income.

Even after controlling for “access” (industry of employment) found to be significant in Packard, et al (2001), the variables capturing “demand” (expectations, alternative investments, and portfolio choices) have a significant impact on whether workers contribute. In fact, including the wider range of “demand” variables constructed from the PRIESO data leaves most of the “access” variables that were significant in the contribution probits in Packard, et al (2001), statistically insignificant. This said, full-

time workers and those that work in larger firms are more likely to contribute, raising concern for workers employed on a part-time basis and those employed in small firms. There also appear to be barriers preventing women in rural areas and those working in agriculture from formal cover.

A brief discussion of possible biases due to endogeneity is warranted before proceeding to the last sub-section of results. Several of the variables in the probit could be simultaneously determined with contribution to the pension system or endogenous. The possible offending variables include the binary variables for self employment and employment without a contract (SELF, and INFW);<sup>54</sup> the controls for industry of employment; and the binary variable capturing credit constraint (CREDCON). Although I attempted to control for endogeneity using a two-stage-least-squares procedure, there were an insufficient number of variables in the PRIESO cross-section with the necessary explanatory power to act as instruments.

Thus, to control for possible biases from endogeneity, I re-ran the probits without the suspect variables. Removing the possibly endogenous variables did not effect the signs or significance of the main results. The coefficients on some of the variables – notably CONT98, CONDEN, and MPG – became more significant. However, removing the dummies SELF and INFW causes the estimated coefficient on years of education (YEDU) that was positive and significant in the tobit on contribution density, to become significantly (1% level) negative. While this seemingly contradictory result could be explained within the Ehrlich and Becker framework,<sup>55</sup> given the relatively free access to the pension system enjoyed by workers in the informal sector, the result most likely reflects a bias from omitting SELF and INFW. For this reason, I prefer to keep the variables in the model.

#### *(vi.c) Examining the Choices of the Self employed*

Evidence from the economic experiments presented in Barr and Packard (2002), indicates that the self employed in Chile are relatively free to reveal their preferences with respect to the pension system. Further, the results of the experiments suggest that the self employed are not significantly different from wage and salaried employees with respect to time and risk preferences<sup>56</sup> – both important determinants of savings and insurance decisions. This being the case, the self employed become an agent group of considerable interest, since it is they that are most free to reveal their preferences while representing the preferences of the working population. Barr and Packard (2002) find that the self

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<sup>54</sup> While it is true that a movement into self employment or employment without a contract substantially lowers the likelihood of contribution, self employment and informal employment are not exclusionary conditions, per se. As explained in Section II, entrepreneurs can contribute if they choose to, and workers without a contract can choose whether or not to be covered by posing as self employed and contributing on the legal minimum wage. Among self employed men and women in the PRIESO sample, 17.5% were contributing to the pension system, while among employees without a contract 17.7% made contributions.

<sup>55</sup> An investment in education can postpone the loss of earnings ability, lower the probability of poverty in old age, and thus, lead to a preference for pooling.

<sup>56</sup> While these findings are robust, they should be taken with caution given the small sample size in the risk aversion and time preference measurement follow up to the PRIESO.

employed who choose to contribute to the pension system are significantly more patient, however, contrary to expectations, those who contribute are also more tolerant of risk. These findings motivate a separate set of regressions on the sample of self employed, in particular to see whether the time and risk preference variables remain significant after a wider selection of “demand” variables from the PRIESO are included in the analysis.

Of the 186 self employed men of working age in the PRIESO sample, 40 (22%) were contributing to the pension system. A tobit regression on contribution density for the sample of self employed men, presented in Table 11, roughly mirrors the results of the regressions in Table 8 on the entire male sample.<sup>57</sup> After controlling for age and position in the household, education has a positive and significant (5% level) effect on contribution density. As in the earlier regressions, self employed respondents who entered the labor market prior to the 1981 reform have significantly (5% level) lower density of contributions. Those who sought credit in the previous year but failed to get a loan also had significantly (5% level) lower contribution densities.<sup>58</sup> The amount of money received by the household in contributory retirement benefits increases contribution density. As in the earlier tobit regression, the log of imputed rent significantly (10% level) lowers contribution density, affirming the earlier finding that savings in the form of housing is perceived as an alternative retirement security instrument to the pension system. Finally, the self employed who expect to live longer contribute to the pension system for a greater share of their working lives.

Including the time and risk preference variables (TIMEPRF and RISKPRF) in the model, although on a smaller sample size, significantly alters the results.<sup>59</sup> A cubic polynomial on AGE, similar to that in the tobit for the entire male sample, is preferred. However, the negative coefficient on PAYGREG is no longer significant. Nor is the coefficient on credit constraints or on the log of imputed rent. The self employed with greater patience and an aversion to risk have a greater contribution density. While this last result may seem at first glance to contradict the findings in Barr and Packard (2002), since the average age of the sample of self employed men (40) is higher than that of the sample of wage and salaried employees (36), a larger share of their contribution density consists of contributions to the PAYGO system prior to the introduction of individual accounts in 1981, and thus to a formal pooling instrument that is less risky to the individual by design. That the time and risk preference variables render the coefficient on PAYGREG insignificant, supports this interpretation.

The results of probits estimating the probability of contribution among self employed men, are presented in Tables 12 and 13. Table 12 presents the results of the model first

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<sup>57</sup> There are an insufficient number of women of working age in self employment to allow a separate analysis of male and female entrepreneurs.

<sup>58</sup> The earlier concern for and caution about the possible endogeneity of this variable applies.

<sup>59</sup> The time and risk preference data was only collected from a sub-sample of 230 PRIESO respondents. Running the regression on the smaller sample without the preference variables does not alter the results shown in the first columns of Table 8.11.

without, and then with the interaction of MPG and LRENT. Table 13 shows the effects of including measures of time and risk preference.

Of the control variables in the model, only AGE and MARRIED behave differently than in the probit on the full sample. The square polynomial on age was rejected, while being married significantly (10% level) lowers the likelihood that self employed men contribute.<sup>60</sup> As in the probit on the full sample, the amount of contributory benefits received by the household lowers the likelihood of contribution. The share of resident elderly men increases the probability of contribution, although unlike the earlier probit, the share of elderly women has no significant effect. None of the variables included to capture household-based, informal pooling are significant. However, among the market-based alternatives, holding productive assets (either a business, machinery or tools) significantly (10% level) lowers the likelihood that the self employed are contributing. Just as in the model for the full sample, a greater contribution density significantly (1% level) increases the probability of further contribution. Similarly, crossing the eligibility threshold for the minimum pension guarantee significantly (1% level) lowers the likelihood of further contribution by 14%.

Including the interaction between MPG and LRENT changes the results only slightly. Resident extended family and holding financial assets both significantly (10% level) increase the likelihood of contribution among self employed men. Either result may be capturing a positive income effect. However, as in the second probit specification on the full sample of working men, once entrepreneurs have crossed the contribution threshold and are eligible for the minimum pension guarantee, the rental value of their homes significantly (1% level) lowers the likelihood of further contributions to the pension system. As discussed earlier, this may be evidence of workers substituting contribution to the pension system with saving outside the system once they have secured the formal pooled benefit, since additional contributions to the system are mainly savings.

Due to the small sample size of self employed for whom data on time and risk preferences are available, a more parsimonious model is required to conserve degrees of freedom. For this reason, only the significant variables from the first probit in Table 12 are used along with the time and risk preference variables in the second specification.<sup>61</sup> As shown in the first two columns of Table 13, most of the significant results from the model on the larger sample of self employed still hold on the smaller sample.

In the next two columns of the table, after adding the time and risk preference variables to the model, the only remaining significant variables are: whether the respondent contributed to the pension system in 1998 (CONT98); contribution density (CONDEN);

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<sup>60</sup> The Chilean pension system only – legally - extends coverage to female spouses of contributors. However, there are a number of anecdotes of self employed men receiving medical attention in the FONASA system, based on the contributions of wives in wage/salaried employment. While this result may be evidence of self employed men relying on the contributions of their spouses for coverage, the binary variable to control for the effects of a contributing spouse is not significant. Removing either variable does not change the result.

<sup>61</sup> I arrived at the more parsimonious form by following a general-to-specific procedure that began with all the variables included in PROBIT 1 in Table 12.

and the measure of risk tolerance (RISKPRF). Among self employed men - after controlling for autocorrelation in contributions between consecutive periods, as well as for the measured and unobservable variables that determine contribution density - a greater tolerance for risk significantly (10% level) increases the likelihood of contribution to the pension system.<sup>62</sup>

## VII. Conclusion

In the preceding sections I have applied a simple analytical framework borrowed from the economics of insurance literature to examine individual and household strategies to mitigate the risk of poverty in old age in Chile. Although the analysis has abstracted from the important inter-temporal, life-cycle element of savings and insurance decisions, it has nevertheless provided valuable insights into other dimensions of such decisions. The results can be summarized by answering the questions posed as hypotheses in Section IV.

Are there structural factors that limit access of certain groups to saving and pooling in the formal pension system? After controlling for sector of employment, and the industry of employment, the variables capturing expectations and preferences for alternative investments have a significant impact on whether workers contribute. Including the demand variables constructed from the PRIESO data in the analysis, leave most of the access variables statistically insignificant. This said, workers in large firms are still significantly more likely to be contributing, raising concern for workers employed in small firms. There also appear to be barriers preventing women in rural areas and those working in agriculture from formal cover.

Does a rise in the (perceived) probability of old-age increase incentives to save in the formal system? The strong positive significance of subjective life expectancy on the contribution density of affiliated men, suggests that peoples' perceptions of the likelihood of facing a period of life without the ability to work, influence their demand for cover from the formal system. It bears emphasizing that respondents' expected mortality has a substantial explained, rational component.

Does greater prevention (which lowers the relative costs of pooling) lower the incentives to save in the formal system? Although there were few forms of prevention that could be included in the empirical analysis, investing in productive assets – tools, vehicles or a small business – can postpone loss of earnings ability. There is evidence that workers who choose to invest in productive assets are less likely to contribute to the pension system. Even among the self employed, holding productive assets lowers the likelihood of contribution.

Do formal pension benefits received by elderly household members increase the likelihood that individuals save in the formal system through a demonstration effect? The amount of income households receive in contributory pensions has a positive effect on the contribution density of men, but no significant effect on that of women. Benefits received by resident elderly women are likely to have been earned through the

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<sup>62</sup> The p-value of the estimated coefficient on RISKPRF is 0.085.

contributions of a deceased husband, and thus, less likely to have a “learning” impact on the behavior of younger women. There is no evidence of a negative demonstration effect on contribution behavior from the amount of non-contributory, social assistance pensions received by household members. This may indicate that social assistance benefits for old age in Chile are set sufficiently low as to prevent moral hazard among those of working age.

Do individuals substitute pooling and saving in the formal system with analogous risk-mitigating behavior outside the system? The expectation of care from children significantly lowers the likelihood of contribution to the pension system. The amount spent on children’s education – a form of pooling as long as supporting children increases the likelihood of reciprocal support for parents in their old age - lowers the likelihood of contribution to the system. Since contributions to the system up to the minimum eligibility threshold may be motivated by a desire to pool or to save, identifying pure savings substitutes requires controlling for those affiliates who have earned the pooled benefit.

Do individuals reduce their contributions to the formal system in favor of saving outside the system, once the formal pooled benefit has been secured? Workers who have met the contributory requirements to qualify for the minimum pension guaranteed by the government – the reformed system’s remaining pooling element against poverty in old age – are significantly less likely to continue making contributions. The likelihood of additional contributions beyond the eligibility threshold is lowered further the greater the rental value of respondents’ homes. Rather than rely on the pension system as an instrument for further savings, respondents who cross the eligibility threshold for the formal pooled benefit may prefer to diversify their retirement portfolio by saving for retirement outside the system in the form of housing. This pattern of behavior becomes statistically significant at age 49 – well under the age when Chilean workers can take early retirement legally.

Finally, demand for cover from the pension system seems to be largely determined by workers’ risk preferences. However, those with a greater tolerance for risk contribute, suggesting that there are retirement security investments in Chile that are perceived as relatively less risky than saving in the pension system. Housing could be one such investment. This last result could also indicate that what individuals and households in Chile are seeking from the mandated pension system, is a relatively greater degree of security, even if this comes in the form of the modest annuity guaranteed by the government.

A valid alternative explanation for these results, is that the minimum pension guaranteed by the government is set too high. Workers with lower life-time earnings would not be able to accumulate a balance at retirement that could purchase an annuity for an amount higher than the guaranteed benefit. For these workers, contribution up to the eligibility threshold may be a high-return investment option, while every additional contribution will be a pure tax (Cox-Edwards, 2000, Edwards and Edwards, 2000). Yermo (2001) uses contribution density and income data from the PRIESO survey to simulate likely accumulated savings at the age of retirement for the sample of respondents, using the parameters employed by Cox-Edwards (2000). He finds that 25% of the women and 5%

of men who responded to the survey will not accumulate sufficient funds to purchase an annuity greater than the minimum pension guarantee. For these individuals, contributing beyond the twenty years required to qualify for the minimum pension would be a pure tax. However, running the probit regressions shown in Tables 9 and 10 on samples of respondents in different income deciles shows that crossing the eligibility threshold has no significant impact on the contribution behaviour of respondents whose incomes place them below the fifth decile. It is those respondents in the fifth income decile and higher that are driving the substitution result discussed in the last section.

The results of this analysis suggests that with respect to individual preferences, the Chilean pension system may be over-designed. Workers seem to be using a system intended to act as a vehicle for savings and investment with a small pooling component, primarily as a pooling device. The falling share of contributors among affiliates to the private pension system shown in Figure 1 is consistent with this finding. Each cohort of workers that completes the 240 months of contributions to the system, may be content to receive the minimum pension guarantee. Given the modest amount of the guarantee, one would hope that these workers would continue to save or invest for retirement outside the system. Evidence presented in this paper suggests that many do. However, Chile may wish to reevaluate the guarantee and tie it more continuously to years of contributions in order to provide a formal pooling option that complements saving in the system by giving workers an incentive to keep contributing beyond the minimum eligibility threshold.



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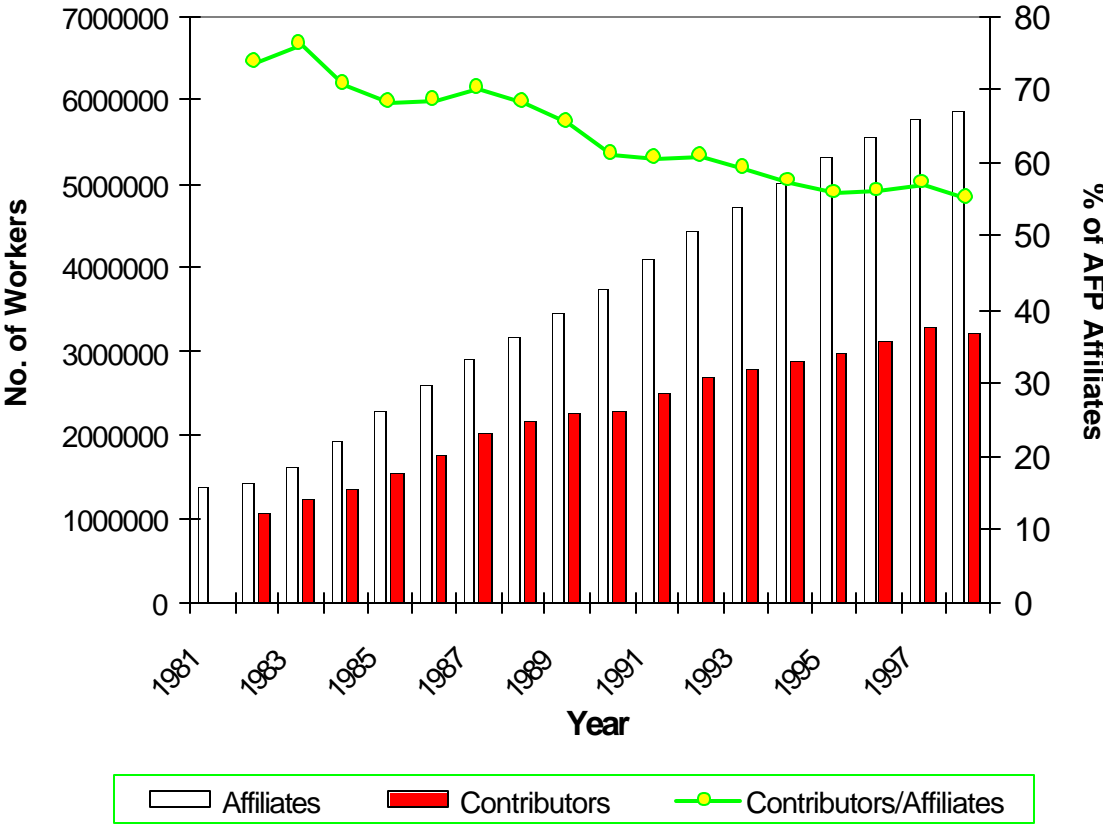
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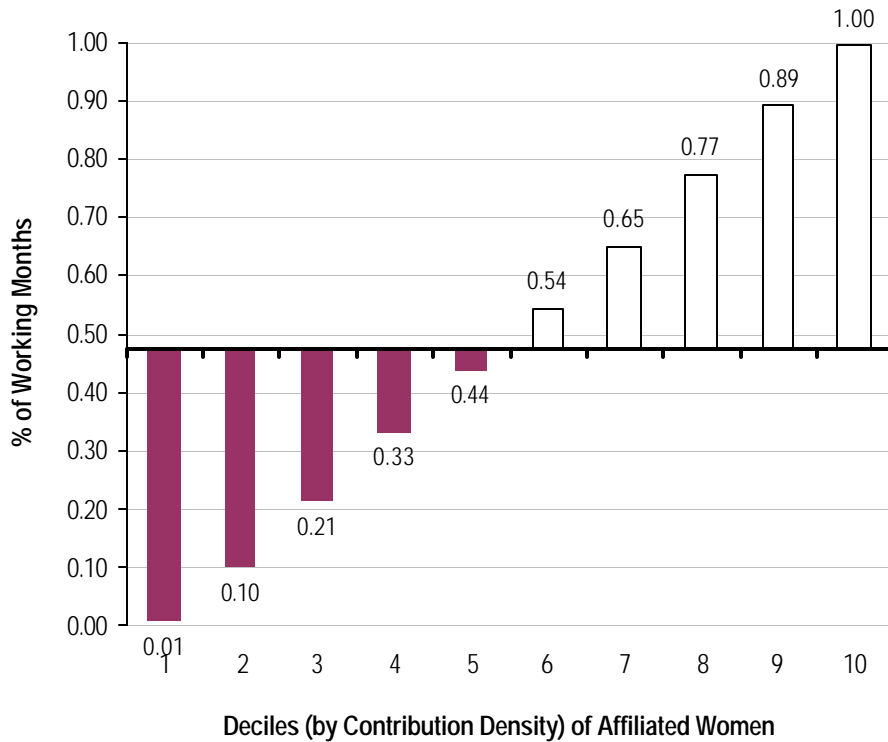
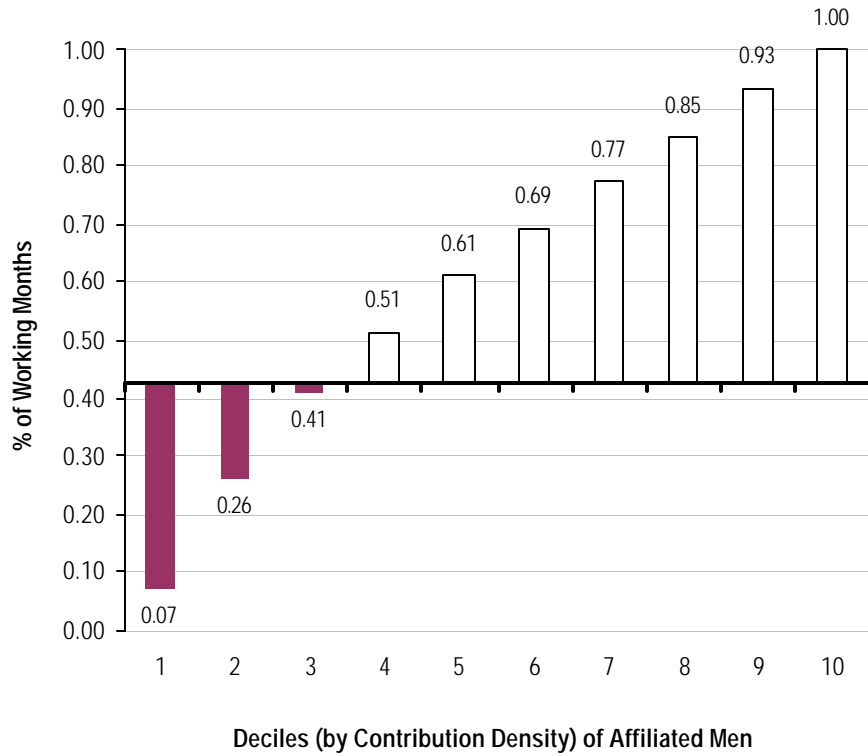
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**Figure 1. Affiliation and Contribution to the System of Individual Retirement Accounts in Chile, 1981 - 1999**



Source: SAFP, 1999

**Figure 2. Reported Contribution Density (Contribution Months/Months in EAP)**  
 (Affiliated Men and Women who Responded to the PRIESO)





**Table 1. Institutional Structure of the Chilean Social Insurance System**

	First Pillar	Second Pillar	Third Pillar	“Zero Pillar” Assistance to Elderly Indigent
<b>Nature of institution and financing</b>	Public Mandate, Public Management, Earmarked Taxes	Public Mandate, Private Management, Own Savings	Voluntary, Private Management, Own Savings/Insurance	Non-contributory Transfer, General Taxes
<b>Old Age Income Security</b>	<p>Minimum Pension Guarantee:</p> <ul style="list-style-type: none"> <li>• “Top up” by government to workers cannot afford a minimum annuity</li> <li>• For men/women aged 65/60, with 20 years of contributions to the second pillar (an AFP)</li> <li>• Minimum annuity benchmark is inflation indexed</li> <li>• Top up financed from earmarked, general taxes</li> </ul>	<p>AFP: <i>Administradoras de Fondos de Pensiones</i></p> <ul style="list-style-type: none"> <li>• Specialized retirement fund managers</li> <li>• Individual retirement accounts financed with 10% of workers’ salary</li> <li>• Additional 3% finances group disability and life insurance coverage for contributors</li> <li>• Mandatory for all employees – Self employed and employers can choose whether to participate or not</li> <li>• Retirement benefit at 65/60 (men/women) as an annuity or scheduled withdrawal</li> <li>• Government mandates that a minimum portion be annuitised – to finance a monthly benefit equal to the minimum pension guarantee</li> </ul>	<p>Private Employers and Contractual Savings Institutions</p> <ul style="list-style-type: none"> <li>• Employer provided plans</li> <li>• Private annuities</li> <li>• Other market insurance – life insurance with savings options</li> <li>• Other self insurance (savings) instruments</li> </ul>	<p>PASIS: <i>Pensiones Asistenciales</i></p> <ul style="list-style-type: none"> <li>• Means-tested by local authorities</li> <li>• No contribution required</li> <li>• Only eligible if over the retirement age, below a certain income, and receiving no other retirement income</li> </ul>
<b>Health</b>	<p>Public Clinics and Hospitals for Indigent</p> <p>FONASA (A &amp; B))</p> <ul style="list-style-type: none"> <li>• 7% of salary, for coverage of 100% - 75% of medical costs</li> <li>• Required proof of income – certified health insurance card</li> </ul> <p>FONASA (C &amp; D)</p> <ul style="list-style-type: none"> <li>• 7% of salary, for coverage of less than 75% of medical costs</li> <li>• Self employed who want coverage must prove contribution to an AFP</li> </ul>	<p>Government mandates that employees who opt out of FONASA contribute to ISAPRES (private companies)</p> <ul style="list-style-type: none"> <li>• 7% of salary for minimum coverage, with option for better plan at higher premium</li> <li>• No requirement that SE be contributing to a pension plan</li> </ul>	Other Private Health Insurance	Coverage of “Catastrophic” Health Risks

Note: Only covers institutional arrangements for workers in the private sector and non-military public sector workers. Chile still administers a separate social insurance regime for its military and police.

**Table 2. Instruments To Mitigate Poverty from  
Loss of Earnings Ability in Old Age**

	<b>Pooling (j )</b>		<b>Saving (s)</b>		<b>Prevention (r)</b>
<b>Formal Public</b>	<ul style="list-style-type: none"> <li>❖ Mandated annuities</li> <li>❖ Inflation indexing and indexed securities</li> <li>❖ Minimum guaranteed benefits, conditioned on contributions</li> <li>❖ Social assistance pensions, conditioned on age and a means test</li> <li>❖ Deposit insurance on private current and savings accounts</li> </ul>	❖	<ul style="list-style-type: none"> <li>Mandated individual retirement accounts</li> </ul>	❖	<ul style="list-style-type: none"> <li>Macro-stability (lower likelihood of inflation and shocks)</li> <li>Financial sector regulation (to insure sound financial sector, and protect household savings)</li> <li>Mandated minimum education</li> <li>Public health</li> </ul>
<b>Formal Private</b>	<ul style="list-style-type: none"> <li>❖ Private annuities</li> <li>❖ Term life insurance policies</li> <li>❖ Disability insurance</li> <li>❖ Long-term care insurance</li> </ul>	❖	<ul style="list-style-type: none"> <li>Savings accounts</li> <li>House (owner-occupier),</li> <li>Housing finance (mortgages and “equity release” contracts)</li> <li>Property to rent</li> <li>Property/valuables to sell</li> <li>Own business</li> </ul>	❖	<ul style="list-style-type: none"> <li>Own education above mandated minimum</li> <li>Own investments in health care above publicly provided minimum</li> </ul>
<b>Informal</b>	<ul style="list-style-type: none"> <li>❖ Inter household transfers</li> <li>❖ Fertility/children</li> <li>❖ Children’s education</li> <li>❖ Resident elderly</li> <li>❖ Resident extended family</li> </ul>	❖	<ul style="list-style-type: none"> <li>Deposits held in the house hold</li> <li>Loans to family and friends</li> </ul>	❖	<ul style="list-style-type: none"> <li>Good health – diet and exercise</li> </ul>

**Table 3. Variables Used In Analysis of the Old Age Insurance Decision**

<b>Variable</b>	<b>Definition</b>
AGE	age of respondent at the time of the PRIESO
AGEPERD	age parent (of same sex as respondent) died
AGR	binary = 1 if respondent is employed in <b>agriculture</b> at the time of the PRIESO
COLATT	binary = 1 if respondent reports owning own home or other residential property in 1990
CONDEN	reported contribution density (ratio of months of contributions /working months)
CONST	binary = 1 if respondent is employed in <b>construction</b> at the time of the PRIESO
CONT	binary = 1 if contributes to the pension system (“99” during PRIESO, “98” during CASEN)
CREDCON	binary = 1 if respondent needed but could not obtain credit in the last 12 months
DEATH	binary = 1 if respondent reports death of a household member in last 3 years
DISAB	how worried respondent is about suffering physical or mental disability (coded 0 to 10)
EXKIDS	number of expected children
FAMEX	binary = 1 if respondent expects to live with or be cared for in old age by children
FIN	binary = 1 if respondent is employed in <b>financial</b> services at the time of the PRIESO
FINASST	binary = 1 if respondent owned financial assets (bonds, shares, deposits) in 1990
FSIZE	number of employed in respondent’s place of work
GETS	binary = 1 if household receives money or goods from non family households
GIVES	binary = 1 if household gives money or goods to non family households
HEAD	binary = 1 if respondent is head of household
HOSP	binary = 1 if hospitalized in the last two years
INFW	binary = 1 if respondent is <b>employed without a contract</b> at the time of the PRIESO
LEDKIDS	log spending on children’s education in the past month
LIFETAB	average life expectancy, predicted by life-table for Chile
LJUB	log income from contributory pensions received by the household
LPASIS	log income from social assistance pensions received by the household
LRENT	log of imputed rent
MARRIED	binary = 1 if respondent is married
MINES	binary = 1 if respondent is employed in <b>mining</b> at the time of the PRIESO
MPG	binary = 1 if respondent has qualified for minimum pension guarantee (MPG)
NYFEM	number of women of aged 14 – 60 in the household (other than respondent)
PAYGREG	Binary = 1 if respondent entered labor market prior to 1981
PERLIVE	binary = 1 if parent (of same sex as respondent) still lives
PSICK	subjective probability of serious illness, discrete values from 0.00 to 1.00
RESFAM	binary = 1 if respondent reports resident extended family in the household
RETAIL	binary = 1 if respondent is employed in <b>retail</b> commerce at the time of the PRIESO
RISKPRF	Measure of risk tolerance (certainty equivalent)
RURAL	binary = 1 if respondent lives in rural area
SELF	binary = 1 if respondent is <b>self employed</b> at the time of the PRIESO
SHKIDS	share of children in the household aged 10 - 13
SHOLDM	share of elderly (over 65) men in the household
SHOLDW	share of elderly (over 60) women in the household
SHYKIDS	share of children in the household aged 0 - 9
SICK	binary = 1 if respondent reports a costly sickness (self, or member of household) in last 3 years
SLIFEX	subjective life expectancy (expected age of death, minus age at time of PRIESO)
SMOKER	number of cigarettes smoked in the last month (equals 0 if non-smoker)
SOC	binary = 1 if respondent is employed in <b>social work</b> at the time of the PRIESO
SPCONT	binary = 1 if respondent’s spouse contributes to the pension system
TIMEPRF	Measure of time preference (subjective discount rate)
TRANS	binary = 1 if respondent is employed in <b>transportation</b> at the time of the PRIESO
UTIL	binary = 1 if respondent is employed in <b>utilities</b> at the time of the PRIESO
WORKED	binary = 1 if respondent reports ever having been employed
WRKASST	binary = 1 if respondent owned own business, machinery or tools in 1990
WRKHRS	number of hours worked in primary job in the last week
YEDU	years of education

**Table 4. Instruments To Mitigate Poverty from Loss of Earnings Ability in Old Age Variables from the PRIESO**

	<b>Pooling (j )</b>	<b>Saving (s)</b>	<b>Prevention (r)</b>	<b>Variables Controlling for Access</b>
<b>Formal Public</b>	<ul style="list-style-type: none"> <li>❖ MPG</li> <li>❖ CONDEN</li> </ul>	<ul style="list-style-type: none"> <li>❖ CONDEN</li> <li>❖ CONT98</li> <li>❖ CONT99 (dependant var)</li> </ul>	<ul style="list-style-type: none"> <li>❖ YEDU</li> <li>❖ HOSP</li> </ul>	<ul style="list-style-type: none"> <li>❖ SPCONT</li> <li>❖ PAYGREG</li> <li>❖ RURAL</li> <li>❖ WORKED</li> <li>❖ FSIZE</li> <li>❖ WRKHRS</li> <li>❖ SELF</li> <li>❖ INFW</li> <li>❖ AGR</li> <li>❖ MINES</li> <li>❖ UTIL</li> <li>❖ CONST</li> <li>❖ RETAIL</li> <li>❖ TRANS</li> <li>❖ FIN</li> <li>❖ SOC</li> <li>❖ NYFEM</li> <li>❖ CREDCON</li> </ul>
<b>Formal Private</b>	<ul style="list-style-type: none"> <li>❖ Too few observations</li> </ul>	<ul style="list-style-type: none"> <li>❖ COLATT</li> <li>❖ FINASST</li> <li>❖ LRENT</li> </ul>	<ul style="list-style-type: none"> <li>❖ YEDU</li> <li>❖ WRKASST</li> <li>❖ HOSP</li> </ul>	
<b>Informal</b>	<ul style="list-style-type: none"> <li>❖ GIVES</li> <li>❖ GETS</li> <li>❖ SHYKIDS</li> <li>❖ SHKIDS</li> <li>❖ SHOLDM</li> <li>❖ SHOLDW</li> <li>❖ RESFAM</li> <li>❖ EXKIDS</li> <li>❖ LEDKIDS</li> <li>❖ FAMEX</li> </ul>	<ul style="list-style-type: none"> <li>❖ Too few observations</li> </ul>	<ul style="list-style-type: none"> <li>❖ SMOKER (not preventing)</li> <li>❖ Too few observations</li> </ul>	

Probability of the bad state “*p*”: AGE, SLIFEX  
 Demonstration effect “*f*”: LJUB, LPASIS

**Table 5. Do You Expect to Live with Your Children When You Can No Longer Care For Yourself?**

	With Son		With Daughter		With Neither		Total
	Obs	%	Obs	%	Obs	%	
<b>Rural</b>							
No children	10	15.2	12	17.9	75	26.3	97
Less than 3	32	48.5	24	35.8	107	37.5	163
Between 3 - 5	18	27.3	22	32.8	78	27.4	118
More than 5	6	9.1	9	13.4	25	8.8	40
<b>Total</b>	<b>66</b>	<b>100.0</b>	<b>67</b>	<b>100.0</b>	<b>285</b>	<b>100.0</b>	<b>418</b>
<b>Urban</b>							
No children	26	22.2	23	12.2	418	26.9	467
Less than 3	64	54.7	88	46.8	591	38.1	743
Between 3 - 5	26	22.2	65	34.6	467	30.1	558
More than 5	1	0.9	12	6.4	76	4.9	89
<b>Total</b>	<b>117</b>	<b>100.0</b>	<b>188</b>	<b>100.0</b>	<b>1,552</b>	<b>100.0</b>	<b>1,860</b>

Source: PRIESO

**Table 6. Do You Expect To Receive Care from Your Children When You Can No Longer Care for Yourself?**

	From Son		From Daughter		From Neither		Doesn't Know		Total
	Obs	%	Obs	%	Obs	%	Obs	%	
<b>Rural</b>									
No children	28	20.9	23	15.3	23	30.7	23	39.0	97
Less than 3	65	48.5	54	36.0	26	34.7	18	30.5	163
Between 3 - 5	32	23.9	56	37.3	19	25.3	11	18.6	118
More than 5	9	6.7	17	11.3	7	9.3	7	11.9	40
<b>Total</b>	<b>134</b>	<b>100.0</b>	<b>150</b>	<b>100.0</b>	<b>75</b>	<b>100.0</b>	<b>59</b>	<b>100.0</b>	<b>418</b>
<b>Urban</b>									
No children	68	18.9	92	15.6	184	33.2	124	34.9	468
Less than 3	170	47.2	244	41.3	201	36.3	128	36.1	743
Between 3 - 5	106	29.4	218	36.9	147	26.5	89	25.1	560
More than 5	16	4.4	37	6.3	22	4.0	14	3.9	89
<b>Total</b>	<b>360</b>	<b>100.0</b>	<b>591</b>	<b>100.0</b>	<b>554</b>	<b>100.0</b>	<b>355</b>	<b>100.0</b>	<b>1,860</b>

Source: PRIESO

**Table 7. OLS Regression – Subjective Life Expectancy of Men and Women**

SLIFEX	Men		Women	
	Coefficient	Std. Err.	Coefficient	Std. Err.
LIFETAB	<b>0.854</b>	<b>(0.034)***</b>	<b>0.879</b>	<b>(0.031)***</b>
YEDU	<b>0.281</b>	<b>(0.087)***</b>	<b>0.197</b>	<b>(0.086)**</b>
SMOKER	<b>-1.113</b>	<b>(0.306)***</b>	<b>-1.051</b>	<b>(0.335)***</b>
HOSP	<b>-2.151</b>	<b>(1.051)**</b>	-0.124	(0.717)
PSICK	<b>-32.196</b>	<b>(12.951)***</b>	<b>-25.040</b>	<b>(11.839)**</b>
DEATH	-2.613	(1.813)	-1.025	(1.577)
SICK	0.607	(0.932)	-1.231	(0.852)
DISAB	0.103	(0.114)	<b>-0.221</b>	<b>(0.115)**</b>
PERLIVE	<b>5.953</b>	<b>(2.473)**</b>	<b>6.689</b>	<b>(2.231)***</b>
AGEPERD	<b>0.065</b>	<b>(0.037)*</b>	<b>0.100</b>	<b>(0.034)***</b>
Intercept	-0.817	(3.086)	-5.116	(2.747)
Number of obs	1068		1210	
F( 10, 1057)	156.420	F( 10, 1199)	200.370	
Prob > F	0.000		0.000	
R <sup>2</sup>	0.597		0.626	
Adj R <sup>2</sup>	0.593		0.623	

“\*\*\*” statistically significant at 1%; “\*\*” at 5%; and “\*” at 10%

**Table 8. Tobit Regressions – “Contribution Density”**  
(Men and Women of Working Age who Responded to the PRIESO)

CONDEN	Men, aged 14 - 65		Women, aged 14 - 60	
	Coefficient	Std. Err.	Coefficient	Std. Err.
AGE	<b>0.256</b>	<b>(0.031)***</b>	<b>0.310</b>	<b>(0.049)***</b>
AGE <sup>2</sup>	<b>-0.006</b>	<b>(0.001)***</b>	<b>-0.008</b>	<b>(0.001)***</b>
AGE <sup>3</sup>	<b>4.7E-05</b>	<b>(0.000)***</b>	<b>6.9E-05</b>	<b>(0.000)***</b>
HEAD	<b>0.084</b>	<b>(0.046)*</b>	-0.018	(0.056)
MARRIED	0.017	(0.035)	<b>-0.085</b>	<b>(0.046)*</b>
YEDU	<b>0.024</b>	<b>(0.004)***</b>	<b>0.026</b>	<b>(0.005)***</b>
WORKED	<b>0.289</b>	<b>(0.050)***</b>	<b>0.419</b>	<b>(0.038)***</b>
SPCONT	0.002	(0.036)	0.047	(0.043)
PAYGREG	<b>-0.140</b>	<b>(0.054)***</b>	0.031	(0.077)
CREDCON	<b>-0.126</b>	<b>(0.030)***</b>	<b>-0.114</b>	<b>(0.038)***</b>
EXKIDS	<b>0.016</b>	<b>(0.010)*</b>	<b>-0.050</b>	<b>(0.014)***</b>
LEDKIDS	0.004	(0.003)	0.002	(0.004)
FAMEX	0.016	(0.026)	-0.033	(0.036)
GIVES	0.043	(0.028)	0.028	(0.038)
GETS	-0.046	(0.035)	0.031	(0.044)
LENT	<b>-0.006</b>	<b>(0.003)**</b>	-0.006	(0.004)
COLATT	0.030	(0.032)	0.051	(0.042)
FINASST	0.031	(0.108)	0.030	(0.165)
WRKASST	<b>-0.096</b>	<b>(0.031)***</b>	<b>0.119</b>	<b>(0.051)**</b>
SLIFEX	<b>0.003</b>	<b>(0.001)***</b>	-1.8E-04	(0.001)
LJUB	<b>0.012</b>	<b>(0.004)***</b>	0.001	(0.005)
LPASIS	0.002	(0.007)	-0.011	(0.010)
Intercept	-3.580	(0.362)	-3.924	(0.556)
Number of obs	935		982	
left censored	198		449	
uncensored	737		533	
Log likelihood	-476.391		-648.5207	
LR $\chi^2$ (22)	469.95		361.410	
Prob > $\chi^2$	0.000		0.000	
Pseudo R <sup>2</sup>	0.330		0.218	

“\*\*\*” statistically significant at 1%; “\*\*” at 5%; and “\*” at 10%

**Table 9. Contribution to the Pension System in December 1999- January 2000**  
Employed Men of Working Age (14 – 65)

	PROBIT 1		PROBIT 2		MEAN
	dF/dx	Std. Err.	dF/dx	Std. Err.	
CONT99					
AGE99	<b>0.035</b>	<b>(0.013)***</b>	<b>0.035</b>	<b>(0.013)***</b>	37.66
AGE <sup>2</sup>	<b>-3.9E-04</b>	<b>(1.6E-04)***</b>	<b>-3.9E-04</b>	<b>(1.5E-04)***</b>	1546.63
HEAD	-0.077	(0.067)	-0.046	(0.064)	0.74
MARRIED	-0.041	(0.050)	-0.057	(0.048)	0.59
SPCONT	-0.012	(0.047)	-0.026	(0.043)	0.19
YEDU	-0.005	(0.006)	-0.003	(0.005)	9.62
RURAL	0.022	(0.053)	0.017	(0.050)	0.20
FSIZE	<b>0.001</b>	<b>(3.2E-04)*</b>	4.9E-04	(3.0E-04)	66.68
WRKHRS	4.0E-04	(0.001)	0.001	(0.001)	50.49
SELFPR	<b>-0.555</b>	<b>(0.088)***</b>	<b>-0.540</b>	<b>(0.093)***</b>	0.25
INFWPR	<b>-0.542</b>	<b>(0.083)***</b>	<b>-0.531</b>	<b>(0.089)***</b>	0.16
AGR	0.116	(0.082)	0.109	(0.078)	0.06
MINES	-0.059	(0.109)	-0.122	(0.106)	0.05
UTIL	0.238	(0.145)	0.214	(0.135)	0.07
CONST	-0.059	(0.082)	-0.082	(0.080)	0.09
RETAIL	0.027	(0.096)	-0.012	(0.090)	0.07
TRANS	0.034	(0.071)	0.015	(0.067)	0.23
FIN	-0.026	(0.079)	-0.062	(0.075)	0.15
SOC	0.076	(0.076)	0.047	(0.072)	0.21
CREDCON	<b>-0.106</b>	<b>(0.044)***</b>	<b>-0.101</b>	<b>(0.043)**</b>	0.26
SHYKIDS	4.2E-04	(0.001)	0.001	(0.001)	18.18
SHKIDS	1.8E-04	(0.002)	-1.2E-04	(0.002)	6.78
SHOLDM	<b>0.007</b>	<b>(0.003)***</b>	<b>0.006</b>	<b>(0.003)**</b>	1.41
SHOLDW	<b>-0.004</b>	<b>(0.002)**</b>	<b>-0.005</b>	<b>(0.002)***</b>	2.71
NYFEM	-0.004	(0.027)	-0.003	(0.026)	1.25
RESFAM	-0.008	(0.085)	-0.012	(0.077)	0.04
EXKIDS	-0.007	(0.013)	-0.007	(0.012)	2.59
LEDKIDS	-0.005	(0.004)	<b>-0.007</b>	<b>(0.004)*</b>	5.32
FAMEX	<b>-0.083</b>	<b>(0.039)**</b>	<b>-0.088</b>	<b>(0.037)**</b>	0.53
GIVES	<b>0.072</b>	<b>(0.039)*</b>	0.049	(0.037)	0.34
GETS	0.052	(0.047)	0.034	(0.045)	0.17
LRENT	-0.001	(0.005)	0.003	(0.004)	6.37
COLATT	<b>0.092</b>	<b>(0.047)**</b>	<b>0.113</b>	<b>(0.046)***</b>	0.46
FINASST	0.017	(0.113)	0.023	(0.101)	0.02
WRKASST	-0.031	(0.045)	-0.013	(0.043)	0.30
SLIFEX	0.001	(0.002)	0.001	(0.001)	37.63
LJUB	<b>-0.019</b>	<b>(0.007)***</b>	<b>-0.016</b>	<b>(0.006)***</b>	0.96
LPASIS	0.016	(0.013)	0.017	(0.012)	0.30
CONT98	<b>0.179</b>	<b>(0.042)***</b>	<b>0.175</b>	<b>(0.042)***</b>	0.60
CONDEN	<b>0.420</b>	<b>(0.093)***</b>	<b>0.401</b>	<b>(0.092)***</b>	0.52
MPG	<b>-0.125</b>	<b>(0.067)**</b>	0.151	(0.101)	0.16
MPG*LRENT			<b>-0.040</b>	<b>(0.013)***</b>	1.13
Number of obs	741		741		
Log likelihood	-124.441		-117.749		
LR chi2(41)	698.540		LR chi2(42)	711.920	
Prob > chi2	0.000	obs. P: 0.663	0.000	obs. P: 0.663	
Pseudo R2	0.737	pred. P: 0.894	0.751	pred. P: 0.906	



**Table 10. Contribution to the Pension System in December 1999- January 2000**  
Employed Women of Working Age (14 – 60)

	PROBIT 1		PROBIT 2		MEAN
	dF/dx	Std. Err.	dF/dx	Std. Err.	
CONTPR					
AGE99	-0.017	(0.041)	-0.017	(0.042)	38.14
AGE <sup>2</sup>	4.7E-04	(0.001)	0.000	(0.001)	1571.20
HEAD	0.186	(0.140)	<b>0.264</b>	<b>(0.150)*</b>	0.21
MARRIED	<b>0.257</b>	<b>(0.134)**</b>	<b>0.266</b>	<b>(0.136)**</b>	0.43
SPCONT	0.012	(0.121)	0.017	(0.126)	0.35
YEDU	0.007	(0.015)	0.010	(0.016)	10.19
RURAL	-0.181	(0.120)	<b>-0.221</b>	<b>(0.127)*</b>	0.15
FSIZE	<b>0.002</b>	<b>(0.001)*</b>	<b>0.002</b>	<b>(0.001)*</b>	60.21
WRKHRSA	-0.001	(0.003)	-0.002	(0.003)	43.96
SELFPR	<b>-1.117</b>	<b>(0.211)***</b>	<b>-1.184</b>	<b>(0.228)***</b>	0.18
INFWPR	<b>-0.971</b>	<b>(0.168)***</b>	<b>-1.021</b>	<b>(0.181)***</b>	0.23
AGR	-0.571	(0.435)	<b>-0.768</b>	<b>(0.457)*</b>	0.05
MINES	0.012	(0.343)	0.011	(0.347)	0.10
UTIL	-0.288	(0.302)	-0.300	(0.305)	0.15
CONST	-0.088	(0.312)	-0.074	(0.316)	0.19
RETAIL	-0.084	(1.073)	-0.005	(1.158)	0.01
TRANS	-0.054	(0.322)	-0.027	(0.328)	0.08
FIN	-0.042	(0.374)	-0.046	(0.382)	0.03
SOC	-0.136	(0.306)	-0.124	(0.310)	0.34
CREDCON	<b>-0.182</b>	<b>(0.094)*</b>	<b>-0.216</b>	<b>(0.099)**</b>	0.28
SHYKIDS	-0.001	(0.003)	-0.002	(0.003)	15.27
SHKIDS	<b>0.007</b>	<b>(0.004)*</b>	<b>0.007</b>	<b>(0.004)*</b>	7.80
SHOLDM	0.010	(0.012)	0.011	(0.012)	1.54
SHOLDW	0.002	(0.006)	0.001	(0.006)	3.46
NYFEM	<b>0.119</b>	<b>(0.065)*</b>	<b>0.119</b>	<b>(0.067)*</b>	1.64
RESFAM	<b>-0.482</b>	<b>(0.238)**</b>	<b>-0.518</b>	<b>(0.238)**</b>	0.04
EXKIDS	-0.064	(0.042)	<b>-0.069</b>	<b>(0.042)*</b>	2.21
LEDKIDS	-0.010	(0.011)	-0.011	(0.011)	5.54
FAMEX	0.099	(0.093)	0.117	(0.096)	0.56
GIVES	-0.066	(0.094)	-0.059	(0.097)	0.35
GETS	0.024	(0.120)	0.041	(0.121)	0.16
LRENT	0.008	(0.011)	0.000	(0.012)	6.76
COLATT	-0.112	(0.107)	-0.104	(0.108)	0.45
FINASST	(dropped due to collinearity)				
WRKASST	0.180	(0.141)	0.211	(0.149)	0.17
SLIFEX	0.004	(0.004)	0.005	(0.004)	35.26
LJUB	-0.019	(0.022)	-0.021	(0.022)	1.44
LPASIS	0.030	(0.038)	0.033	(0.040)	0.21
CONT98	<b>0.210</b>	<b>(0.098)**</b>	<b>0.188</b>	<b>(0.102)*</b>	0.53
CONDEN	<b>0.813</b>	<b>(0.189)***</b>	<b>0.865</b>	<b>(0.197)***</b>	0.40
MPG	-0.105	(0.181)	<b>-0.459</b>	<b>(0.275)*</b>	0.14
MPG*LRENT			<b>0.054</b>	<b>(0.030)*</b>	0.87
Number of obs	396		396		
Log likelihood	-55.458		-53.665		
LR chi2(40)	420.100		LR chi2(41)	423.690	
Prob > chi2	0.000	obs. P : 0.606	0.000	obs. P : 0.606	
Pseudo R2	0.791	pred. P : 0.799	0.798	pred. P : 0.799	

**Table 11. Tobit Regressions - “Contribution Density” of Self Employed, Without and With Preference Variables**

(Men of Working Age who Responded to the PRIESO)

	w/o Pref. Variables, Full Sample		w/o Pref. Variables, Exp. Sample		With Pref. Variables, Exp. Sample	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
CONDEN						
AGE99	<b>0.261</b>	<b>(0.113)**</b>	<b>0.460</b>	<b>(0.183)**</b>	<b>0.583</b>	<b>(0.152)***</b>
AGE <sup>2</sup>	<b>-0.005</b>	<b>(0.003)*</b>	<b>-0.010</b>	<b>(0.005)**</b>	<b>-0.014</b>	<b>(0.004)***</b>
AGE <sup>3</sup>	3.40E-05	-2.20E-05	<b>7.9E-05</b>	<b>(3.7E-05)**</b>	<b>1.1E-04</b>	<b>(3.2E-05)***</b>
HEAD	-0.022	-0.134				
MARRIED	0.135	-0.095				
YEDU	<b>0.019</b>	<b>(0.009)**</b>	<b>0.031</b>	<b>(0.019)*</b>	<b>0.052</b>	<b>(0.017)***</b>
WORKED	0.088	-0.2				
SPCONT	-0.031	-0.078				
PAYGREG	<b>-0.292</b>	<b>(0.141)**</b>	-0.161	(0.267)	-0.247	(0.223)
CREDCON	<b>-0.151</b>	<b>(0.077)**</b>	-0.088	(0.164)	-0.060	(0.140)
EXKIDS	0.014	-0.022				
LEDKIDS	0.002	-0.007				
FAMEX	0.105	-0.066				
GIVES	0.071	-0.067				
GETS	0.058	-0.099				
LRENT	<b>-0.014</b>	<b>(0.008)*</b>	-0.005	(0.016)	-0.011	(0.013)
COLATT	-0.006	-0.081	-0.136	(0.160)	-0.204	(0.136)
FINASST	<b>0.311</b>	<b>(0.173)*</b>		(dropped due to collinearity)		
WRKASST	-0.09	-0.07	-0.207	(0.135)	<b>-0.288</b>	<b>(0.116)**</b>
SLIFEX	<b>0.006</b>	<b>(0.003)**</b>	0.008	(0.005)	<b>0.016</b>	<b>(0.005)***</b>
LYJUB	<b>0.023</b>	<b>(0.010)**</b>	-0.018	(0.022)	-0.001	(0.019)
LYPASIS	0.03	-0.026				
TIMEPREF					<b>-0.710</b>	<b>(0.177)***</b>
RISKPREF					<b>-2.9E-04</b>	<b>(7.7E-05)***</b>
Intercept	<b>-4.218</b>	<b>(1.460)***</b>	<b>-6.442</b>	<b>(2.417)***</b>	<b>-7.015</b>	<b>(1.938)***</b>
Number of obs	186		62		60	
left censored	46		18		17	
uncensored	140		44		43	
Log likelihood	-110.764		-43.512		-28.516	
LR $\chi^2$ (22)	62.35	LR $\chi^2$ (11)	14.73	LR $\chi^2$ (13)	39.97	
Prob > $\chi^2$	0.000		0.000		0.000	
Pseudo R <sup>2</sup>	0		0.145		0.412	

“\*\*\*” statistically significant at 1%; “\*\*” at 5%; and “\*” at 10%

**Table 12. Contribution to the Pension System Among Self Employed  
in December 1999- January 2000**  
(Men of Working Age)

	PROBIT 1		PROBIT 2		MEAN
	dF/dx	Std. Err.	dF/dx	Std. Err.	
CONT99					
AGE99	<b>0.008</b>	<b>(0.004)**</b>	<b>0.009</b>	<b>(0.004)***</b>	41.12
HEAD	0.040	(0.092)	-0.009	(0.088)	0.80
MARRIED	<b>-0.115</b>	<b>(0.063)*</b>	<b>-0.106</b>	<b>(0.062)*</b>	0.69
SPCONT	0.017	(0.047)	0.005	(0.046)	0.24
YEDU	-0.005	(0.005)	-0.004	(0.005)	10.02
RURAL	-0.011	(0.053)	-0.010	(0.050)	0.22
FSIZE	<b>0.001</b>	<b>(0.000)**</b>	<b>0.001</b>	<b>(5E-04)**</b>	13.77
WRKHRS	<b>0.002</b>	<b>(0.001)**</b>	<b>0.002</b>	<b>(0.001)**</b>	53.14
CREDCON	-0.039	(0.052)	-0.020	(0.049)	0.31
SHYKIDS	0.002	(0.001)	0.002	(0.001)	17.77
SHKIDS	0.003	(0.002)	0.002	(0.002)	6.31
SHOLDM	<b>0.008</b>	<b>(0.004)**</b>	<b>0.006</b>	<b>(0.004)*</b>	2.11
SHOLDW	-0.003	(0.003)	-0.004	(0.003)	3.26
NYFEM	0.018	(0.032)	-0.010	(0.033)	1.26
RESFAM	0.110	(0.089)	<b>0.140</b>	<b>(0.086)*</b>	0.05
EXKIDS	-0.005	(0.015)	-0.003	(0.014)	2.69
LEDKIDS	-0.006	(0.005)	-0.006	(0.005)	5.95
FAMEX	-0.049	(0.045)	-0.045	(0.043)	0.51
GIVES	0.058	(0.039)	0.036	(0.036)	0.38
GETS	-0.041	(0.062)	-0.018	(0.059)	0.13
LRENT	0.003	(0.005)	0.007	(0.006)	7.37
COLATT	0.010	(0.052)	0.001	(0.048)	0.63
FINASST	0.130	(0.106)	<b>0.155</b>	<b>(0.104)*</b>	0.03
WRKASST	<b>-0.071</b>	<b>(0.046)*</b>	-0.053	(0.043)	0.57
SLIFEX	0.003	(0.002)	0.002	(0.002)	33.38
LJUB	<b>-0.021</b>	<b>(0.009)**</b>	<b>-0.020</b>	<b>(0.009)***</b>	1.23
CONT98	<b>0.185</b>	<b>(0.058)***</b>	<b>0.181</b>	<b>(0.062)***</b>	0.35
CONDEN	<b>0.310</b>	<b>(0.101)***</b>	<b>0.334</b>	<b>(0.111)***</b>	0.36
MPG	<b>-0.141</b>	<b>(0.073)***</b>	0.128	(0.136)	0.14
MPG*LRENT			<b>-0.035</b>	<b>(0.018)***</b>	1.10
Intercept	<b>-0.781</b>	<b>(0.245)</b>	-0.782	(0.269)	1.00
Number of obs	183		183		
Log likelihood	-53.531		-48.779		
LR chi2(29)	85.130		94.630		
Prob > chi2	0.000		0.000		
Pseudo R2	0.443		0.492		
obs. P	0.219		0.219		
pred. P	0.061	(at x-bar)	0.053	(at x-bar)	

“\*\*\*” statistically significant at 1%; “\*\*” at 5%; and “\*” at 10%

**Table 13. Contribution to the Pension System Among Self Employed  
in December 1999- January 2000 – Including Preference Variables**  
(Men of Working Age)

	Without Preference Variables		With Preference Variables		MEAN
	dF/dx	Std. Err.	dF/dx	Std. Err.	
CONT99					
AGE	<b>0.009</b>	<b>(0.005)*</b>	4.3E-04	(0.001)	39.89
HEAD					0.79
MARRIED	-0.019	(0.084)	0.024	(0.067)	0.68
SPCONT					0.21
YEDU					10.19
RURAL					0.19
FSIZE	0.001	(0.001)	7.0E-05	(3.1E-04)	12.73
WRKHRS	0.003	(0.003)	3.6E-04	(0.001)	52.50
CREDCON					0.34
SHYKIDS					19.68
SHKIDS					6.82
SHOLDM	0.010	(0.009)	0.001	(0.004)	2.23
SHOLDW					2.27
NYFEM					1.23
RESFAM					0.05
EXKIDS					2.85
LEDKIDS					6.00
FAMEX					0.48
GIVES					0.39
GETS					0.06
LRENT					7.34
COLATT					0.58
FINASST					0.00
WRKASST	<b>-0.147</b>	<b>(0.087)*</b>	-0.020	(0.051)	0.61
SLIFEX					34.69
LJUB	<b>-0.048</b>	<b>(0.031)*</b>	-0.007	(0.021)	0.92
CONT98	<b>0.334</b>	<b>(0.166)***</b>	<b>0.046</b>	<b>(0.131)*</b>	0.24
CONDEN	<b>0.278</b>	<b>(0.137)**</b>	<b>0.054</b>	<b>(0.154)*</b>	0.36
MPG	<b>-0.221</b>	<b>(0.144)*</b>	-0.042	(0.118)	0.15
MPG*LRENT	(dropped, predicts failure perfectly)				1.10
TIMEPREF			-0.017	(0.059)	0.44
RISKPREF			<b>1.3E-05</b>	<b>(4E-05)*</b>	3460.00
Intercept	<b>-0.752</b>	<b>(0.322)***</b>	<b>-0.127</b>	<b>(0.360)*</b>	1.00
Number of obs	62		60		
Log likelihood	-16.121		-7.673		
LR chi2(10)	36.370	LR chi2(12)	52.130		
Prob > chi2	0.000		0.000		
Pseudo R2	0.530		0.773		
obs. P	0.242		0.250		
pred. P	0.071		0.003		

“\*\*\*” statistically significant at 1%; “\*\*” at 5%; and “\*” at 10%

Appendix One

**Sample Frame and Field Report<sup>1</sup>**

**for the**

**Social Risk Management Survey**  
***Encuesta de Prevision de Riesgos Sociales (PRIESO)***  
 Santiago, Chile, December 1999 – January 2000

### **A.1.I. Background**

The World Bank and the Department of Economics at the University of Chile (Survey Unit), conducted a survey to identify and evaluate the strategies taken by individuals – and by groups of individuals in the household – in the face of a series of risks to income. The questionnaire explores both institutional strategies as well as informal or traditional strategies taken by households in the face of income risks arising from the inability to work in old age, disability, work injury, and the death of an income earning spouse or other household member.

The PRIESO questionnaire was designed by Truman Packard (Department of Economics at the University of Oxford, for the World Bank) and José Cuesta (Queen Elizabeth House at the University of Oxford) under the direction of Robert Holzmann (Director of Social Protection, World Bank), and with the help of Ernesto Castillo Norbona and Ada Guzmán (Survey Unit, University of Chile).<sup>2</sup>

### **A.1.II. The Sample Frame**

The sample frame used in the design of the PRIESO, is based on that developed for the CASEN 1998 by Chilean National Statistics Institute (INE) and the Survey Unit, using data from the last national census conducted in Chile in 1992. The population represented in the sample consists of individuals aged 14 and over residing in the Greater Metropolitan Region of Santiago, who responded to the CASEN 1998. The sample was constructed to include urban as well as rural households.

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<sup>1</sup> I would like to thank MIDEPLAN for granting permission for the use of their sample frame for the PRIESO and to Don Fernando Flores, Julio Muñoz and Ernesto Castillo for their hard work to take full advantage of this opportunity. This annex contains excerpts from a longer field report of the PRIESO survey, prepared by Julio Muñoz, and available in Spanish upon request.

<sup>2</sup> Extensive and valuable input was provided by Salvador Valdes-Prieto (Catholic University of Chile), Andras Uthoff (ECLA), John Hoddinott (IFPRI), Abigail Barr, David Bevan (University of Oxford), Emanuel Jiménez, Margaret Grosh, and Kinnon Scott (World Bank). Estelle James, William Mabney, Indermit Gill, Ana-Maria Arriagada, Laura Rawlings, Kathy Lindert, Gillette Hall, Edmundo Murrugarra, Robert Palacios, David Lindeman, and Claudio Montenegro (World Bank) also provided helpful comments. Suggestions on the language employed and exact phrasing of questions were received from Ana Maria Urutia and Isabelle Rodriguez (Instituto de Asuntos Culturales, ICA Chile). All errors are the responsibility of the survey's principal authors.

The sample was stratified by conglomerates. In each strata an independent, representative sample was obtained. Grouping these independent samples together produces a representative sample of the Greater Metropolitan Region.

### Stratification

The sample was stratified to include urban and rural households in the Greater Metropolitan Region of Santiago. For the purpose of stratification the geographic unit “sub-district” (subcomuna) was defined, that involves splitting existing districts in two parts: an urban sub-district and a rural sub-district, according to the definitions of *urban* and *rural*, provided by INE.

### Sampling Units

#### Primary Sampling Units (PSU)

In Greater Urban Santiago all sub-districts were considered. As such the PSUs consist of all the sectors within the sub-districts covered by the 1992 National Census.

#### Secondary Sampling Units (SSU)

The SSU consist of permanently occupied residences that exist at the time of updating the frame.

#### Tertiary Sampling Units (TSU)

The TSUs consist of permanent household residents, 14 and older, that responded to the CASEN 1998. This last sampling unit was the unit of study.

The sample size was set at 2,500 individuals aged 14 and over in the Greater Metropolitan Region of Santiago: 2,000 from urban households and 500 from rural households – an 80% to 20% urban/rural distribution to approximately match the distribution of the Chilean population. In order to end up with a number of usable observations relatively close to the sample size with which the study was conceived, 2944 individuals were selected, of which 2441 are urban and 503 are rural.

### **A.1.III. Selecting the Sample**

All sub-districts were included from both Greater Urban Santiago and Greater Rural Santiago. The sectors within each sub-district were selected with probability proportional to size (PPT). The households selected within each sector were selected randomly. The respondent selected in each household was also selected randomly from among respondents to the CASEN 1998 aged 14 and over.

*Probability of Selection.* The probability of selecting a primary sampling unit (PSU), or sector within a sub-district is “with probability proportional to estimated size”, using the estimated probabilities from the 1992 National Census.

$$z_i = \frac{M_i}{M}$$

Where :

$M_i$  = Number of residences in sector i, according to the 1992.

$M = \sum_i M_i$  or number of residences in the respective sub-district.

*Secondary Sampling Units (SSU).* The probability of selecting a secondary sampling unit (SSU) or residence, depends on two values: the number of residences interviewed in sector i and the number of residences found in that sector during the revalidation of the frame. The average number of residences that were expected to be interviewed were 5 in urban areas and 10 in rural areas. This implied surveying all of the households or “family nuclei” that exist in the residence sampled.

$\bar{m}$  = average number of households to interview per sector

$m_i$  = number of households interviewed in sector i

$M_i'$  = updated number of households in sector i

*Tertiary Sampling Units (TSUs).* The probability of selecting an individual within the household (TSU) depends on the number  $H_{ijk}$  of individuals 14 or older  $k^{\text{th}}$  household of the  $j^{\text{th}}$  residence of the  $i^{\text{th}}$  sector.

*Sampling Fraction.* The *sampling fraction* – the ratio between the theoretical size of the sample, and the size of the population is

$$f_{ijk} = \frac{nM_i}{M} \frac{\bar{m}}{M_i'} \frac{1}{H_{ijk}}$$

where  $i$  refers to the sector,  $j$  to the residence and  $k$  to the household or “family nucleus”. In practice  $m$  had to be substituted often with  $m_i$ .

*Expansion Factor.* The *expansion factor* is the reciprocal value of the sample fraction, and is a function of the number of individuals 14 and older in each household. This factor acts as a weight on each individual surveyed and expresses the number of individuals that the respondent represents. The total estimator results from taking the mean value of the product of multiplying the expansion factor by the value of any given variable.

#### **A.1.IV. Pilots Final Protocol, and Training**

Most of the questions in the PRIESO have never been asked in previous surveys in Chile. For this reason, particular attention was paid to whether respondents would understand the topics being covered, especially those in Module’s I (Risk Perception), II (Evaluation of the

Pension System) and III (Financial Strategies). Two separate pilots were conducted to evaluate the survey's length, the wording of questions and to verify whether responses made sense.

The first pilot consisted of 40 interviews conducted by 8 numerators the weekend of August 28 – 31, 1999. The average length of the interview was 39 minutes. After extensive changes to the questionnaire a second pilot of 60 interviews was conducted from November 6 – 9, 1999. The average interview length was cut to 32 minutes. Further changes brought the average length down to 28 minutes per interview.

University students working toward undergraduate degrees in sociology and economics, as well as regular Survey Unit staff experienced in conducting the CASEN, were enlisted as potential numerators. Each was given a copy of the questionnaire to take home and study prior to the first training session. In this session each question was read and the intent behind the question explained. Of the 93 candidates who signed up as numerators, only 65 passed the training and took part in actual interviews.

#### A.1.V. Fieldwork & Results

Interviews for the PRIESO began on December 11, 1999. Each numerator was initially assigned no more than 2 sectors (a maximum of 10 interviews), and was required to turn in the first 3 completed interviews for inspection to detect and eliminate any random or systematic errors, and to clear up any doubts that arose in the first wave of the survey.

Field work extended until January 27, 2000. The field work took longer than originally expected due to the complexity of the questions being asked, the need for follow up visits to most households, normal procedures to validate the data from randomly selected interviews, and delays brought about by presidential elections in Chile. The results of the field work are presented in the table below. Despite some deterioration in the sample frame since it was last used in November – December 1998, a 77% response rate was achieved.

**Table A.1.1. PRIESO Results of Field Work**

Result	Urban		Rural		Total	
	n	%	n	%	n	%
Sample	2,441	100.0%	503	100.0%	2,944	100.0%
<b>Surveys completed</b>	<b>1,860</b>	<b>76.2%</b>	<b>418</b>	<b>83.1%</b>	<b>2,278</b>	<b>77.4%</b>
Household changed residence	177	7.3%	28	5.6%	205	7.0%
Respondent changed residence	119	4.9%	13	2.6%	132	4.5%
Respondent not home	75	3.1%	13	2.6%	88	3.0%
No one home	61	2.5%	12	2.4%	73	2.5%
Respondent deceased/incapacitated	54	2.2%	14	2.8%	68	2.3%
Refusals	52	2.1%	3	0.6%	55	1.9%
No one lives in the residence	43	1.8%	2	0.4%	45	1.5%

It should be noted that 12.3% of the sample had changed residence since the CASEN 1998 was completed. This level of movement is significant and should not be ignored. Sample specialists at the Survey Unit claim that this sort of mobility is normal in Chile, and that it



represents both "pull and "push" migration, as well as the Chilean (and wider Latin American) custom of sending a household member to reside (*allegarse*) with friends and family members in response to income shocks. While an entire module of the PRIESO was designed specifically to capture these traditional forms of risk management, we were unable to interview this particularly large group of potential respondents. Ideally, we would follow up on this movement. The migrant data would add a valuable dimension to the larger data set as well as provide materials for a fuller analysis of social risk management.



**Universidad de Chile**  
 Departamento de Economía  
 Unidad de Encuestas

**PRIESO: Social Risk Management Survey – Santiago, Chile**

*December 1999/January 2000, English Translation of Final Version*

Segment: \_\_\_\_\_

Address: \_\_\_\_\_

District: \_\_\_\_\_

Numerator: \_\_\_\_\_

Socio-economic Classification: \_\_\_\_\_

1<sup>st</sup> Visit: \_\_\_\_ / \_\_\_\_ / 1999, Hour: \_\_\_\_ : \_\_\_\_ Result: \_\_\_\_\_

2<sup>nd</sup> Visit: \_\_\_\_ / \_\_\_\_ / 1999, Hour: \_\_\_\_ : \_\_\_\_ Result: \_\_\_\_\_

3<sup>rd</sup> Visit: \_\_\_\_ / \_\_\_\_ / 1999, Hour: \_\_\_\_ : \_\_\_\_ Result: \_\_\_\_\_

Duration of Interview : \_\_\_\_ minutes

**MODULE I. HOUSEHOLD COMPOSITION**

To all household members							Only to those 14 and older				
Write first name of all household members	Relation to house hold head	Sex	Age	Did you reside here in Nov. 1998?	Goes to school or ed. institution?	Last educational grade level reached/course completed?	Did you have paid work/job last week?	Were you looking for paid work/job?	Why weren't you looking for paid work/job?		
Total No. of HH members: _____	1 Household head 2 Spouse/partner 3 Son/daughter 4 Father/mother 5 Father/mother in law 6 Son/daughter in law 7 Grandson/daughter 8 Brother/sister 9 Brother/sister in law 10 Other family 11 Non family 12 Dom service resident 13 Dom service non res.	1 Male 2 Female	<i>In years completed</i>	1 Yes 2 No	1 Yes 2 No	1 Pre-school 2 Lower Primary 3 Primary 4 Lower Secondary 5 Upper Secondary 6 Tech. training 7 Profess. institute 8 Undergraduate 9 Graduate	1 Yes → Q11 2 No → Q9	1 Yes, looking for first time 2 Yes, currently unemployed → Go to Q11 3 No → Q10	1 Retired 2 HH tasks 3 Study 4 Family work non-paid 5 Disabled 6 Elderly 7 Other Specify → Go to Q11		
Nº	1	2	3	4	5	6	Grade	Type	8	9	10
1											
2											
3											
4											
5											
6											
7											

11. This residence is a....?
- 1 [ ] House  
 2 [ ] Condominium  
 3 [ ] Apartment in building  
 4 [ ] Room (s) in apartment  
 5 [ ] Room in old house or convent  
 6 [ ] Mediagua o mejora  
 7 [ ] Shanty  
 8 [ ] Other (mobile, tent, etc.).  
 Specify.
12. The home you reside in is....?
- 1 [ ] Owned and paid for  
 2 [ ] Owned and still making payments  
 3 [ ] Rented  
 4 [ ] Provided by your employer  
 5 [ ] Provided by family or friends
16. In the last three years, have you had to face one of the following problems that have negatively effected your economic situation and/or that of your household? (*multiple responses allowed*)
- 1 [ ] Economic recession that caused loss of income  
 2 [ ] Political change that caused loss of income  
 3 [ ] Natural disaster (floods, drought, earthquake, etc.).  
 4 [ ] Disability of a family member that contributed to household income, or worked  
 5 [ ] Death of a family member who contributed to household income, or worked  
 6 [ ] A sickness expensive to treat (that cost more than a month's income to treat)  
 7 [ ] Other unforeseen event  
 Specify: \_\_\_\_\_  
 8 [ ] No such event → Go to Q20
17. Which of these effected you most economically?  
 \_\_\_\_\_
18. How much money did the event cost you?  
 \$ \_\_\_\_\_ pesos
19. How did you solve the problem?

## MODULE II. RISK PERCEPTION

*We will now ask you some questions with respect to the current situation of you and your family, as well as your expectations for the future.*

13. On a scale from 1 to 7, where 1 is *very bad* and 7 *very good*, how would you rate your quality of life and that of your household?

Personal: \_\_\_\_\_ Household: \_\_\_\_\_

14. Which of the following statements, best define your household? (*Multiple responses allowed*)

- 10 [ ] We depend on help from family or the state  
 20 [ ] We often go into debt to meet basic expenses  
 30 [ ] We can't go into debt, and have to adjust when there is a shortage of income  
 40 [ ] We do not go into debt, but we do not have enough to save  
 & [ ] We save for/to  
 51 [ ] Future emergencies  
 52 [ ] Invest  
 53 [ ] For old age  
 54 [ ] Other objective - Specify: \_\_\_\_\_

15. Compared to the current economic situation, do you expect the economic situation in Chile to... ?

Period	Economic situation in Chile:
a. The next year	
b. The next five years	

*Note: Read first the titles in block letters. According to the block letter titles selected by the respondent, read the options under the title. The respondent can select multiple titles and options under each title.*

10 [ ] COULD NOT RESOLVE THE PROBLEM  
AND IT REDUCED MY LIVING  
STANDARD

20 [ ] BY USING YOUR SAVINGS

& [ ] BY USING SUBSIDIES, PENSIONS OR  
INSURANCE

- 30 [ ] Work injury subsidy  
 32 [ ] Unemployment subsidy  
 32 [ ] Severance payments  
 33 [ ] Social assistance pensions PASIS  
 34 [ ] Single family subsidy SUF  
 35 [ ] FONASA (public health insurance)  
 36 [ ] ISAPRE (private health insurance)  
 37 [ ] Early pension for old age  
 38 [ ] Social assistance pension  
 39 [ ] Other subsidy or insurance.  
 Specify: \_\_\_\_\_

& [ ] BY SELLING A GOOD OR PROPERTY

- 41 [ ] Livestock  
 42 [ ] An automobile  
 43 [ ] An appliance  
 44 [ ] A piece of property

- 45 [ ] Pawning a possession
- 46 [ ] Selling some other good  
Specify : \_\_\_\_\_

& [ ] BY ASKING FOR A LOAN:

- 51 [ ] A bank or other commercial lender
- 52 [ ] Compensation Fund
- 55 [ ] Your employer (an advance)
- 54 [ ] A money lender
- 55 [ ] Family member or friend
- 56 [ ] Other lending entity  
Specify: \_\_\_\_\_

& [ ] BY WORKING MORE

- 61 [ ] Work extra hours
- 62 [ ] Finding a second job
- 63 [ ] Starting own business – self employment
- 64 [ ] Other, Specify: \_\_\_\_\_

& [ ] BY SENDING A HOUSHOLD MEMBER TO WORK

- 71 [ ] Sending spouse to find job
- 72 [ ] Child to work w/o removing from school
- 73 [ ] Pulling child out of school to work
- 74 [ ] Sending another household member to work  
Specify: \_\_\_\_\_

& [ ] REDUCING AND/OR CUTTING SPENDING ON...:

**Cutting                  Reducing**

- 81 [ ]                  81 [ ] Recreation
- 82 [ ]                  82 [ ] Education/educational materials
- 83 [ ]                  83 [ ] Health
- 84 [ ]                  84 [ ] Housing (payment, rent, etc)
- 85 [ ]                  85 [ ] Food
- 86 [ ]                  86 [ ] Utility bills
- 87 [ ]                  87 [ ] Another expense

& WITH THE HELP OF FRIENDS AND/OR FAMILY OUTSIDE THE HOUSEHOLD

- 91 [ ] Taking up residence with a family member
- 92 [ ] Sending a child or elder to live with family
- 93 [ ] With some other assistance from family/ friends  
Specify: \_\_\_\_\_

- 20. How probable is it that one or more of the following events could happen to you or to a household member within the next 12 months?

	To you	To a house hold member
Events	1 Very probable 2 Probable 3 A bit probable 4 Not probable 5 Not applicable	1 Very probable 2 Probable 3 A bit probable 4 Not probable 5 Not applicable
a. Loss of job for a week		
b. Loss of job for longer than a year		
c. Forced temporary closure of business		
d. Bankruptcy of business		
e. Loss of clients		
f. Loss of property or other possession		
g. Serious illness		
h. Serious accident/injury		
i. Physical incapacity		
j. Death		
k. Retirement because of old age		

- 21. Would you be able to handle these events?

- 1 [ ] Yes.                      → Go to Q22
- 2 [ ] No.                      → Go to Q23

- 22. Why would you be able to handle these events?  
(multiple responses allowed)

- 1 [ ] Formal pension system (INP, AFP, etc.)
- 2 [ ] Formal health system (FONASA, ISAPRE, etc.)
- 3 [ ] Belong to Mutuality (work injury insurance)
- 4 [ ] Have other insurance  
Specify: \_\_\_\_\_
- 5 [ ] Have money in a savings account
- 6 [ ] Have invested in goods and machinery
- 7 [ ] Have property
- 8 [ ] Have things in my house I can sell
- 9 [ ] Have many kids who can work
- 10 [ ] Can count on the help of family (besides children) and friends
- 11 [ ] Can apply for a loan
- 12 [ ] Government assistance is sufficient
- 13 [ ] Other - Specify: \_\_\_\_\_

**GO TO MODULE III**

23. Why would you be unable to handle these events?  
(multiple responses allowed)

- 1  I am still recovering from the last serious event  
 2  I don't have insurance  
 3  My insurance would not cover events  
 4  Will not qualify for the minimum pension  
 5  I don't have a job or other source of income  
 6  I have no savings and no investments  
 8  There is nothing in my house I can sell  
 9  I don't have children who could work  
 10  Family (not kids) and friends could not help  
 11  No access to loans or credit  
 12  Government assistance is unavailable or insufficient  
 13  Other - Specify: \_\_\_\_\_

### GO TO MODULE III

## MODULE III. EVALUATION OF THE PENSION SYSTEM

We will now ask you some questions about the Chilean Social Security System generally, and follow with questions about your Pension System in particular.

24. Until what age do you believe you will live?  
 \_\_\_\_\_ old
25. Until what age do you think you'll be able to keep working?  
 \_\_\_\_\_ old
- Not applicable (does not work)
26. How much are you worried that you or a family member will suffer from the following situations? (Using a scale from 1 to 10, where Level 1 indicates "no worry", and Level 10 indicates "maximum worry").

Situation	Level
a. Being unable to work in old age	
b. Prolonged (expensive) sickness	
c. Physical or mental incapacity	
d. Accident	
e. Unemployment	
f. Loss of income from the death of spouse or partner	
g. Support of dependent relatives (care for elderly, etc.)	
h. Unforeseen responsibility for dependent relatives (new child, disabled relative, unexpected elderly family, etc)	
i. Other: _____	

27. Using a scale of 1 to 7, where 1 indicates *very bad* and 7 indicates *very good*, how would you grade the following features of the AFP Pension System?

Feature	Grade	Don't know/ don't respond
a. Payment of pensions		
b. Level of contributions		
c. Level of commissions		
d. Use of funds in case of emergency		
e. Security of the investments		
f. Switching between AFPs		
g. Overall grade for system		

28. Do you think it is probable that the AFP Pension System will still exist 20 years from now?

- 1  Very probable  
 2  Probable  
 3  A bit probable  
 4  No probability  
 5  Don't know

29. Do you believe that the Government will make changes in the rules of the Pension System regarding ... Does this worry you?

	How probable is it that the system's rules will change ...?	How much do these changes worry you?
Changes in rules	1 Very probable 2 Probable 3 A bit probable 4 No probability 5 Don't know	(1 indicates <i>not worried</i> , 10 indicates <i>maximum worry</i> )
a. Payment of pension		
b. Level of contributions		
c. Level of commissions		
d. Access to funds in case of emergency		
d. Security of investments		
e. Switching between AFPs		

30. Who do you believe should be responsible for financing pensions?

- 1 [ ] Worker only → Go to Q32  
 2 [ ] Employer only → Go to Q32  
 3 [ ] Government only → Go to Q31  
 4 [ ] Worker and employer  
 5 [ ] Worker and the Government  
 6 [ ] Employer and the Government  
 7 [ ] Worker, Employer and Government

31. Arrange in order of responsibility (*If respondent indicated 2 responsible actors, order as 1<sup>st</sup> and 2<sup>nd</sup>. If respondent indicated 3 responsible actors, order as 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup>*)

\_\_\_\_ Worker  
 \_\_\_\_ Employer  
 \_\_\_\_ Government (Central and Local)

32. ¿What aspect of the AFP system should the government guarantee? (*Only to those respondents who mentioned the Government in question 30*).

- 1 [ ] That the AFPs not invest irresponsibly  
 2 [ ] A minimum return  
 3 [ ] That the AFPs not go bankrupt  
 4 [ ] Other - Specify: \_\_\_\_\_

33. Do you have family and/or friends who contribute to an AFP account?

- 1 [ ] Yes  
 2 [ ] No

34. Did family and/or friends ever recommend that you contribute to an AFP account?

- 1 [ ] Yes  
 2 [ ] No

35. Have you ever recommended to family and/or friends that they should contribute to an AFP account?

- 1 [ ] Yes  
 2 [ ] No

**Please allow us to ask you now about your present status in the Pension System.**

36. Are you currently affiliated in a Pension System? (*if the respondent is retired, consider them affiliated*)

- 1 [ ] Yes Go to Q37  
 2 [ ] No Go to Q58

37. What year did you contribute for the first time?

Year: 19\_\_\_\_\_

38. Since that time, have there been periods when you did not contribute?

- 1 [ ] Yes, For how long? \_\_\_\_\_ years \_\_\_\_\_ months  
 2 [ ] No

39. Are you presently receiving a pension for retirement, as a survivor, or for disability?

Institution	For Retirement	As survivor/orphan or for disability
1 INP		
2 CANAEMPU		
3 EMPART		
4 AFP, <b>Which?</b>		
5 CAPREDENA		
6 DIPRECA		
7 Other - Specify: _____		
8 Not receiving		
Indicate the amount	\$	\$

40. Are you or your spouse currently contributing to a pension system?

- | You   | Spouse                 |
|-------|------------------------|
| 1 [ ] | 1 [ ] Yes, to INP      |
| 2 [ ] | 2 [ ] Yes, to CANAEMPU |
| 3 [ ] | 3 [ ] Yes, to EMPART   |
| 4 [ ] | 4 [ ] Yes to AFP,      |

**You:** \_\_\_\_\_ **Spouse:** \_\_\_\_\_

- |       |                                     |
|-------|-------------------------------------|
| 5 [ ] | 5 [ ] Yes, to CAPREDENA             |
| 6 [ ] | 6 [ ] Yes, to DIPRECA               |
| 7 [ ] | 7 [ ] Other                         |
| 8 [ ] | 8 [ ] Not contributing. → Go to Q59 |

41. Why do you contribute to the Pension System?

**Note:** Respondent can choose more than one response. If respondent selects a title in block letters, probe using options under the title in block letters.

- 01 [ ] Because it is mandatory  
 02 [ ] I'm worried about income in old age  
 03 [ ] To receive the minimum guaranteed pension  
 04 [ ] I have to in order to have FONASA or ISAPRE coverage  
 05 [ ] I want disability coverage  
 06 [ ] I want to leave a survivor benefit to my spouse and kids  
 07 [ ] I don't think my spouse and kids will take care of me in the future  
 08 [ ] There are no better options  
 & [ ] THE PENSION FUNDS ARE AN ATTRACTIVE INVESTMENT, BECAUSE...  
 11 [ ] minimum return guarantee  
 12 [ ] good returns  
 13 [ ] low commissions

- 14  good investments  
 15  allow tax deductions

20  Another reason - Specify: \_\_\_\_\_

**Note:** If respondent contributes to AFP, go to Q42  
 If respondent contributes to another system, go to Q52

42. When was the last time you received an AFP statement?

\_\_\_\_\_ Month of \_\_\_\_\_ Year

Does not receive a statement from AFP

43. Was the return earned by your pension fund among...?

- 1  The three best  
 2  The three worst  
 3  Average

To what period are you referring? \_\_\_\_\_

*Looked up information in statement*

44. What commission does your AFP charge to manage your savings?

- 1  The three best  
 2  The three worst  
 3  Average

To what period are you referring? \_\_\_\_\_

*Looked up information in statement*

45. Who pays the commissions charged by your AFP?

- 1  You and your salary is discounted  
 2  You, and your pension is discounted  
 3  Your employer  
 4  The Government  
 5  Split between you and your employer  
 6  Don't know

46. How much do you pay your AFP in commissions?

\$ \_\_\_\_\_ (pesos)  Don't know

47. You make contributions on....?

- 1  The minimum salary  
 2  A salary below your actual salary  
 3  Your entire salary/income

48. Do you think that when you reach the retirement age, you will have a sufficient balance in your individual account to at least receive the minimum pension for life?

- 1  Yes  
 2  No  
 3  Don't know

49. Do you, or does your employer on your behalf, make voluntary contributions to your AFP?

- 1  Yes, in account 1 (you can't withdraw)  
 2  Yes in account 2 (you can withdraw)  
 3  No → Go to Q52

50. How much money do you contribute voluntarily to your AFP account?

\$ \_\_\_\_\_ in account one  
 (you can't withdraw)

\$ \_\_\_\_\_ in account two  
 (you can withdraw)

51. Why do you make voluntary contributions?

- 1  I want a higher pension  
 2  I want greater tax deductions  
 3  I want a better return  
 4  I want to qualify for early retirement  
 5  Other: \_\_\_\_\_

52. Would you like to contribute more or *less than* you currently contribute?

- 1  Yes, more  
 2  Yes, less  
 3  Same

**Go to Q54**

53. If you could choose the amount of your pension contributions, what percentage of your total monthly income would you contribute?

\_\_\_\_\_ % of total monthly income

54. What other insurance plans do you (or your employer) have?

- 1  Work injury insurance  
 2  Automobile insurance  
 3  Life insurance (other than AFP)  
 4  Severance or unemployment insurance  
 5  Disability insurance (other than AFP)  
 6  Health insurance ISAPRE or FONASA  
 7  Complementary health insurance  
 8  Other - Specify: \_\_\_\_\_  
 9  None

55. In addition to the Pension System, how are you saving/investing for income security in old age? *(multiple responses allowed)*

- 1 [ ] I do not save, b/c I cannot save  
 2 [ ] I do not save/invest, I spend  
 3 [ ] Regular savings accounts at banks  
 4 [ ] Purchase property  
 5 [ ] An own business  
 6 [ ] Educating kids  
 7 [ ] Loans to friends/family at interest  
 8 [ ] Invest in shares  
 9 [ ] Life insurance with savings option  
 10 [ ] Annuity  
 11 [ ] Other - Specify: \_\_\_\_\_

56. If you weren't forced to contribute to the Pension System how would you save/invest for income security in old age? *(multiple responses allowed)*

- 1 [ ] I do not save, b/c I cannot save  
 2 [ ] I do not save/invest, I spend  
 3 [ ] Regular savings accounts at banks  
 4 [ ] Purchase property  
 5 [ ] An own business  
 6 [ ] Educating kids  
 7 [ ] Loans to friends/family at interest  
 8 [ ] Invest in shares  
 9 [ ] Life insurance with savings option  
 10 [ ] Annuity  
 11 [ ] Other - Specify: \_\_\_\_\_

57. What portion of your current monthly income do you think you will need to meet your expenses when you can no longer work?

- 1 [ ] Less than 30%  
 2 [ ] Between 30% and 50%  
 3 [ ] Between 50% and 75%  
 4 [ ] Between 75% and 100%  
 5 [ ] 100%  
 6 [ ] More than 100% of current income

**Note: The following questions only to respondents who are not or who have never contributed to the pension system.**

58. Is your spouse contributing to the Pension System?

- 1 [ ] Yes, to INP  
 2 [ ] Yes, to CANAEMPU  
 3 [ ] Yes, to EMPART  
 4 [ ] Yes to AFP, which? \_\_\_\_\_  
 5 [ ] Yes, to CAPREDENA  
 6 [ ] Yes, to DIPRECA  
 7 [ ] Other, Specify \_\_\_\_\_  
 8 [ ] Does Not contribute  
 9 [ ] Does not have spouse

59. Have you ever contributed to a Pension System?

- 1 [ ] Yes  
 2 [ ] No → Go to Q61

60. When was the last time you contributed to a Pension System?

\_\_\_\_\_ Month, of \_\_\_\_\_ Year

61. Why do you not contribute to the Pension System?

*Note: Respondent can choose more than one response. If respondent selects a title in block letters, probe using options under the title in block letters.*

& [ ] I AM NOT (WAS NOT) OBLIGATED TO:

- 11 [ ] I am not working  
 12 [ ] I am self employed  
 13 [ ] I don't have enough to save  
 14 [ ] Other - Specify: \_\_\_\_\_

& [ ] I AM (WAS) OBLIGATED TO BUT CAN (COULD) NOT:

- 21 [ ] I'm not interested (don't want to)  
 22 [ ] My employer does not let me  
 23 [ ] My employer would lower my take home pay if I contribute  
 24 [ ] I don't have enough money  
 25 [ ] Other - Specify: \_\_\_\_\_

& [ ] CONTRIBUTING DOES NOT ATTRACT ME:

- 31 [ ] I prefer to spend my money today, rather than save for the future  
 32 [ ] You have to contribute for too many years to receive a pension  
 33 [ ] I contributed once, and wasn't satisfied  
 Specify \_\_\_\_\_  
 33 [ ] I cannot withdraw my savings in an emergency

& [ ] I HAVE (HAD) OTHER ALTERNATIVES

- 41 [ ] My spouse cares for me and will care for me in the future  
 42 [ ] My children will care for me  
 43 [ ] Other family members will care for me  
 44 [ ] I'm saving for myself,  
 How? \_\_\_\_\_  
 45 [ ] I have other insurance  
 Which? \_\_\_\_\_

& [ ] IT IS NOT AN ATTRACTIVE SAVINGS OPTION

- 51 [ ] I cannot withdraw my savings in emergencies  
 52 [ ] Returns are low  
 53 [ ] No discounts in taxes  
 54 [ ] AFPs make risky investments  
 55 [ ] AFP commissions are too high  
 56 [ ] Other - Specify: \_\_\_\_\_

& [ ] I DON'T (DIDN'T) KNOW – DON'T HAVE ENOUGH INFORMATION



- 61 [ ] An AFP salesperson never came to talk to me  
 62 [ ] My employer never spoke to me about the Pension System

**MODULE IV. FINANCIAL STRATEGIES**

We would now like to ask you several questions about your financial activities:

62. Would you contribute to the Pension System if....?

*Note: Respondent can choose more than one response. Only if respondent selects the title in block letters, "IT WERE ECONOMICALLY ATTRACTIVE..." etc. , then probe reading options 11 to 17.*

- 01 [ ] You were a dependent worker (with a boss)  
 02 [ ] You had enough money to save  
 03 [ ] You had more information  
 04 [ ] You did not have negative previous experiences  
 05 [ ] You did not expect your spouse and kids to care for you in the future  
 & [ ] IT WERE ECONOMICALLY ATTRACTIVE  
 11 [ ] With higher returns  
 12 [ ] With tax deductions/incentives  
 13 [ ] With safer investments  
 14 [ ] Lower commissions  
 15 [ ] With the possibility of withdrawing funds in case of emergency  
 16 [ ] Could chose level of my contribution  
 18 [ ] Other - Specify: \_\_\_\_\_

20 [ ] Other – Specify: \_\_\_\_\_

63. If you could chose the amount of your contributions to the Pension System, how much would you contribute every month?

\$ \_\_\_\_\_ pesos a month

64. In what alternative to the Pension System do you invest your savings? (*multiple responses allowed*)

- 1 [ ] I do not save  
 2 [ ] I do not invest, I spend  
 3 [ ] Regular savings accounts at banks  
 4 [ ] Purchase property  
 5 [ ] An own business  
 6 [ ] Educating kids  
 7 [ ] Loans to friends/family at interest  
 8 [ ] Invest in shares  
 9 [ ] Life insurance with savings option  
 10 [ ] Annuity  
 11 [ ] Other - Specify: \_\_\_\_\_

	Deposits		
	1	2	3
65. Do you have money deposited in ...? (Can mark more than one alternative)			
1. Checking account 2. Savings account 3. Certificate of deposit in pesos 4. Certificate of deposit in dollars 5. Mutual funds 6. Life insurance with savings option 7. None of the above → Go to Q72			
66. Where is your money deposited?			
1. State Bank 2. Commercial bank 3. Life insurance company 4. Credit union – savings and loan 5. Mutual fund 6. At home 7. Other place, Specify: _____			
67. How easily can you withdraw your savings?			
1. Immediately 2. With 5 days notice 3. With 5 to 30 days notice 4. With more than a month's notice 5. Does not know			
68. What do you loose if you withdraw your money before the agreed period?			
1. Loose the interest 2. Loose a portion of saved funds 3. Don't loose anything 4. Don't know			
69. What rate of interest do they pay you? %			
70. How often?			
1. Monthly 2. Every 6 months 3. Annually 4. None			
71. How long does it take you to get from your house to the place where you have this account or deposit?  _____ hour y _____ minutes			

72. How long does it take you to get to the nearest bank?

\_\_\_\_\_ hours and \_\_\_\_\_ minutes

73. Are you (or were you 10 years ago) the owner of:  
(Multiple responses are allowed).

**Today**

**10 Years ago**

- 1 [ ]      1 [ ] Your home ?  
 2 [ ]      2 [ ] Some other house?  
 3 [ ]      3 [ ] Land or agricultural property?  
 4 [ ]      4 [ ] Share in an agricultural collective  
 5 [ ]      5 [ ] Cattle, sheep, farm animals  
 6 [ ]      6 [ ] Vehicle?  
 7 [ ]      7 [ ] Tools and work machinery?  
 8 [ ]      8 [ ] Financial assets/shares?  
 9 [ ]      9 [ ] Loans to friends and family?  
 10 [ ]     10 [ ] Other - Specify: \_\_\_\_\_  
 11 [ ]     11 [ ] No invests/property

74. In the last 12 months did you receive income from a property in the form of a dividend or rent?

\$ \_\_\_\_\_

75. In the last 12 months have you applied for a loan/credit?

- 1 [ ] Yes, applied  
 2 [ ] No, did not apply → Go to Q77

76. The last time you applied for a loan, were you granted a loan/credit?

- 1 [ ] Yes → Go to Q80  
 2 [ ] No → Go to Q78

77. Why did you not apply for loan/credit?

**Note:** Respondent can choose more than one response. If respondent selects a title in block letters, probe using options under the title in block letters.

& [ ] I DID NOT NEED IT

- 11 [ ] I prefer to use only my own resources  
 12 [ ] I have access to other sources of help from family and friends  
 15 [ ] Other - Specify: \_\_\_\_\_

& [ ] I DID NOT KNOW HOW TO APPLY

- 21 [ ] Did not have enough information  
 22 [ ] There were no lending institutions or money lenders nearby  
 25 [ ] Other - Specify: \_\_\_\_\_

& [ ] I THOUGH I WOULD NEVER GET IT

- 31 [ ] I don't have a job  
 32 [ ] I have a "precarious", unstable job

33 [ ] I don't have property (to guarantee loan)

34 [ ] I don't have guarantees (references)

35 [ ] No stable income

36 [ ] They don't attend to people like me  
(sex, race, religious discrimination)

37 [ ] I'm still paying-off an earlier loan

38 [ ] Other - Specify: \_\_\_\_\_

& [ ] WOULD NOT HAVE MET MY FINANCIAL NEEDS:

- 41 [ ] The size of the loan I applied for was too big  
 42 [ ] The size of the loan I applied for was too small  
 45 [ ] Repayment period was too long  
 46 [ ] Repayment period was too short

& [ ] IT WAS TOO EXPENSIVE

- 51 [ ] Interest rate too high  
 52 [ ] Commissions are too high

& [ ] IT WAS TOO DIFFICULT

- 61 [ ] Process was too bureaucratic  
 62 [ ] Process was too risky  
 63 [ ] Other - Specify: \_\_\_\_\_

70 [ ] OTHER Specify: \_\_\_\_\_

→ Go to Q88

78. Why were you not granted the loan/credit? (Multiple responses allowed).

- 1 [ ] No guarantees (references)  
 2 [ ] No property (with which to guarantee loan)  
 5 [ ] No job  
 4 [ ] Have a "precarious" job  
 5 [ ] Bad credit report/history (Boletin Comercial, DICOM, P. Verde)  
 6 [ ] No stable income  
 7 [ ] Not up to date with tax payments  
 8 [ ] They did not say why  
 9 [ ] Other - Specify: \_\_\_\_\_

79. What did you do instead?

Specify \_\_\_\_\_

→ Go to Q88

80. Who granted you the loan, credit?

- 1 [ ] Bank  
 2 [ ] Other commercial lender (*financiera*)  
 3 [ ] Compensation fund (*caja de compensacion*)  
 7 [ ] Foundation/charitable organisation  
 4 [ ] Official housing finance institution  
(CORFO, SERVIU)  
 5 [ ] City government  
 6 [ ] Money lender  
 7 [ ] Friend or family member  
 8 [ ] Other - Specify: \_\_\_\_\_

81. What is the (nominal) rate of interest you are paying on the loan/credit?

1  Monthly \_\_\_\_\_%

2  Annually \_\_\_\_\_%

3  I don't pay interest

82. What is the period for repayment of the loan/credit?

1  Contract for 1 month

2  Between 1 and 6 months

5  Between 6 and 12 months

4  Between 1 and 2 years

5  Between 2 and 5 years

6  Longer than five years

83. How often do you make payments?

1  Daily

2  Weekly

5  Monthly

4  Every 5 months

5  Every 6 months

6  Annually

7  Other - Specify: \_\_\_\_\_

84. How much are your payments?

\$ \_\_\_\_\_ in pesos, or US\$ \_\_\_\_\_

85. When did you receive the loan/credit?

Month: \_\_\_\_\_, and Year: \_\_\_\_\_

86. Have you finished paying back the loan ?

1  Yes

2  No, How much do you have left to pay?

\$ \_\_\_\_\_ pesos or US\$ \_\_\_\_\_

87. What did you use the money from the loan/credit for?  
(don't read out all the options)

**A. Your business or farming activity**

1  Work tools

2  Machinery

3  Equipment and furnishings

4  Other equipment

5  Vehicle or bicycle for work

6  Purchase of raw materials

7  Purchase of property

8  Purchase of animals

9  Purchase of sale goods for the business

10  Payment of debts

11  Other use for small/agricultural business.

Specify: \_\_\_\_\_

**B. In the home**

1  Appliances (stove, blender,)

2  Electric goods for the home (radio, TV)

3  Emergency or illness

4  Payment of household debt

5  Purchase of a house

6  Education

7  Construction of a house

8  Remodeling or extending the home

9  Vehicle or bicycle for the home

10  Other household use.

Specify: \_\_\_\_\_

**Note: The questions on financial awareness are posed to all respondents**

88. What was the rate of inflation in the last 12 months?

1  Less than 2%

2  Between 2% and 5%

3  Between 5% and 10%

4  More than 10%

5  Does not know

89. What was the national unemployment rate in the last trimester?

1  Less than 10%

2  Between 10% and 12%

3  Between 12% and 16%

4  More than 16%

5  Does not know

90. Do you know how much the price of the dollar has changed in the last year?

1  Rose more than \$100

2  Rose between \$50 and \$100

3  Rose between \$1 and \$50

4  Fell between \$1 and \$50

5  Fell between \$50 and \$100

6  Has not changed

7  Does not know

91. Do you know what was the value of the Santiago Stock Market Index (IPSA) last week?

\_\_\_\_\_

Does not know

## MODULE V. INTER AND INTRA HOUSEHOLD STRATEGIES

We would now like to ask you some questions about the assistance you/your household gives to family and friends living outside your household

92. Do you, or does someone in your household, **give** assistance to family and/or friends outside of your home, in the form of money, visits, purchase of food or goods, or other forms of help?

1 [ ] Yes  
2 [ ] No → Go to Q93

Who do you help? (relation to the respondent)	How do you help?	If your help is in the form of money, on what is that money spent?	How often do you help?	Do these family or friends contribute to....?	Where do they live?
1 Ex-spouse or partner 2 Son/Daughter 4 Father/Mother 5 F or M in Law 7 S or D in Law 8 Grandchild 9 Brother/sister 10 B or S in law 11 Other family 12 Non family 13 Employees	1 Care for minors or elders 2 Regular visits for reasons not mentioned 3 Food or other basic goods 4 HH Durables like fridge, or stove etc. 5 Machinery or tools 6 Money (except for alimony) 7 Alimony 8 Other - Specify	1 Food, or other basic goods such as clothes 2 HH durables like fridge, stove etc. 3 Education expenses 4 Health expenses 5 Credit payments 6 House payments 7 Other – Specify 8 Does not know	1 Daily 2 Once a week 4 Twice a month 5 Every month 6 Every three months 7 Every six months 8 Yearly	1 Contributes 2 Don't contribute 3 Don't know 4 Doesn't apply	1 Same neighbourhood 2 Same district 3 Same city 4 Another city 5 Another rural area 6 Another country in Latin America 7 In Europe or the US 8 Another country

	a	b	c	d	e	f
1						
2						
3						
4						
5						

93. Do you, or does someone in your household, **receive** assistance to family and/or friends outside of your home, in the form of money, visits, purchase of food or goods, or other forms of help?

1  Yes  
2  No → Go to Q94

Who do you receive help? (relation to the respondent)	What form does that help take?	If your help is in the form of money, on what is that money spent?	How often do you receive help?	Do these family or friends contribute to the Pension System?	Where do they live?
1 Ex-spouse or partner 2 Son/Daughter 4 Father/Mother 5 F or M in Law 7 S or D in Law 8 Grandchild 9 Brother/sister 10 B or S in law 11 Other family 12 Non family 13 Employees	1 Care for minors or elders 2 Regular visits for reasons not mentioned 3 Food or other basic goods 4 HH Durables like fridge, or stove etc. 5 Machinery or tools 6 Money (except for alimony) 7 Alimony 8 Other - Specify	1 Food, or other basic goods such as clothes 2 HH durables like fridge, stove etc. 3 Education expenses 4 Health expenses 5 Credit payments 6 House payments 7 Other – Specify 8 Does not know	1 Daily 2 Once a week 4 Twice a month 5 Every month 6 Every three months 7 Every six months 8 Yearly	1 Contributes 2 Don't contribute 3 Don't know 4 Doesn't apply	1 Same neighbourhood 2 Same district 3 Same city 4 Another city 5 Another rural area 6 Another country in Latin America 7 In Europe or the US 8 Another country

	a			b			c			d			e			f		
1																		
2																		
3																		
4																		
5																		

94. How many children do you have?

Male: \_\_\_\_\_ and Female: \_\_\_\_\_

95. How many children do you expect to have?

Total: \_\_\_\_\_

96. How much money do you spend on your children's education?

\$ \_\_\_\_\_ every month

0  Not Applicable

97. Now I'd like to ask you several questions about your parents

	Father	Mother
a. What level of education did your parents reach? 1 Primary 2 Secondary 3 CFT 4 P. Institute 5 University 6 Other, Specify		
b. Are they alive? 1 Yes 2 No → Go to Q97.d		
c. How old are they? → Go to Q98		
d. At what age did they die?		

98. How do you care for your parents?
- 1 [ ] Visiting when they are sick → Go to Q100  
 2 [ ] With regular visits → Go to Q100  
 3 [ ] By giving money → Go to Q100  
 4 [ ] Helping them with tasks → Go to Q100  
 5 [ ] In other ways. → Go to Q100  
 Specify: \_\_\_\_\_  
 6 [ ] I do not provide care for my parents  
 7 [ ] Not applicable
99. Why do you not provide care for your parents?  
*(Respondent can pick more than one option)*
- 1 [ ] We don't have time  
 2 [ ] We don't have money  
 3 [ ] They are in good health and don't need  
 4 [ ] They are in a good economic situation  
 5 [ ] Other siblings are caring for them  
 6 [ ] They receive old age and survivor pensions  
 7 [ ] Other - Specify: \_\_\_\_\_
100. What role do household members over 65 play in the home?
- Male Female
- 1 [ ] 1 [ ] Work and contribute to HH income  
 2 [ ] 2 [ ] Stay at home doing HH chores, e.g.  
 caring for children  
 3 [ ] 3 [ ] Stay at home and don't do any HH chores  
 4 [ ] 4 [ ] Other - Specify: \_\_\_\_\_  
 5 [ ] 5 [ ] Not applicable
101. Do you expect to live with one of your children in old age?
- 1 [ ] Yes, in the house of a son  
 2 [ ] Yes, in the house of a daughter  
 3 [ ] No
102. Do you expect your children to care for you when you can no longer care for yourself?
- 1 [ ] Yes, a son  
 2 [ ] Yes, a daughter  
 3 [ ] No, Why not? \_\_\_\_\_  
 4 [ ] Does not know
103. How many people outside of your household – family or friends - expect to receive you help in an economic emergency?
- No of People \_\_\_\_\_
104. On how many people outside your household – family or friends – could you rely on in case of an economic emergency?
- No. of People \_\_\_\_\_
105. Do you have persons for whom you are economically responsible, who are...:
- 1 [ ] Pregnant  
 2 [ ] Ill  
 5 [ ] Likely to become ill  
 4 [ ] Disabled  
 5 [ ] None of the above

## MODULE VI. LABOR STRATEGIES

106.	Did you work for money last week?  1 Yes → Go to Q111.a 2 No			
107.	If you did not work last week, were you temporarily absent on leave, sick leave, vacation, strike, or for another reason?  1 Yes → Go to Q111.a 2 No			
108.	Have you looked for paid work in the last 12 months?  1 Yes, for the first time → Go to Q109 and Q112 2 Yes, I'm unemployed → Go to Q109 and Q111.a 3 No → Go to Q110			
109.	How long have you been looking for paid work? → Go to Q111.a			
110.	Why did you not look for paid work?  1 Retired 2 Doing non-paid family work 3 Household owner → Go to Q122 4 Student → Go to Q122 5 Disabled or Elderly → Go to Q122 6 Other, Specify → Go to Q122			
111.a	Please describe your main (principal) job, <i>or the job you recently lost</i>	111.b Apart from your main job, do you have another job?  1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No → Go to Q123	111.c Do you have another job in addition to those mentioned?  1 Yes 2 No → Go to Q123	
		<b>Main (principal) job</b>	<b>Second job</b>	<b>Third job</b>
112.	What is (was) your job – what do (did) you do?			
113.	Occupational (job) category:  1 Employer - boss 2 Self employed 3 Employee 4 Worker (physical work) 5 Non resident domestic service 6 Resident domestic service 7 Non-paid family member 8 Soldier & Police forces			
114.	What does the firm, (institution or business) you work (worked) for do?			
115.	Does this firm, (institution or business) belong to the public or to the private sector?  1 Public institution or business 2 Private institution or business 3 International organisation			
116.	How many people work in this firm (institution or business)? 1 One person 2 2 to 5 persons 3 6 to 9 persons 4 10 to 49 persons 5 50 to 199 persons 6 200 or more persons 7 Doesn't know			

117. Did you sign a contract for your job?  1 Yes, open-ended contract 2 Yes, time bound contract 5 Yes, but I don't know the terms of contract 4 No, but my job is open-ended 5 No, I did not sign a contract 6 Don't know, don't remember																							
118.a. Where do you do your job?  1 At home, self employed 2 At home, employed 5 In another household 4 Local workshop attached to a home 5 Independent establishment 6 Agricultural farm 7 Fishery 8 In a household/home 9 In public places (street, parks, etc.) 10 Transport (air, sea, land) 11 Other, Specify																							
118.b. In the last month what is your take-home (net, liquid) income?																							
119. How long have you worked at this job?  <i>(Interviewer: Include number of years and months).</i>	Year(s) _____ and Month(s) _____	Year(s) _____ and Month(s) _____	Year(s) _____ and Month(s) _____																				
120. How many hours a day, and days a week did you work in the last month?	Hours a day: _____ and Days a week: _____	Hours a day: _____ and Days a week: _____	Hours a day: _____ and Days a week: _____																				
121. Did you receive other income from your MAIN such as: <i>(Respondent can give multiple responses).</i>  1 Bonuses 2 Income from sale of agricultural goods 3 Extra hours 4 Family allowances 5 Other. Specify: 6 Did not receive any other income	Type : _____  Amount : \$ _____	Type : _____  Amount : \$ _____	Type : _____  Amount : \$ _____																				
122. In the last month, did you receive income from any of the following public subsidies: <i>(Respondent can give multiple responses)</i> <table style="width: 100%; border: none;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 10%;">1. No</th> <th style="width: 10%;">2. Yes</th> <th style="width: 20%;">Amount</th> </tr> </thead> <tbody> <tr> <td>1. Social assistance pension, PASIS</td> <td style="text-align: center;">[ ]</td> <td style="text-align: center;">[ ]</td> <td>\$ _____</td> </tr> <tr> <td>2. Single family subsidy , SUF</td> <td style="text-align: center;">[ ]</td> <td style="text-align: center;">[ ]</td> <td>\$ _____</td> </tr> <tr> <td>3. Severance subsidy</td> <td style="text-align: center;">[ ]</td> <td style="text-align: center;">[ ]</td> <td>\$ _____</td> </tr> <tr> <td>4. Did not receive any of these subsidies</td> <td colspan="3" style="text-align: center;">[ ]</td> </tr> </tbody> </table>					1. No	2. Yes	Amount	1. Social assistance pension, PASIS	[ ]	[ ]	\$ _____	2. Single family subsidy , SUF	[ ]	[ ]	\$ _____	3. Severance subsidy	[ ]	[ ]	\$ _____	4. Did not receive any of these subsidies	[ ]		
	1. No	2. Yes	Amount																				
1. Social assistance pension, PASIS	[ ]	[ ]	\$ _____																				
2. Single family subsidy , SUF	[ ]	[ ]	\$ _____																				
3. Severance subsidy	[ ]	[ ]	\$ _____																				
4. Did not receive any of these subsidies	[ ]																						



123. How much money do you contribute every month to your household's total income?

\$ \_\_\_\_\_ pesos per month

124. Would you like to be doing the same job for the next ?

- 1 [ ] 3 months  
 2 [ ] 6 months  
 5 [ ] 1 year  
 4 [ ] More than a year  
 5 [ ] Don't want  
 6 [ ] Doesn't know  
 7 [ ] Not applicable

125. If you are self-employed a year from now would you want to:

- 1 [ ] remain self employed  
 2 [ ] find employment - leave self employment

126. In the past month, have you been looking for an additional job that will generate additional income?

- 1 [ ] Yes. → Go to P128  
 2 [ ] No

127. Why not?

*(multiple responses allowed).*

- 1 [ ] I did not (do not) need to  
 2 [ ] I already have additional jobs  
 5 [ ] I'm waiting to hear about an additional job I applied for  
 4 [ ] I'm waiting to start a new job  
 5 [ ] I'm tired of looking  
 6 [ ] I have domestic (household) responsibilities  
 7 [ ] Health and age reasons  
 8 [ ] Other - Specify: \_\_\_\_\_

**Go to Q130 on the next page**

128. How long have you been looking?

\_\_\_\_\_

129. What is the minimum salary you would be willing to accept for the additional job?

\$ \_\_\_\_\_ per hour

\$ \_\_\_\_\_ per day

\$ \_\_\_\_\_ per month

[last question on next page]

130. Since November of last year (1998) until today:

- Did someone in your house hold loose their job? or
- Did someone in your house hold who did not work in November 1998, begin to work since then?

1 [ ] Yes, who? → **CONTINUE**  
 2 [ ] No → **END OF SURVEY**

	a. Relation to the respondent	b. Lost job or began to work?	c. For how long were they without work?	d. How long had they been working in that activity?	e. What happened?	f. What is their job or activity now?
	1 HH Head 2 Spouse/partner 3 Son/Daughter 4 Mother/Father 5 M/F in law 6 S/D in law 7 Grandson/daught 8 Brother/Sister 9 B/S in law 10 Other family 11 Non family	1 Lost job → <b>Go to c</b> 2 Began to work or self employed activity → <b>Go to d</b>	Take down time and → <b>Go to e</b>		<b>If they lost a job</b>  1. Found a new job 2. Started own business 3. Has not found a job 4. Returned to the same job  <b>If they answered 3 or 4 END OF SURVEY</b>  <b>Started work or self employed activity</b>  5 Remained in the same activity 6 Changed job or activity 7 Lost job/stopped activity  <b>If they answered 7 END OF SURVEY</b>	
	<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>
1						
2						
3						
4						
5						