

**Who Knows What About Their Pensions?
Financial Literacy in the Chilean Individual Account System**

Jeremy Skog

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Abstract

This paper examines the question of what affiliates of the Chilean pension system know about their pension system, and whether they respond to incentives to learn more about their benefits depending on whether they stand to gain most from a particular aspect of the pension system. We rely on the 2004 Social Protection Survey (*Encuesta de Prevision Social*, EPS) to assess individuals' financial literacy regarding several structural questions about their pension system. These questions are aggregated into several clusters, representing aspects of the pension lifecycle, and literacy along these vectors of knowledge is assessed using an integer scoring system. Using multivariate regression, we show the older, healthier, more educated, married male workers know more about the system. Also, union members, those with higher incomes, and workers at larger companies are also more financially informed. We also find that knowledge varies by subject area; accordingly, it is important to ascertain what literacy shortfalls must be targeted before determining what education efforts might be useful. We also conclude that people become more pension literate, as that knowledge becomes more useful.

Jeremy Skog

Doctoral Candidate

Department of Insurance & Risk Management

The Wharton School, Univ. of Pennsylvania

3620 Locust Walk, St. 3000 SH-DH

Philadelphia, PA 19104

E-mail: skog@wharton.upenn.edu

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The Chilean pension system has served as a model for many pension reformers around the world because of the perceived success of its system of individual accounts, which shift much of the financing responsibility and risk to workers. There also exists evidence from other defined contribution pension systems around the world that workers are not particularly adept at handling decisions regarding retirement saving. Accordingly, in the Chilean case, it would be useful to know what participants know about their system, how this knowledge is distributed, and whether this affects their saving and investments. This paper examines participants' knowledge of the Chilean pension system using both univariate and multivariate analyses of an invaluable microeconomic dataset known as the 2004 Encuesta de Prevision Social (EPS). We find that participants are ignorant of many aspects of their system, but pension literacy varies both according to sociodemographic group and according to the knowledge being tested. Those who stand to benefit most from the system do know more about their pension, but they know little about other state-run safety net programs. In sum, people gain pension literacy as that knowledge becomes more useful.

In what follows, we first offer a brief overview of the Chilean pension system, and then describe the model and data we use to assess pension literacy scores. Next we summarize the findings and provide multivariate regression models that help address what people know and why they know it. Last, we offer a discussion and suggestions for future research.

The Chilean Pension System

The Chilean government completely revamped the country's old-age retirement system in 1980 in order to replace a host of bankrupt and disorganized defined benefit programs which, by the 1970s, were paying 70% of pensioners a minimum pension and faced insolvency (Valdes-Prieto, 1998; Edwards, 1998). The new system had three parts. The most prominent is an individual defined contribution account financed by a payroll tax and managed by investment houses known as Administradores de Fondos de Pensiones (AFPs). Workers in the wage and salary sector were to contribute 10 percent of their pay to these accounts; retirement benefits were then to be determined as a function of the accumulation built up and the worker's retirement age. Workers who have sufficient accumulations in their accounts may retire prior to reaching the legal retirement age (65 for men and 60 for women). The second part of the national retirement program is the Minimum Pension Guarantee (MPG), payable to any worker having at least 20 years of contributions to the AFP system (even if their accounts were insufficient to generate this threshold income. Finally, the third element of the system is the state-run welfare system which will pay a means-tested benefit (known as the PASIS benefit) to the indigent.

At the time of the transition, existing workers were given the choice of remaining in a national state-run defined benefit system (INP) or transferring to the new AFP system. Those who transferred would have their past service valued via a 'Recognition Bond,' which would come due at retirement. The government's liability from these bonds was expected to rise and then gradually fall, as workers in the old INP system fell through attrition (Diamond 1994). All new entrants to the wage workforce would be automatically enrolled in the AFP system. The self-employed may but are not required to contribute to any retirement scheme.

Workers can select which AFP they want to manager their money, but they may not select individual investments themselves. Rather, AFP managers determine the fund portfolios, subject to numerous maxima and minima. For instance, the current cap on international investments is between 20% and 30% of the fund, with the current limit being determined by the Central Bank of Chile (Yazigi, 2003, pg. 84). In addition, the government requires that each AFP pay investment returns within a range based on the average return across all AFP companies. Each AFP must maintain a reserve which is used to make up shortfalls if returns are too low. Initially all AFPs invested more or less identically, but in 2002 a “Multifund” approach was permitted. Now each AFP must offer a minimum of 2 and a maximum of 5 funds named A through E with A being the highest and E being the lowest risk. Participants are now granted more choice in determining their pension investments and how much risk they are willing to take on. The allowable returns spread between good and poorly performing funds is twice as large, at 4% in the riskiest two funds as in the three less risky funds (Yazigi, 2003, pg.82). As people grow older, they are automatically shifted into less risky funds unless they opt otherwise (Yazigi, 2003, pg. 54).

As Chile was one of the first nations to switch its retirement system to an individual-account format, it has become a model for many of the pension reforms adopted in Latin America and elsewhere (Mitchell and Barreto, 1997). Yet the system has its detractors, and a recent Government Commission (Consejo, 2006) has issued a report at the request of the new government suggesting ways to improve the model. For our purposes the most important concern voiced had to do with the relatively low levels of awareness that workers have regarding the system, which may in turn contribute to low participation rates. To this we turn next.

Pension Literacy: Prior Analysis

In the conventional life-cycle microeconomic model, workers will rely on accurate knowledge regarding their likely retirement benefits and consumption needs in order to arrive at the optimal saving decisions. If they lack key financial information, this can cause people to prepare inadequately for retirement, including saving too little and retiring too early (Lusardi and Mitchell, 2006). Indeed, researchers using US data finds that “misinformation or lack of information is the norm” (Gustman and Steinmeier 2001b). There is some variability across the population: for instance, men tend to know more about their retirement benefits than do women: pension literacy increases with age: and wealthier, healthier, and more educated people tend to be better informed about their retirement prospects (Mitchell, 1988; Gustman and Steinmeier 2001a; Chan and Stevens 2004). Also, those who are most likely to rely on the government social security system are the least informed, while those who are mostly expected to rely on their pensions are the most well-informed, particularly where it concerns their decision making (Luchak and Gunderson, 2000). Nevertheless, little is known about individuals’ reasons for acquiring knowledge: thus, older people may know more simply because they are closer to retirement; healthier people may know more because they expect to live longer in retirement; and wealthier or more educated people may know that they will need to rely on their pensions more in retirement than poorer people. It also appears that one’s co-workers and peers play a role: unions and other communities also can enhance financial literacy (Duflo and Saez 2002).

Relatively few analysts have examined the question of pension knowledge outside of the United States. Thus far Arenas De Mesa et al. (2006) have used Chilean data, although that paper was primarily descriptive and limited to examining trends of single variables across groups without performing multivariate analysis. Clearly there is much to learn.

Data and Descriptive Results

For this analysis we rely on a unique new microeconomic data set from Chile known as the EPS survey (<http://www.proteccionsocial.cl/>) Designed and conducted by an international team from the University of Chile and the University of Pennsylvania, there have been two waves released, in 2002 and 2004. Here we use the 2004 wave as it contains the most complete data on socioeconomic characteristics, family and work history, and pension knowledge, as well as wealth and health status; our sample is limited to those between ages 18 and 60.¹ The age span offers the opportunity to determine how financial knowledge changes over the life cycle as well across individual circumstances. Furthermore, we are able to compare knowledge of those who only were exposed to the new AFP system, with that of persons exposed to the old INP system as well.

Using the EPS survey, we create a series of categorical variables to measure aspects of retirement system literacy in the Chilean context. These are divided into four clusters for ease of discussion: knowledge regarding system inputs; knowledge of pension investments; knowledge of the expected benefits from the AFP system; and knowledge of the safety-net components. Within these clusters we further split up the factors to assess workers' knowledge of financial data, on the one hand, and knowledge of system rules, on the other. Thus, for instance, workers were asked "what are AFP contributions" and many might have tried to answer it; yet few would have gotten the answer correct. Both sets of answers are used in our construction of pension literacy; a full list of the specific variables developed from the questions appears in Table 1.

Table 1 here

In addition to examining individual questions, we also undertake an aggregation exercise to determine whether people are knowledgeable about the whole pension system or whether their knowledge is limited to a few specific areas. Our goal is to examine vectors of knowledge to see whether people become selectively literate in areas likely most relevant to them, or whether a few same people learn about all aspects of the retirement system. Naturally, which pattern prevails would have different policy implications for increasing pension literacy. To do this, we sum each individual's number of correct scores within each cluster, crediting him with a score of one if the question was answered correctly and zero if not. In this way an individual score of 'literacy' is created for each cluster and for the pooled AFP questions as a whole. (We do not include in this aggregating the questions about the safety net or welfare benefits paid by the state, as those have separate determinants and distributions as we show below). This aggregated score may then be used to determine how knowledge is distributed among the population. In addition, by using the knowledge score as a dependent variable in a multivariate model, we can examine the determinants of knowledge. Other scoring mechanisms will be explored in future analysis.

Descriptive Results

The distribution of pension literacy is first examined by dividing the respondents into two segments, the 'literate' and the 'illiterate,' divided at the mean aggregate literacy score for each cluster. We then determined what percentage of people highly literate for one cluster was also highly literate in another cluster. This technique allows us to examine how literacy along one dimension correlates with another, thereby allowing us to measure how closely the vectors of knowledge are related. Another way we examine the distribution of knowledge is to prepare histograms of affiliates' scores for each of the clusters and for the pooled score. This allows us to

determine if knowledge is uniformly or normally distributed throughout the population, or if there is a bimodal distribution.

Table 1 reports the mean values of the key pension literacy variables, and we see that most people believe they know more than they do, in the sense that more people offer an answer to the questions than get the answers correct. Panel A shows note that only half of all participants claim to know the amount of contributions that they are making to the system, and only one-third could report the correct amount for contributions, even though the mandatory contribution rate has been 10% for more than two decades. We counted answers of between ten and fourteen percent as valid, to allow for misperceptions because of fees and the deductions for survivor and disability insurance. Very few can report how much they pay in commissions, perhaps an explanation for perceived system inefficiencies (Diamond, 1994). This lack of knowledge persists, despite 70% of the population claiming that they receive information from their AFP company on a regular basis.

Panel B underscores that respondents also are under informed regarding their pension balances. Half the people claim to know how much they have saved in their accounts, but only one-fifth are within 20% of the actual figure (where the actual balance was gathered from administrative records; see Arenas de Mesa et al. 2006). Around one-third of the population is aware of recent innovations such as multifunds and able to describe them accurately. Turning to Panel C, it appears that people are generally knowledgeable about their retirement expectations, and four-fifths can correctly name the retirement ages for men and women. Yet only 10 percent know how their pensions are calculated when they reach that point, which is striking given that the system has been around for a generation. Similarly, half of the participants know that there is

a minimum pension guarantee, but only one-third try to indicate either the eligibility conditions or the benefit amount; almost no one gives the correct values or requirements.

Knowledge of the safety net or welfare elements of the system is reflected in Panel D. Again, here financial literacy is remarkably low. Only 20 % of respondents claim to know the eligibility requirements, and most of them are wrong – only five percent know the right conditions. Only 10 % know how much the welfare system benefit amounts to.

One concern is that, because of this lack of knowledge, people may not be saving what they should to assure themselves of a reasonable retirement. Of course some might be saving outside their pensions, but the apparent widespread pension illiteracy could mean that people may be misaligning their portfolios and replicating investments undertaken within the AFP system rather than complementing them.

Correlations of Pension Literacy Scores

We next use a simple analysis of integer scores clustered by panels, wherein we determine what portion of high-knowledge types for one cluster are also in the high-knowledge category for the other cluster. A random-response would yield a score of around 25%, as a person would have to guess enough questions correctly in each cluster to be above the mean. Given that some questions are categorical in nature, or have multiple required responses, the true value is even less than this amount. Results are presented in Table 2. We note that in most cases knowledge carries across the various clusters, with scores in the range of 60-70%, except in the case of welfare knowledge, and that this knowledge does not arise because of random chance. In the lowest response for the pension life-cycle clusters, only fifty percent of literate members of cluster B were also literate in cluster C.

Table 2 here

The lack of carryover of literacy from the pension life-cycle clusters to the welfare cluster is sensible, people who do not need to know about the welfare system will find it burdensome to become informed about it. It is interesting, however, that those who are fairly well-informed about the welfare system (the last column in the table) are also fairly well-informed about the other aspects of the system, with literacy carryover rates of 55, 46, and 77 percent respectively. The large carryover occurs in knowledge of pension payout rules, perhaps these are also learned as participants learn about the welfare system, or must be determined when discovering that one needs to learn about the welfare system.

Histograms

Next we examine histograms of the knowledge scores to determine how pension literacy is distributed across the respondent population. Figure 1 focuses on the pooled score across clusters A, B and C, and it is of interest that the pooled score follows a roughly skewed-normal distribution. There is a single peak where most of the people are concentrated, with fewer in the tails. Also, the population is skewed to the left, with the modal person answering 6 questions out of 21 correctly and with a long right-tail representing the most knowledgeable individuals. The median number of points is 7, with the mean also at 7 questions. A single individual answered 20 questions correctly, representing the maximum.

Figure 1 here

Figure 2 shows that the distribution of scores within the clusters is similar. As most of the points can be awarded in cluster C, because of the larger number of questions contained within this group, knowledge of pension payout rules will be rewarded more according to this scoring technique. However, knowledge of pension payouts is important to a thorough understanding of the pension system so this does not appear to be an unjustifiable bias. In Cluster A, which covers

contributions, we see that most respondents have slight literacy with the median score being two out of six (the mode is only one). The mean is slightly lower, at 1.6. The distribution of knowledge is single-peaked. Cluster B pertains to investment knowledge, and here we see a much greater knowledge distribution within disparity. Of the seven questions in this cluster, most get only one question correct (median 2, mean almost 2.5). There is also a local maximum at five, driven by the knowledge of multi-funds. The vast majority of people with scores of higher than 5 in this category got all of the multifund questions correct, with the lowest number being 51.2% of the population correctly answering the correct number of multifunds. Then 78% of the population knew which fund was the riskiest and literacy improved from there for the other multifund questions. Of 8 possible questions in Cluster C, the median number of correct answers is three (mode two; median 2.93). Most people possess a middling level of knowledge in this area.

Figure 2 here

Panel D, regarding safety net benefits, is where respondents know the least. The median number of questions correct is zero, with 74% of the population answering this number (mean 0.5). Only 26% of the population get at least one question correct, and of those who do, 41% got only one question correct. This may be reasonable as many associated with the pension system will probably not make use of the welfare benefit, if they maintain their membership in the system by contributing until retirement. The minimum guaranteed pension benefit provides better benefits and covers most AFP members.

Multivariate Methodology

Next we report multivariate regression models of the cluster and pooled literacy scores as the dependent variables. Three variants of the OLS regressions are considered. The first uses the canonical set of sociodemographic variables including an age spline, variables measuring workplace characteristics, and other variables as follows:

$$Y_{cluster} = \alpha + \beta_1 x_{sociodemographic} + \beta_2 x_{workplace} + \beta_3 x_{other} + \beta_4 x_{control} + \varepsilon .$$

We also perform a Wald test to determine whether the effect of pre-post age 42 effect discerns any difference between the groups. A second formulation includes the expectation variables which measure respondent's expectations about when they will retire and how long they will live. Individuals are directly questioned on their expected retirement age and their expected life expectancy. It is anticipated that those who expect their pension to last longer will have a greater incentive to learn more about the system. The third variant examines the effect of age and age squared which assesses the age effects and is reported in Appendix 1.²

Hypotheses

The independent variables we use are selected based on their relevance from prior literature, and also because of their interest and availability in the dataset. These we break down into several groups: sociodemographic factors, workplace variables, and other controls. Turning first to the sociodemographic variables, these include health, age, sex, wealth, education, marital status, and number of children. Prior research has suggested that men are more pension literate than women, perhaps because they have traditionally been responsible for handling family finances and earn more; *The Economist* has pointed out that Chilean women earn less than men and this gap translates into differential benefits in a defined contribution system. Also older people are hypothesized to know more than younger ones as the former group is closer to

retirement and benefit receipt. We also evaluate an age spline, based on the person being younger or older than age 42 at the survey date. We expect that those in the older group will know more about the benefits available, as they had to have elected the new AFP system at or after the time the new system was adopted. It is anticipated that those who choose the AFP system will be significantly more informed compared to other groups. Marital status is controlled as a married individual may have a stronger bequest motive than a single one; for similar reasons we include the number of children. Health has multiple effects, though the overall effect is indeterminate. Those in better health can anticipate living longer in retirement, so these individuals will therefore rely more on their pensions and derive greater benefit from knowledge of it. On the other hand, the less healthy are likely to lean more on the safety net benefit both because they are unable to accumulate much pension wealth and also because they are likely to rely more on survivors benefits to pay for their survivors. Years of education are included both because of more sophisticated information processing skills and also because they are likely more aware of the retirement needs. Household wealth is also controlled,³ though the overall effect of this variable is indeterminate. Wealthier individuals should have more knowledge of financial matters, so information should be cheaper for them to obtain; on the other hand, wealthier persons are also less dependent on the state pensions system since they have outside savings.

A vector of workplace factors is also examined. One is respondent earnings, which is likely to affect knowledge of the pension system in some important ways. A person's income is likely less correlated with his background than wealth, and it may not be as tied to his education. On the other hand, earnings may better reflect their current state of financial knowledge than does wealth. Two other variables indicate whether a respondent's job is governed by a labor

contract and whether he is a member of a union. Mitchell (1988) reported that union membership in the US positively influenced knowledge, and we expect similar results for both of these variables here as unions may act as important informal sources of information. Company size is also likely to be related to pension knowledge, due to scale economies and diseconomies. Small firms may have workers share knowledge, including about pension provisions, although a small company will find it relatively more expensive to undertake the cost of informing its employees.

Other controls are included to capture additional possible variability in the population. First, we include a measure of regional population density in the respondent's area, as this might be positively related to pension literacy if people in high-density regions can access information more readily and at lower cost. On the other hand, poor information can be spread as easily as good. Some sets of regressions also include respondents' expected life expectancies and their expected retirement ages. Life expectancy should be positively correlated with knowledge, whereas expected retirement age should be negatively correlated with knowledge as these variables represent the usefulness of their pensions knowledge to the individual.

Results

Many of the hypotheses are borne out in Table 3, where the first three columns report regression findings for individual clusters, and the pooled clusters A, B, and C appear in column 4. Older people tend to know more, although the effect is particularly pronounced in the older age group.⁴ Also being male and healthy have a small effect. Being married has a relatively large effect, as does each year of education as a person gains a point of financial literacy for approximately every three years of education. Surprisingly, knowledge appears to decrease with the number of children, although by only a small amount. Interestingly, workplace variables play

a large role in determining knowledge. Being in a union counts for getting 0.7 more questions correct while working in the formal sector, shown by having a labor contract counts for an extra 1.1 questions on average. Working in a larger firm also tends to make a person more knowledgeable, at a level similar to being in a union, possibly because these firms have more resources to devote to educating their employees or do more careful record keeping of pension accounts. This highlights the strong relationship between pensions literacy and workplace informational networks.

Table 3 here

When moving from the pooled pensions level to the cluster level, we find that results can vary greatly, suggesting that information is being lost as we move to a coarser level of examination. In particular, the knowledge of welfare benefits tends to go in the opposite direction from the knowledge of other aspects of the system. Thus, when the clusters are pooled, we segregate out the answers to the welfare cluster of questions, as it would distort the pension literacy picture. Age effects also appear in the clusters: people know more as they get older. The gender effect plays a large role in each of the cluster regressions, although it goes in the opposite direction in clusters C and D; men are more knowledgeable than women except in the area of pension payout rules and welfare benefits. If men are generally wealthier, then they will be less likely to make use of these benefits, a possible explanation. Health has an overall positive effect on pensions knowledge except that those who are in better health know less about the welfare system, as expected. Education is positively related with most questions, except for the welfare system. Marriage appears to have a positive effect on cumulative knowledge and also on knowledge of money going into the system and invested within it, although no effect on either payout rules or welfare knowledge. The number of children has a negative effect except for

clusters C and D, where it is insignificant. Income has a positive effect on knowledge except for welfare knowledge where it is insignificant. It appears that current income is more important than wealth, which is insignificant, in determining knowledge of the financial system, at least in the pensions realm. Membership in a union and possessing a labor contract has the expected positive effect on most panels and the pooled regressions although their effect on welfare knowledge is not significant. The effect of the formal sector is also not significant for pensions payouts, suggesting that these informal informational effects are only beneficial when applied to portions of the pension system in the current life-cycle and not the final expected payout. Workers in larger firms are more knowledgeable about the pensions system but not welfare knowledge, workplace informational networks do not appear to extend to the welfare realm. Population density has a positive effect on the pooled knowledge mainly via clusters A and B; it has a negative effect on panels C and D. This suggests peer and community effects seem to depend on the type of knowledge being studied. The most interesting result is the different effects that variables have over the different panels, suggesting that knowledge cannot merely be examined at the aggregate level, but that relative literacy depends on specific knowledge areas. Only age under 42 is significant and in the same direction for all of the regressions. Otherwise, the groups who possess the least knowledge and should therefore be targeted for education efforts are quite different.

A second set of regressions include the expectations variables, to see if these influence participants to gain knowledge. Because these variables directly capture individuals' expectations of how useful a pension will be, we compare the results with and without their inclusion. Results are presented in Table 4, where we find that the expected retirement age was significant and negative in the pooled regression, again mainly due to clusters A and B. It was

not significant in cluster D, as expected, but it was also insignificant in cluster C which measures pension payouts. This is a surprising result, as those who expect to retire at a younger age should be more acquainted with pension payouts. Expected Lifespan is significant and positive in the Pooled regressions and also those on clusters B and C. As expected, it is insignificant on the welfare benefits, although it is also found to be insignificant in the Panel A regressions. Although this is surprising, people pay into the system at all ages and thus the length of time a person expects to live may not influence knowledge of this factor appreciably.

Table 4 here

As expected, the usefulness of knowledge has a positive effect on retirement system knowledge. The number of questions answered correctly drops as a person's expected retirement age increases. Note that as people get older, the age at which they expect to retire drops creating a potentially dangerous scenario where people originally expect to work for a long time and so do not prepare for the future. As they age they move their retirement time-table up but have not made the necessary preparations. In contrast, the older a person is, the longer they expect to live and their knowledge of pensions increases also. This is what we expected since a person who lives longer will be more dependent on their pension to protect them from the risk of outliving their assets.

Conclusions and Discussion

After 25 years of experience with a national individual account pension system, the Chilean Government is currently reviewing the strengths and weaknesses of its old-age system. Reforms are expected in the coming years, but for these to have the most positive effects, they must be carefully targeted to help the groups most in need. Our research has focused on pension

literacy, by examining the factors that correlate with knowledge throughout the pension lifecycle and the importance of expectations on knowledge acquisition.

Consistent with earlier non-Chilean population studies, the Chilean EPS indicates that older, healthier, more highly paid, and more educated men, display more pension literacy across the board. We also find that people appear more likely to inform themselves as knowledge becomes more relevant, which implies that they respond to incentives when investing in self-education. Yet we also show that summary measures of knowledge may not be the best way to determine which groups to target for educational efforts. Finally, workers with a labor contract and who are union members have significantly more knowledge, as do those employed at larger firms, verifying the importance of informal information systems in determining knowledge.

One implication of this work is that efforts to increase pension literacy could be most fruitfully directed towards employees in smaller firms, women workers, and less-educated employees. Yet company and other workplace factors are not significantly linked to knowledge of the safety net programs. This suggests that people must first learn that the information is useful and that programs exist, before they will find it useful to learn about specific programs. Other studies have confirmed that financial illiteracy regarding retirement saving can have damaging effects on retirement preparedness; our contribution is to show ignorance is lowered when workers believe they can benefit from retirement system knowledge.

Several avenues of future research suggest themselves. Here integer scoring is used, but different scoring mechanisms could offer alternative ways to evaluate the distribution of financial knowledge (Brockett et al., 2002). It might also be informative to compare the results of non-affiliates with those of the affiliates. Those who do not participate may have complex reasons to not contribute; and it would be useful to determine how nonparticipants prepare for

retirement versus those in the system. Finally, this study does not fully exploit the panel aspect of the dataset. Future research can evaluate whether financial literature changes over time and whether knowledge shifts, or its determinants become more or less important, over time. This would be especially interesting to examine with an eye towards education efforts, to examine their success or failure in informing the population and seeing whether overall knowledge of the pension system is increasing or decreasing over time.

Other nations are also facing the problem of pension illiteracy. The US Pension Protection Act of 2006 has focused US interest on defined contribution plans in its effort to provide investment education and advice to workers, while acknowledging investors' need to become informed of their needs and the workings of the system. Interest in pension literacy is quickly becoming a worldwide affair, and Chile's experience offers insights into what enhances pension knowledge.

References

- Arenas de Mesa, Alberto, David Bravo, Jere Behrman, Olivia Mitchell, and Petra Todd. With the assistance of Andres Otero, Jeremy Skog, Javiera Vasques, and Viviana Velez-Grajales, (2006). "The Chilean Pension Reform Turns 25: Lessons from the Social Protection Survey." NBER Working Paper 12401.
- Brockett, Patrick L., Richard A. Derrig, Linda L. Golden, Albert Levine, and Mark Alpert, (2002). "Fraud Classification Using Principal Component Analysis of RIDITs." *Journal of Risk and Insurance*, 69:3, 341-373.
- Chan, Sewin, and Ann Huff Stevens. (2004). "Do Changes in Pension Incentives Affect Retirement? A Longitudinal Study of Subjective Retirement Expectations." *Journal of Public Economics* 88: 1307-1333.
- Consejo Asesor Presidencial para la Reforma Previsional. *Informe Final*. 2006.
<http://www.consejoreformaprevisional.cl/view/informe.asp>
- Diamond, Peter, (1994). "Privatization of Social Security: Lessons From Chile. *Revista de Analisis Economico*, vol. 9, no. 1, June 1994, pp. 21-33.
- Duflo, Esther and Emmanuel Saez (2003) "The Role of Information and Social Interactions in Retirement Plan Decisions: Evidence from a Randomized Experiment." *Quarterly Journal of Economics*, vol. 118, no. 3, August 2003, pp. 815-42.
- Edwards, Sebastian (1998). "The Chilean Pension Reform: A Pioneering Program," in *Privatizing Social Security*, M. Feldstein (Ed.), Chicago: The University of Chicago Press: 33-57.
- Gustman, Alan L. and Thomas L. Steinmeier (2001a) "What People Don't Know about their Pensions and Social Security" in William G. Gale, John B. Shoven and Mark J. Warshawsky, editors, *Public Policies and Private Pensions*, Washington D.C.: Brookings Institution: pp. 57-119.
- Gustman, Alan L. and Thomas L. Steinmeier (2001b) "Imperfect Knowledge, Retirement and Saving." NBER Working Paper 8406.
- Luchak, Andrew, and Morley Gunderson (2000) "What Do Employees Know About their Pension Plan?" *Industrial Relations* 39:4, 646-670.
- Lusardi, Annamaria and Olivia S. Mitchell. 2006. "Financial Literacy and Planning: Implications for Retirement Wellbeing." NBER WP.
- Mitchell, Olivia (1988) "Worker Knowledge of Pension Provisions," *Journal of Labor Economics* 6:1, 21-39.

Mitchell, Olivia and Flavio Barreto. (1997) "After Chile, What? Second Round Pension Reforms in Latin America," *Revista de Analisis Economico*, vol. 12 no. 2, November 1997, pp.3-36.

The Economist. (2006) "Women in Chile: Left Behind." 08-12-06: 30-31

Valdes-Prieto, Salvador (1998). "The Latin American Experience with Pension Reform," *Annals of Public Cooperative Economics*, Dec '98, Vol. 69 Issue 4, p 483.

Yazigi, Alejandro Ferreiro, Ed. (2003) *The Chilean Pension System Based on Individual Capitalization*, Fourth Edition. Superintendency of Fund Administrators, Santiago.

Table 1: Summary of Pension Literacy Results Among AFP Participants

	Percent Who Know
<u>A. Knowledge Regarding Contributions</u>	
1.1 Claims knows AFP amt contributions	49.03
1.2 Gave correct amt AFP contributions	36.82
2.1 Claims knows Fixed AFP commissions	1.71
2.2 Claims knows Var AFP commissions	2.08
2.3 Claims knows both commissions	0.47
3. Received AFP statement last 12 months	69.30
<u>B. Knowledge Regarding Investments</u>	
1.1 Claims knows AFP accumulation	52.82
1.2 Gave correct amt AFP accum (+-20%)	21.47
2.1 Knows about multifunds	47.61
2.2 Knows how many multifunds	32.95
2.3 Knows correct number of multifunds	20.22
2.4 Knows his/her type of fund	32.82
2.5 Knows which is riskiest fund	38.25
<u>C. Knowledge Regarding Payouts</u>	
<u>I AFP System</u>	
1.1 Knows how AFP calculates pensions	11.78
1.2 Knows Female legal retirement age	79.03
1.3 Knows Male legal retirement age	82.72
<u>II Guaranteed Benefits</u>	
2.1 Claims knows reqs for minimum pension	33.35
2.2 Knows reqs for minimum pension	0.25
2.3a Knows there is minimum pension	48.91
2.3b Claims knows minimum pension amt	35.19
2.4 Gave correct value minimum pension amt	3.74
<u>D. Welfare Benefits</u>	
3.1. Claims knows reqs for welfare pension	19.25
3.2. Gave correct reqs for welfare pension	3.66
3.3. Claims knows welfare pension amt	16.46
3.4. Gave correct amt welfare pension	10.47

Notes: Results computed using 2004 EPS survey of AFP affiliates age 18-60 in 2002. N=10141.

Table 2: Correlation of Pension Literacy Scores By Cluster: Percent in Row and Column

Cluster	A	B	C	D
A	100	71.27	60.11	55.06
B	57.77	100	51.35	46.16
C	65.12	68.64	100	77.8
D	27.69	28.64	36.11	100

Note: Cells denotes the percentage of the row cluster population which is highly literate if the column cluster is also highly literate. Notes: Results computed using 2004 EPS survey of AFP affiliates age 18-60 in 2002. N=10141.

Table 3: Regression Results with Integer Scoring

	Panel A	Panel B	Panel C	Pooled	Panel D
Sociodemographic Vars					
Age effect > 42	0.005*	0.025**	0.033**	0.063**	0.014**
	(2.31)	(6.43)	(10.48)	(9.71)	(6.92)
Age effect >= 42	0.008**	0.004	0.028**	0.040**	0.001
	(4.02)	(0.94)	(8.66)	(6.02)	(0.34)
Male	0.164**	0.226**	-0.123**	0.267**	-0.157**
	(8.00)	(5.66)	(3.88)	(4.07)	(7.64)
Years of Education	0.068**	0.189**	0.091**	0.348**	0.006
	(21.70)	(30.99)	(18.90)	(34.81)	(1.92)
In good health	0.040	0.098*	0.081*	0.219**	-0.071**
	(1.73)	(2.17)	(2.25)	(2.95)	(3.04)
Married	0.076**	0.160**	0.063	0.299**	-0.009
	(3.42)	(3.69)	(1.83)	(4.20)	(0.39)
Number of Children	-0.023*	-0.044*	-0.021	-0.088**	0.016
	(2.36)	(2.35)	(1.42)	(2.85)	(1.69)
Wealth (Bns of Pesos)	-0.004	-0.013	-0.011	-0.028	-0.004
	(0.79)	(1.35)	(1.43)	(1.76)	(0.75)
Workplace Vars					
Monthly Income (10,000s of Pesos)	0.002**	0.008**	0.003**	0.013**	-0.001
	(4.94)	(10.49)	(4.03)	(9.89)	(1.38)
Union Member	0.142**	0.509**	0.068	0.718**	0.014
	(4.48)	(8.23)	(1.38)	(7.09)	(0.44)
Labor Contract	0.426**	0.611**	0.080	1.117**	0.011
	(13.64)	(10.02)	(1.65)	(11.17)	(0.34)
Large Firm	0.137**	0.414**	0.168**	0.719**	0.041
	(5.11)	(7.88)	(4.05)	(8.36)	(1.51)
Other Vars					
Population Density (100s of people)	0.027**	0.030**	-0.021*	0.035*	-0.065**
	(4.98)	(2.80)	(2.56)	(2.03)	(12.03)
Constant	0.190*	-1.414**	0.690**	-0.534	0.180*
	(2.15)	(8.20)	(5.06)	(1.89)	(2.03)
Observations	10141	10141	10141	10141	10141
R-squared	0.19	0.24	0.11	0.28	0.04
Age Exposure (P-Value)	0.293	0.001	0.333		0.000

Notes: See Table 1. Absolute value of t statistics in parentheses * significant at 5%; ** significant at 1%

Table 4: Regression Results Incorporating Expectations Variables

	Panel A	Panel B	Panel C	Pooled	Panel D
Sociodemographic Vars					
Age effect > 42	0.005*	0.026**	0.032**	0.064**	0.014**
	(2.54)	(6.68)	(10.33)	(9.85)	(6.79)
Age effect >= 42	0.009**	0.004	0.027**	0.040**	0.000
	(4.28)	(1.06)	(8.36)	(6.02)	(0.21)
Male	0.175**	0.249**	-0.132**	0.292**	-0.162**
	(8.36)	(6.09)	(4.09)	(4.35)	(7.70)
Years of Education	0.068**	0.189**	0.091**	0.348**	0.006
	(21.76)	(30.94)	(18.78)	(34.74)	(1.89)
In good health	0.047*	0.096*	0.067	0.210**	-0.074**
	(2.00)	(2.10)	(1.86)	(2.80)	(3.14)
Married	0.075**	0.153**	0.062	0.290**	-0.008
	(3.36)	(3.54)	(1.81)	(4.08)	(0.37)
Number of Children	-0.023*	-0.044*	-0.021	-0.087**	0.016
	(2.35)	(2.34)	(1.42)	(2.85)	(1.68)
Wealth (Bns of Pesos)	-0.004	-0.013	-0.011	-0.028	-0.004
	(0.80)	(1.37)	(1.44)	(1.78)	(0.75)
Workplace Vars					
Monthly Income (10,000s of Pesos)	0.002**	0.008**	0.002**	0.013**	-0.001
	(4.92)	(10.39)	(4.00)	(9.81)	(1.36)
Union Member	0.140**	0.501**	0.068	0.709**	0.015
	(4.41)	(8.11)	(1.39)	(6.99)	(0.47)
Labor Contract	0.424**	0.606**	0.081	1.112**	0.012
	(13.56)	(9.94)	(1.69)	(11.11)	(0.37)
Large Firm	0.137**	0.409**	0.167**	0.712**	0.041
	(5.09)	(7.79)	(4.01)	(8.28)	(1.51)
Other Vars					
Population Density (100s of people)	0.027**	0.030**	-0.022**	0.035*	-0.066**
	(5.05)	(2.81)	(2.64)	(2.02)	(12.05)
Expected Retirement Age	-0.003*	-0.008**	0.002	-0.010*	0.001
	(2.31)	(3.04)	(0.87)	(2.15)	(0.99)
Expected Lifespan	-0.001	0.005*	0.004*	0.008*	0.000
	(0.77)	(2.44)	(2.29)	(2.35)	(0.35)
Constant	0.420**	-1.293**	0.341	-0.532	0.080
	(3.36)	(5.31)	(1.77)	(1.33)	(0.64)
Observations	10141	10141	10141	10141	10141
R-squared	0.19	0.24	0.11	0.28	0.04

Note: See Table 3.

Appendix Table 1: Descriptive Statistics of Explanatory Variables

Variable	Mean	Std. Dev.
Age < 42	35.48	6.48
Age ≥ 42	3.67	5.73
Male	0.54	0.50
Years of Education	11.02	3.66
Good Health	0.75	0.43
Married	0.60	0.49
Nkids	1.66	1.54
Wealth	0.03	1.92
Monthly Income	20.87	27.98
Union	0.11	0.32
Labor Contract	0.62	0.49
LargeFirm	0.21	0.40
Population Density	1.97	1.77
Missing Years Ed	0.00	0.06
Missing Exp Ret Age	0.29	0.46
Missing Life Exp	0.11	0.31
Missing Union	0.13	0.34
Missing Labor Contract	0.27	0.44
Missing Large Firm	0.28	0.45
Missing Monthly Income	0.16	0.37
Missing NKids	0.30	0.46

Appendix Table 2: Examination of Age Effect: OLS Regressions

	Panel A	Panel B	Panel C	Pooled	Panel D
Sociodemographic Vars					
Age in 2004	0.002 (0.25)	0.064** (4.71)	0.040** (3.73)	0.106** (4.75)	0.030** (4.30)
Agesq	0.000 (0.77)	-0.001** (3.61)	-0.000 (1.00)	-0.001* (2.44)	-0.000** (3.30)
Male	0.175** (8.37)	0.250** (6.11)	-0.133** (4.09)	0.293** (4.37)	-0.162** (7.72)
Years of Education	0.068** (21.75)	0.189** (30.89)	0.091** (18.77)	0.347** (34.69)	0.006 (1.88)
In good health	0.047* (2.00)	0.096* (2.11)	0.067 (1.86)	0.211** (2.81)	-0.074** (3.13)
Married	0.074** (3.33)	0.151** (3.47)	0.062 (1.81)	0.287** (4.03)	-0.008 (0.35)
Number of Children	-0.022* (2.34)	-0.042* (2.25)	-0.021 (1.41)	-0.086** (2.78)	0.016 (1.70)
Wealth (Bns of Pesos)	-0.004 (0.79)	-0.013 (1.34)	-0.011 (1.43)	-0.028 (1.76)	-0.004 (0.74)
Workplace Vars					
Monthly Income (10,000s of Pesos)	0.002** (4.92)	0.008** (10.37)	0.002** (4.00)	0.013** (9.79)	-0.001 (1.39)
Union Member	0.140** (4.41)	0.501** (8.10)	0.068 (1.39)	0.708** (6.99)	0.015 (0.47)
Labor Contract	0.424** (13.56)	0.607** (9.95)	0.082 (1.69)	1.113** (11.12)	0.012 (0.39)
Large Firm	0.137** (5.09)	0.410** (7.81)	0.167** (4.02)	0.714** (8.29)	0.041 (1.53)
Other Vars					
Population Density (100s of people)	0.027** (5.06)	0.030** (2.82)	-0.022** (2.64)	0.035* (2.02)	-0.066** (12.06)
Expected Retirement Age	-0.003* (2.32)	-0.008** (3.02)	0.002 (0.88)	-0.010* (2.15)	0.001 (1.01)
Expected Lifespan	-0.001 (0.76)	0.005* (2.46)	0.004* (2.29)	0.008* (2.37)	0.000 (0.34)
Constant	0.461** (2.63)	-1.878** (5.50)	0.227 (0.84)	-1.190* (2.12)	-0.145 (0.83)
Observations	10141	10141	10141	10141	10141
R-squared	0.19	0.24	0.11	0.28	0.04

Note: See Table 3.

Figure 1: Distribution of Pooled Literacy Scores

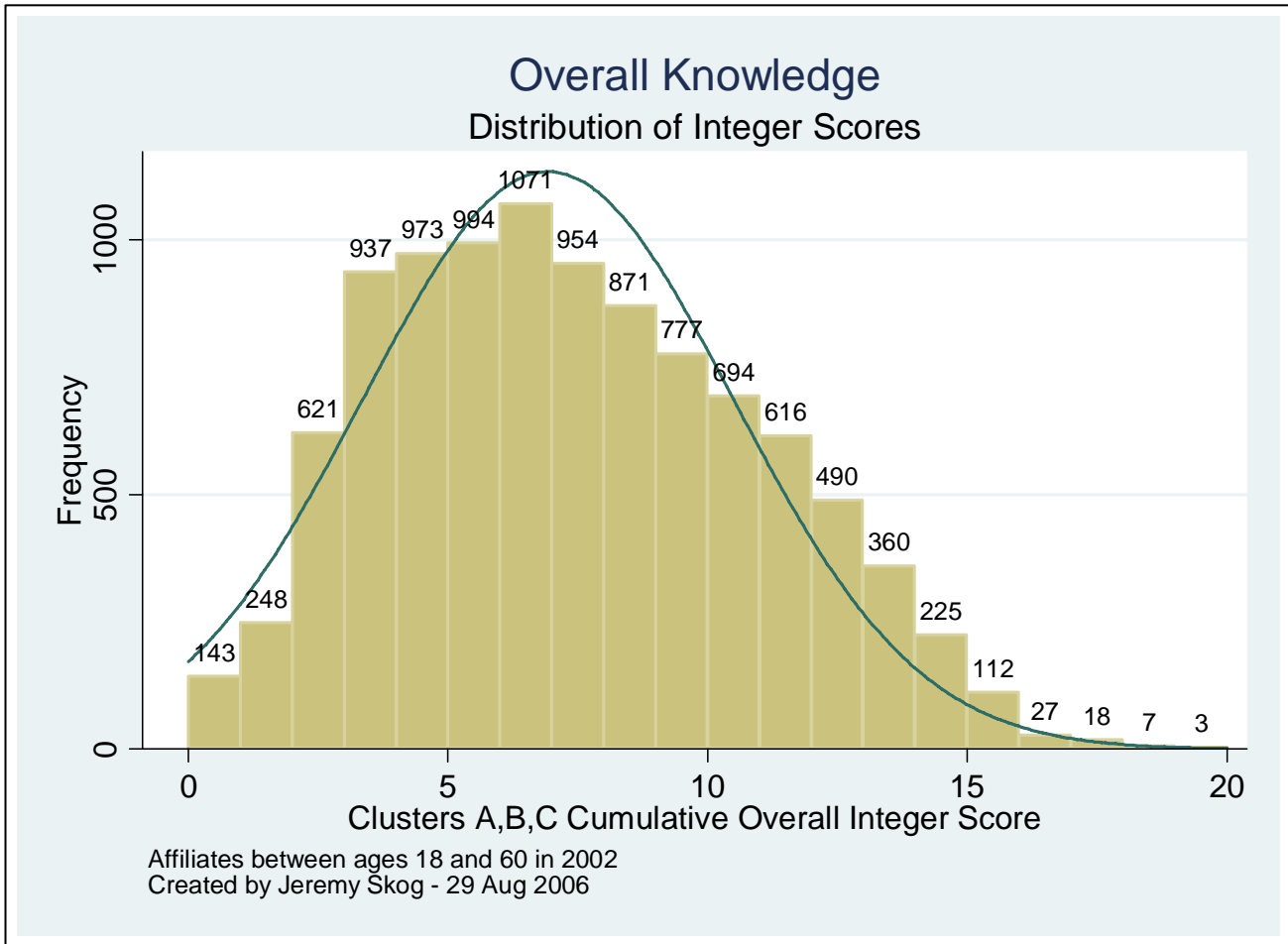
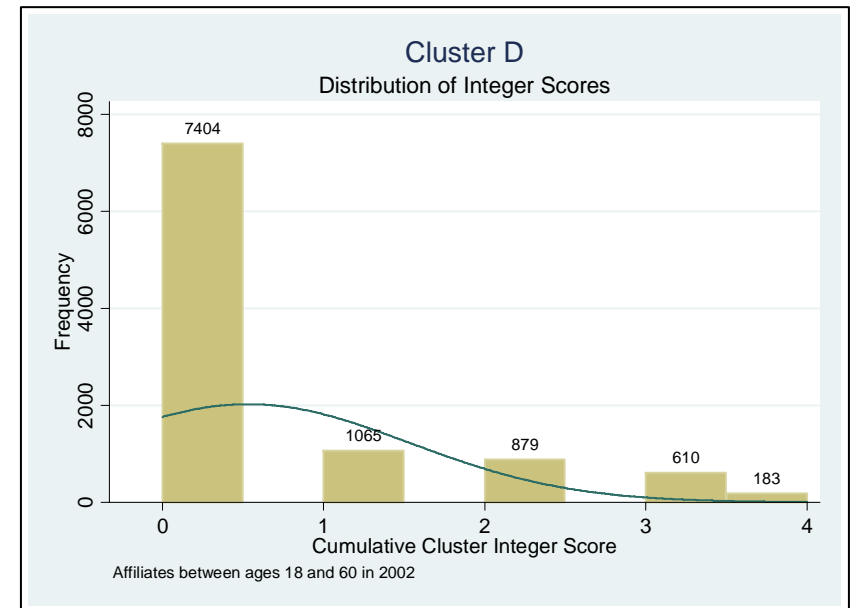
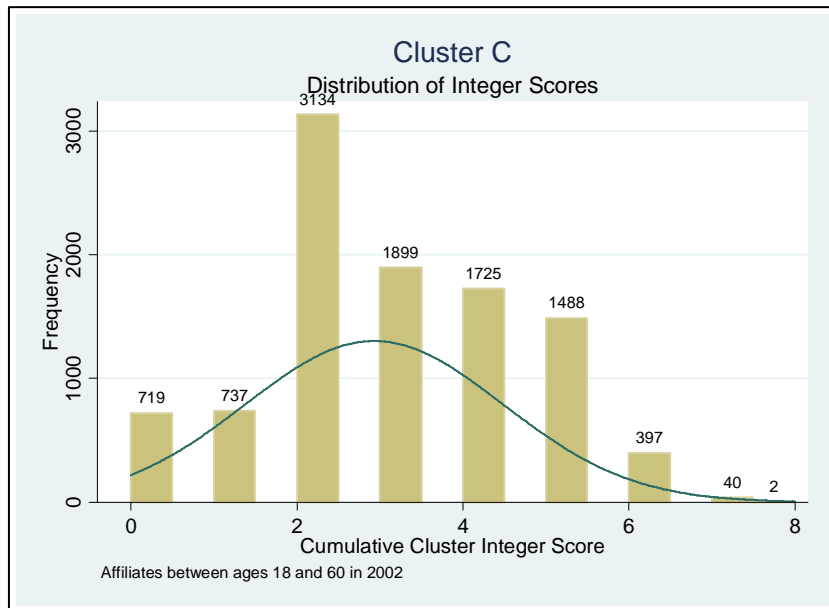
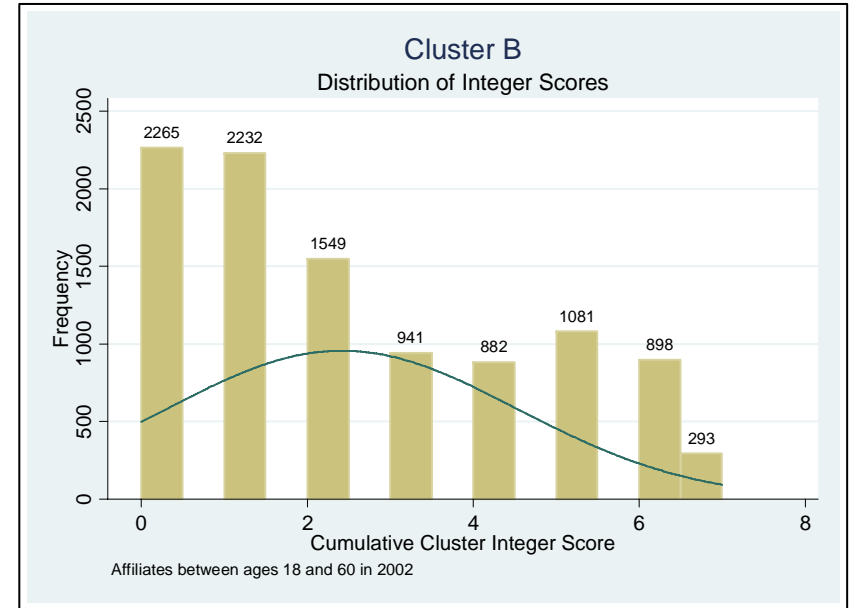
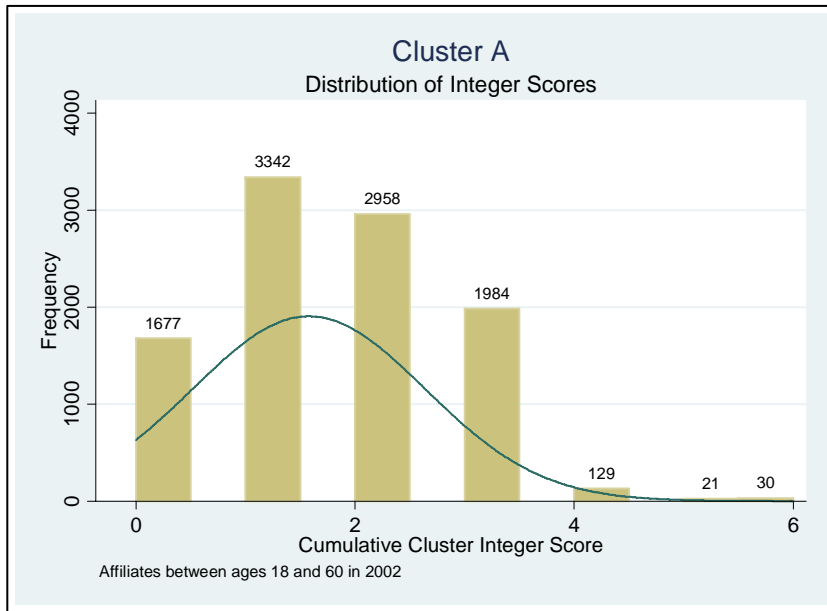


Figure 2: Distribution of Literacy Scores by Cluster



Appendix: Further Investigation of the Age Effect

Because the Chilean government mandated entry into the new system for those entering the workforce after 1981 and the older generation had a choice of whether or not to join the new system, we have a natural experiment on whether choosing to join the AFP system is correlated with greater knowledge of the system. There are two cases, either those who learned about the system decided to join it, or, after learning about the system they decided to stay away. It is also possible that people did not learn about the new system and simply entered into it for other reasons. In this case, we would expect to find no great difference in the levels of knowledge between those who defaulted into the new system and those who actively joined it.

This is investigated by means of an age spline, with the different effects at age 42 examined in the main results section and in Table 3. In addition, regressions were performed simply using the age variable without the spline; results are presented in Appendix Table 2. Here age is found to be positively correlated with knowledge and significant for all of the regressions except cluster A. Age might be insignificant for cluster A as people pay into the system at all ages and therefore one age should not necessarily know more than any other. The age squared variable is also included here to account for non-linearities in the age effect. The coefficient of the squared term is negative and is significant for all results except for clusters A and C, suggesting that the age effect is concave for most clusters.

This could perhaps be because there is a limit on the maximum amount of knowledge a person can gain and might indicate diminishing returns to how much knowledge we gain simply as an effect of getting older. Cluster A might be experiencing effects as previously described where age has little bearing on what people know about contributions. It is uncertain why panel C does not experience a positive effect, although it could be explained by people having

additional rewards to the payouts as they age, making it more worthwhile to learn about this part of the pensions system, even as the other parts become less worthwhile as age increases. Overall, the general effect of age connoting more pension knowledge is confirmed by these results, even beyond the effect of opting into the system.

Appendix Table 2 here

Endnotes

¹ As some respondents were not asked some of the questions used to examine literacy, we must also eliminate these individuals to maintain the homogeneity of the group contained in the data set as we examine different aspects of financial literacy. Accordingly, our final sample includes about 10,100 people who all possess the necessary information for analysis.

² We also create missing dummy variables for all variables as necessary, and include these as controls. These ‘missing’ dummies are included in all of the OLS regressions as a control, in unreported results available on request.

³ Net housing wealth represents the majority of household assets, as in many countries; the values subtract mortgages still outstanding. Also included in net wealth is the value of vehicles, ownership of rental properties and companies, assets owned, and private savings. Debt is then subtracted from the sum of these components to determine household net wealth.

⁴A Wald test was performed for each of the regressions to determine if the coefficients on the separate age spline variables were significantly different. They were found to be different for clusters B and D. This is surprising as we expect those who chose the AFP system would be focused on the different payout systems which it offers, contrasted with the INP which pays a life annuity. The similarity in panel A is less surprising since all current affiliates are making contributions so being exposed to the old system should not necessarily make people more literate in this regard. This could be viewed optimistically, as it means that people who defaulted into the old system are as knowledgeable as people who purposely chose the new system, at least in some respects. Unfortunately, we have previously shown that there is not a great deal of knowledge among any group.