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**Pension Payments in Chile:
Past, Present, and Future Prospects**

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Abstract

This paper reviews recent developments in the payout market for Chilean pensions, focusing particularly on the role of annuities, and illustrates what makes the payout market in Chile so different from those in other nations.

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Pension Payouts in Chile: Past, Present, and Future Prospects

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Chile's funded individual-account defined-contribution pension system was adopted in 1981 and is still vibrant after more than 25 years. Following in Chile's scheme footsteps, several other Latin American nations also adopted funded personal accounts, and countries in other continents have also viewed the Chilean approach with significant interest. During the Chilean system's first two decades, analysts and policymakers devoted most of their attention to questions pertaining to coverage, contributions, and investment portfolios. Now however, as the system moves toward maturity and retirees are increasingly claiming benefits under the program, there is substantial interest in how benefits will be paid. The goal of this paper is to review recent developments in the payout market for Chilean pensions, focusing particularly on the role of annuities, and to illustrate what makes the payout market in Chile so different from those in other nations.

In what follows, we first offer a brief summary of the Chilean defined contribution (DC) pension system as it has evolved over the years since 1981. Next we focus particularly on ways that participants can elect to take their pension benefits, alternatives that include both a phased withdrawal option, and a life annuity. Last, we offer some thoughts on the nature of the Chilean annuity market and discuss prospects for the future.

I. A Brief Overview of the Chilean Defined Contribution Pension System¹

Chile first instituted a government-run old-age system in the 1920s, and during the mid-1950s, there were three main pension funds organized on occupational lines: one covered most salaried workers, another covered the police, and a third applied to members of the armed forces. Additional occupational systems were then added, and by the end of the 1970s, the retirement system included a patchwork of more than 150 individual and quite fragmented defined benefit regimes. This structure produced incomplete coverage (generally attributed to evasion of contributions), low and uneven benefits, and ultimately led to massive financing problems. By the end of the 1970's, government subsidies worth 2% of GDP were needed to finance the system, and prospects were for additional problems.

When Pinochet's military government determined to overhaul the system, it first raised retirement ages, boosted contribution rates, and eliminated some special schemes. Thereafter, in 1980, the new pension system was created and the old systems were closed in 1983 to new workers who then were required to contribute to a funded defined-contribution individual account program. Next, it instituted a mandatory national defined pension program.

The new system was very much in keeping with World Bank recommendations for a multipillar arrangement. The **first pillar** program included a noncontributory, publicly financed, means-tested, PAYGO welfare-based pension (*pensiones asistenciales*, or PASIS) for the indigent. There was also a state-guaranteed minimum pension guarantee (MPG) for those

¹ This section draws on Arenas et al. (2006) which cites numerous historical references to the development and growth of the Chilean pensions system over the last three decades.

workers who contributed 20 years into the new DC program but ended up with benefits below the government-decreed minimum.²

The **second pillar** of the Chilean pension system is the better-known feature of the system. It consists of a national contributory defined-contribution program known as the AFP program, mandatory for wage and salary workers; affiliation remains optional for the self-employed.³ All covered workers must elect one of the privately-managed pension funds, and contribute 10% of their monthly earnings to that retirement fund, along with an additional contribution (2-3 % of monthly wages) to cover administrative costs as well as disability and survivor insurance.⁴ Workers can switch between AFPs with advance notice but must hold all of their balance with a single AFP at any given time. At the outset only government bonds were available for the investment portfolios, and more recently the AFPs have been permitted to offer five funds in the target maturity date spirit. This approach automatically moves workers' assets into more conservative investments as they grow older.

There is also a small **third pillar** in the Chilean system, which also follows the individual funded DC approach. In essence, any worker electing to contribute more than the mandated 10% amount to his AFP may do so, thus obtaining some additional tax benefits. Relatively few people add additional voluntary contributions in practice.

Figures 1 and 2 show the time trend in the size of assets under management in the Chilean AFP system, along with the number of contributors and retirees. Figure 3 shows the

² The public defined-benefit system that administers the old PAYGO defined-benefit program was closed to new entrants by the 1980 reform, but it continues to pay those retirees who remained in the old program at the time of the reform; it also pays "recognition bonds" at retirement to those who moved to the new system and received credit for prior contributions.

³ It also provides life insurance and disability benefits as part of the mandatory program.

⁴ Mandatory system contributions are capped at a ceiling earnings level of approximately US\$2,000 a month; fewer than 5 per cent of AFP contributors earn over that ceiling.

number of people by age claiming different types of pension benefits. We observe that the asset base has been increasing at a rate of over 9% per year, such that the pension system now amounts to more than 60% of the Chilean GDP. The number of pensioners in the system is around 640,000, of which 37% are early retirees, 28% are normal retirees, and 35% are disability retirees (the latter number is relatively high inasmuch as any young system will tend to have a high proportion of disabled participants relative to regular retirees during the early years).

Figures 1-3 here

II. Payout Methods Under the Chilean System

At retirement, retirees may use their accumulated funds to determine their retirement payout streams. Women may begin their “normal” payouts at age 60, while men must wait until age 65; under certain circumstances to be explained below, a worker may elect to begin his payments as young as age 55 if he is entitled to receive “early” payments. Unlike in some countries, receiving one’s pension does not require one to completely withdraw from the labor force, so some workers remain employed while collecting their pension.

The main options for retirement payouts from the AFP system are either (a) a “phased withdrawal” (PW) benefit, or (b) a life annuity payout.⁵

Phased Withdrawal Payments. In the case of the phased withdrawal approach, the retiree leaves his assets invested with the AFP whereupon the fund administrator sets the payout according to a government formula that converts the balance into a monthly payout that takes into account the

⁵ Strictly speaking, they have other two choices from the combination of these modalities according to recent changes in the regulation. But in practice, few people make these combinations.

retiree's age, sex, and marital status. Specifically the PW benefit paid to retiree i in year t is given by:

$$PW_{i,t} = \frac{Balance_{i,t}}{12 \cdot NCU_{i,t}} \quad (1)$$

where $PW_{i,t}$ is the monthly benefit under the PW system which depends on $Balance_{i,t}$ or the amount he accumulated in the fund as of his retirement date, and $NCU_{i,t}$ refers to the government's estimate of the "necessary capital" required to finance one unit of pension payout, given the retiree's sex, age, and family composition.⁶ The NCU term therefore this is an annuity factor converting the worker's accumulated pension balance into a periodic payment.

Survivorship pensions are required by law. If the pensioner is male, his widow will receive 60% of his pension if lack children eligible for survivorship benefits. In the case of the decedent leaving dependent children exist, his widow would receive 50% of her deceased husband's pension while each child receives an additional 15% of the benefit. If the pensioner is female, a survivorship pension is paid only to her dependent children and to her surviving husband only if he is disabled.

When the AFP payouts first started, the government lacked good information about how workers' survival patterns in retirement. As a result, US actuarial tables were initially used for annuitants to project the phased withdrawal amounts. Yet those with very low balances do not purchase annuities, so using annuitant tables to compute payouts for those taking phased withdrawals likely overestimates their life expectancy. Over time, new mortality tables for Chile (RV-2004) have been devised based on actual annuitant mortality patterns over the period 1995 to 2003. And finally, each retiree's PW amount is recomputed each year, given updated mortality

⁶ See Pino (2005).

patterns and life years remaining, both of which produce a decreasing pattern of payouts over time.⁷

As with all phased withdrawal programs, the retiree who elects the PW option retains ownership of his AFP balance as long as it is positive, but he faces both investment risk and longevity risk in that the balance might decline to zero. At the point of converting to the PW mode, the retiree also is charged a flat fee as a percentage of the payout amount.⁸ As of 2007, the average PW payment for a retiree claiming at the normal retirement age was US\$211 and US\$476 for the early retiree.⁹

Annuities. Alternatively, a retiree may use the balance in his account to purchase a life annuity from a life insurance company. The advantage of annuitizing one's retirement wealth is that it then protects the retiree against both mortality risk and capital market risk, but the downside is that he must relinquish his capital accumulation to the insurer. In principle retirees can opt for *both* PW and annuity payments, but in fact most retirees take either the immediate annuity or the PW, perhaps combined with a deferred annuity.

In all cases, the retiree purchases his annuity benefit from a life insurance company where he relinquishes his pension fund and pays a commission (2% of the balance or less) in exchange for a lifelong annuity expressed in UFs (Unidad de Fomento), a standard numeraire for inflation-indexed payments widely used in Chile.¹⁰ The annuity benefit continues until the

⁷ This is similar to the 1/E[T] rule implemented by the US Internal Revenue Service, when determining how quickly the retiree must spend down his 401(k) plan; see Horneff et al. (2007).

⁸ Prior to 1987 there were commissions charged on the balances but this has now been ruled out.

⁹ See Superintendencia de Pensiones, http://www.spensiones.cl/safpstats/stats/.sc.php?_cid=45 and economic indicators from Banco Central de Chile, http://www.bcentral.cl/estadisticas-economicas/series-indicadores/index_p.htm. Both viewed 01/20/09).

¹⁰ As of 1/09, a UF is equal to CP\$21,347, or about US\$34.40 (Banco Central de Chile, economic indicators viewed at http://www.bcentral.cl/estadisticas-economicas/series-indicadores/index_p.htm).

retiree's death, and if there are dependents, for as long as the latter are eligible. There is, of course, some risk that buyers may suffer from insolvency by the life insurance company providing the life annuity. In such an eventuality, the Chilean Superintendencia de Valores is authorized to conduct a public auction to seek to recapitalize the failed company; all participating life insurers estimate the number of periods during which they will continue paying 100% of the promised pension annuity amounts. The life insurer offering the longest contract period wins, and after this, the government guarantees continued benefits up to a cap, from general revenue.¹¹ As of 2007, the average monthly annuity payment benefit for a retiree claiming at the normal retirement age was 11 UF (US\$394) and for the early retiree, 11.3 UF (US\$369).¹²

Table 1 provides a descriptive overview of the key features that distinguish the phased withdrawal form of benefit and the annuity modality. Clearly the PW approach affords more liquidity but more longevity and capital market risk; the Immediate or Deferred Annuity approach protects against outliving one's assets, but it offers little to no bequest potential.

Table 1 here

Figure 4 provides a time trend depiction of the fraction of retirees in the system taking an annuity versus a phased withdrawal. Of particular interest is the time path of annuitization adoption: after only a few years of the system's inception, already one quarter of pensioners had elected the immediate annuity option and today close to 60% of retirees have take the immediate life annuity. It is in this sense that the data show quite high levels of annuitization in Chile,

¹¹ The formula for the benefit is

$$\text{Guaranteed Pension} = \text{Max}\{45 \text{ UF}, \text{MPG} + 0.75 \cdot (\text{Annuity} - \text{MPG})\}$$

¹² Information collected from the Superintendencia de Pensiones, "Número y monto promedio en U.F. de las pensiones pagadas por Rentas Vitalicias en el Sistema Previsional (anuales)" www.spensiones.cl/safpstats/stats/.sc.php?cid=45 and monetary units were converted into US\$ using data from the Banco Central de Chile (www.bcentral.cl/estadisticas-economicas/series-indicadores/index_p.htm).

consistent with others' reports on the time trends (Rocha and Thornburn 2006; Morales et al. 2008; James et al. 2008; Thornburn et al. 2007)

Figure 4 here

Figures 5A and B shows the time path of benefit streams under both the PW and the annuity, respectively for a single male retiring at age 65 and for a female retiring at age 60 (these figures assume the male retiree has a balance of CP\$20 million or approximately US\$33,230; the female balance is CP\$56 million or approximately US\$90,540). We can observe that the projected PW amount is initially higher than the annuity value, but within a decade after retirement, the phased withdrawal benefit is projected to fall below the annuity payment.

Figures 5 A and B here

The Role of the Minimum Pension Guarantee. Several aspects of the Chilean retirement system are geared to make the system pay 'adequate' benefits. One benchmark against which benefits are valued is the "minimum pension guarantee" (MPG), which is set by the government as a target minimum monthly nominal income value. This amount is inflation-updated annually and is higher for older retirees. For instance the MPG value in December 2007¹³ for a retiree younger than age 70 was CP\$96,391 per month (~US\$174); for those age 70-74 it was CP\$105,396 (US\$191); and for people age 75 + it was CP\$112,454 (US\$204). A time series of MPG's over time appears in Figure 6, where it can be seen that this is generally higher than the national minimum monthly earnings level and in fact is equivalent to about one-fourth of the national average pay of contributors into the pension system.¹⁴

Figure 6 here

¹³For the reader's convenience, US\$1 was worth CP\$620 as of January 2009.

¹⁴ Superintendencia de Pensiones, www.spensiones.cl/safpstats/stats/.sc.php?_cid=44, Cotizantes e ingreso imponible promedio (mensuales), viewed 1/20/09.

In terms of the payout choices, the worker retiring at the *normal* age who takes a phased withdrawal may receive a benefit set by the formula in equation (1), but if this benefit is below the MPG, he may request a higher payout rate which will naturally reduce his balance more quickly. In the event that he runs out of money, the government will top up his benefit to the MPG amount only if the worker had a minimum of 20 years of contributions into the system and his total old-age income falls below the MPG.¹⁵ As Arenas et al. (2006) show, however, this is a relatively stringent criterion. Currently many retirees who were credited for service under the old PAYGO system may have sufficient years of service, but it has been estimated that no more than half of future retirees will be likely to attain this 20 years of service goal.¹⁶ If the phased withdrawal is taken at the *early* retirement age, then the benefit at least 50% of his average salary in the last 10 years he paid into the system or 110% of the MPG (rising to 70% and 150%, respectively, by 2010).

If the worker annuitizes at the *normal* retirement age, he must allocate at least enough of his balance to a fixed real annuity such that his benefit is at least equal to the MPG. If he retires *early*, he must purchase an annuity that exceeds 50% of his average salary in the last 10 years he paid into the system or 110% of the MPG (rising to 70% and 150%, respectively, by 2010). Annuity benefits may be either fixed or variable; in practice, most pay a real fixed payment (expressed in UF) though the variable benefits has some portion devoted to a fixed real benefit with another portion linked to some index (such as a money market or stock index); in the latter case the fixed part must amount to at least a fraction of the worker's preretirement pay.

¹⁵ Superintendencia de Pensiones, <http://www.safp.cl/573/printer-3022.html>.

¹⁶ Since the calculation takes into account one's final 10 years of contributions, this means that benefits are low for people claiming benefits after a long unemployment period or with many zero contribution periods. To disincentivize early retirement, the regulator has limited to 16 the number of zero months of contributions that can be counted in the retiree's final decade of contributions.

It is also worth noting that the government guarantee covers all of the MPG plus 75% of the excess of the annuity value over the MPG, with a maximum payment of 45 UF. The latter means people receiving a pension higher than MPG face insolvency risk from the life insurance company. The higher the pension amount, the higher is the eventual benefit reduction in case of insolvency. For this reason people are provided not only annuity bids but company ratios when they decide how to take their retirement benefits.

Since the new system was started, there has been only one life insurer bankruptcy, and the regulator undertook provisional intervention until the beneficiaries were assigned to another life insurance company. The regulator ran an initial auction in March of 2006 but it was re-done as only one offer was received; the second auction in October of 2006 received two bids. In the tender Euroamerica S.A offered to continue to pay the full pension value for 124 months,¹⁷ for US\$77 million in equity. After that period, participants will receive the guarantee from the government.

Benefit Takeup Patterns. It is of interest to explore benefit takeup patterns over time. Figure 7 shows the time path of people purchasing annuities versus taking the PW: in the 1990's, the number of people who elected the annuity began to rise, and it exceeded the number selecting PW benefits. Figure 8 shows average payments that people received according to the payment method they elected. These trends show no important difference between the average payment for people who purchased an annuity at either the normal retirement (NR) or early retirement (ER) age. There is, however, a significant difference between those who elect the PW at the normal age (PWNR) and people who select the PW at the early retirement age (PWER). That is, the average early PW amount actually paid may exceed the normal PW value, inasmuch as those

¹⁷ From February 2008 to May 2018.

who retire early to start receiving pension benefits must satisfy higher balance requirements. As a result, low income people who have not accumulated much in their pension funds have little opportunity to take early retirement payments, as a rule. It is for this reason that the normal retirement age PW amount will be expected to be the lowest payout, on average, and likely very close to the MPG.

Figures 7 and 8 here

III. Understanding the Chilean Annuity Market

During the early days of the Chilean pension system and into through the 1990's, a substantial component of peoples' retirement accounts was charged by intermediaries in the form of commissions. Figure 9 depicts the time path of front loaded commissions charged by life insurers over time, which rose to around 5% of the retiree balance in 2001. In response to this perceived high rate of charges, policymakers began to draft a law to hold down commissions. This discussion took a decade to bear fruit, with a draft law emerging in around 2001 and a final law passed by the Congress in 2004. Initially a maximum commission of 2.5% of the individual's balance could be charged; this was then lowered to 2% in 2008. This regulation is generally perceived to have had an important impact in bringing down commissions, as is clear from Figure 9.

Figure 9 here

In addition to the cap imposed on annuity commissions, this reform also established a system for retirees to obtain anonymous bids via an on-line offer and quotation system (known as SCOMP by its Spanish acronym). This system was introduced as an electronic competitive market for all those workers could obtain pension quotes. Specifically, the AFPs and the life

insurers receive the same information about each person requesting a quote, including the retiree's age, sex, balance, and any beneficiaries. The main goal of the system was to increase competition and enhance transparency for consumers.

Those who request a price quote via this system and purchase an annuity can elect to do so directly, or they may engage a life insurer, broker, or financial adviser in which case they can pay up to 2.5 percent of their pension balance to such an intermediary. The operation of the SCOMP system may be summarized as follows:

- A member starts the retirement process by informing his AFP of his intention (this can be either via an agent or over the internet). The AFP issues a "certificate" reporting the member's balance, and the member then requests premium quotes from his AFP, a life insurer, or any broker licensed to work with SCOMP.
- The affiliate may request up to three quotes for each certificate issued by the AFP.
- The system processes and certifies the validity of the request and sends the information to the pension benefit providers, who then submit their offers to the system.
- These are then fed to the member and they are valid for 15 days.

What is important to note is that the system is merely informative; that is, each retiree decides his own course of action. He may select any of the offers provided, request additional quotes, negotiate with a provider separately from the SCOMP offers (with the requirement that this external offer cannot be lower than the benefit amount offered by this provider via the SCOMP), or request that SCOMP carry out an auction on his behalf in which case he must take the lowest price offer. To date, the services of the SCOMP platform have been used for approximately 144,000 retirees, who used an average of 1.3 requests per member since its creation in August 2004 (see Tables 2 and 3). This implies that 81% of requests were accepted

by the affiliate or pension beneficiary. In practice, it appears that the most popular way to access SCOMP is via brokers, who advise 38% of the purchasers. The worker's AFP can also obtain a price quote on the retiree's behalf, which amounts to 3% of the market, while life insurers account for 27% of the requests.

Tables 2-3 here

The evidence also indicates that 62% of people selected the highest benefit (best monetary offer) provided by the bidders, and the ratio rises to 84% if we consider the highest three monetary offers generated. Though this might be interpreted as savvy purchasing behavior, it must be acknowledged that high benefit levels are not the only consideration: thus insurers differ according to their risk classification, so it is difficult to compare a high benefit payment monetary offer from a lower ranked firm with a lower benefit and a more highly-regarded firm.

Further analysis of monetary quotes indicates that takeup rates vary according to the channel used to access the system (Figure 10). Specifically, people who referred their decision to brokers elected the highest payout 75% of the time; the ratio was 43% when the retiree used his AFP for advice, and only 3% when the life insurer was consulted. This could indicate that brokers are actually helpful in assisting people's decisionmaking. A possible explanation for the AFP's poor performance as a channel is related to its lack of incentives during the retirement phase. That is, an AFP participates actively during the worker's accumulation phase, registering contributions, investing, and managing the account; on the other hand they receive no commission for giving advice about payout products. The fact that so few people obtain the highest payout product when consulting a life insurer may be due to the fact that agents have an incentive to capture customers once they are contacted.

Figure 10 here

While many have deemed the SCOMP system a success, it remains the case that buying an annuity is not a simple task. That is, the SCOMP-generated reports may be 10 pages long with multiple numbers, various calculations about payments under different payout structures (e.g. simple annuity, annuity with a guaranteed period, etc.). This information seems to be quite daunting for those seeking to comparison shop annuity products at retirement. Furthermore, recent surveys show that people are not terribly well informed about the pension system and may lack the financial literacy to make sensible financial choices (Arenas et al. 2007; Mitchell et al. forthcoming). As a result, retirees are likely to continue requesting the services of intermediaries, which in turn reduces their pension levels due to the commissions charged.

A further consideration is that it is virtually impossible for people to “learn by doing” as most people undertake this once in a lifetime. The decision requires the purchaser to sign a contract in which he transfers his pension balance to a life insurer in exchange for a cash flow until the purchaser’s death. For this reason, the Chilean pension supervisory authority has been quite focused on enhancing information flow and strengthening the platform for annuity bids. Suppliers also benefit from SCOMP. While one-third of retirees do request online quotes directly, thus avoiding paying fees to intermediaries, only 12% finalize the process without paying any commissions (Reyes and Steward 2008). This reinforces the notion that consumers lack financial knowledge for making such a momentous and irreversible decision. It is for this reason that they seek out and pay advisers; it is for this reason that the regulator has continued a downward pressure on commissions payable to intermediaries.

Are Chilean Annuities Attractive?

Prior research has noted that adverse selection is likely when retirees have the option to annuitize (Mitchell et al. 1999; Finkelstein and Poterba 2004). This arises from an asymmetry of

information between the life insurer and the individual seeking to buy the annuity. Specifically, the retiree may have better information about her health conditions and thus about her life expectancy, compared to the information available to the insurer. For instance, people who believe their mortality probability is lower than average will value offered annuities more than someone who believed that his mortality is higher. Life insurers in Chile are not allowed to discriminate between buyers using health tests, medical records, or familiar history – in fact, they only permit age and sex to be used to classify purchasers. Of course, in fact, mortality patterns do differ across segments of the population for various reasons (McCarthy and Mitchell, 2003), and mortality patterns can also change over time as result of improvements that affect life expectancies of one group more than another (new drugs, new vaccines, etc.). For this reason, it is of interest to ask whether there is adverse selection in the Chilean annuity market, and if so, how important this phenomenon might be.

One way to analyze adverse selection is to simply plot population and annuity mortality patterns which we do in Figure 11.¹⁸ The evidence strongly suggests that the male population does die earlier than those persons who purchase annuities, in Chile, supportive of the notion that people who expect to live longer purchase annuities that allow them to smooth consumption and avoid the longevity risk. A companion figure indicates the effect is even stronger for women. Thus there is some degree of adverse selection in the Chilean annuity market since people who are expected to live longer are more likely to purchase annuities.

Figure 11 here

¹⁸ Information collected from INE (The National Institute of Statistics - Chile) where mortality tables are aggregated over 5-year periods and disaggregated using the methodology in Ruiz (forthcoming).

One way to quantify these differences is to compute the A/E ratio comparing population and annuitant mortality patterns. Specifically we compare the number of deaths in the Chilean male population with a given age structure using one table, versus the number of deaths in the annuitant group using the annuity mortality table. The formula for the A/E method is:

$$A / E = \frac{\sum_x w_x q_x^*}{\sum_x w_x q_x} \times 100$$

where q_x^* is the probability associated with the table in question that an individual of age x dies, and q_x is the corresponding probability for the base table. w_x are the weights which are set with value $w_{65} = 100,000$ and $w_x = w_{x-1}(1 - q_{x-1})$. In the Chilean case, we see that for males the ratio is 84.8 and for females, 66.1. By way of comparison, McCarthy and Mitchell (2003) find a smaller number for US men, 65.3 but a relatively larger ratio for women, 73.6. Thus we interpret this result as showing that men and women annuitants in Chile live longer than the population, but the women live relatively much longer than in the US. As a result, it would be reasonable to conjecture that women would find life annuities relatively more appealing than men.

Another way to judge whether Chilean annuity markets are appealing is to compute the so-called Money's Worth Ratio, or the discounted expected present value of the lifetime payment stream relative to the premium, conditional on survival. This calculation requires that one employ not just a period but a cohortized mortality table and term structure for interest rates (see Mitchell et al. 1999). Also, the formula must take into account whether the person purchased a single annuity or joint annuity (compulsory for married males). In addition, in Chile, life insurers also promise a funeral benefit of 15 UF in case of the purchaser's death. Accordingly, the Money's worth ratio for a single life annuitant may be defined as:

$$MWR_t = \frac{\left(A_t \sum_{t=d+1}^{12(w-x)} \frac{{}_t p_x}{(1+i_t)^t} \right) + F}{P}$$

where MWR is the money's worth ratio, A is the monthly annuity payment in UF, w is the ultimate age in the mortality table, ${}_t p_x$ is the probability that a life aged x is still alive at time t, d is the number of deferment months chosen in the annuity, i_t is the interest rate used for discounting future payments, F is the funeral benefits and P is the premium paid to the life insurance company.

Similarly, the money's worth ratio for a joint annuity may be defined as:

$$MWR_t = \frac{\left(A_t \sum_{t=d+1}^{12(w-x)} \frac{{}_t p_x + 0.6(1 - {}_t p_x) {}_t p_y}{(1+i_t)^t} \right) + F}{P}$$

where almost all the variables are the same as before, but now we need to add the death probability of the beneficiary (${}_t p_y$)¹⁹. In case of guarantee periods, the term ${}_t p_x$ takes the value one in the periods covered by the guarantee.

Table 4 replicates some earlier MW computations carried out by two different research groups at the end of the 1990s and early in the 2000's, and Table 5 reports our own updated estimates for the years 2005-2008. Overall, and somewhat different from other countries,²⁰ we find that MW ratios tend to exceed 1.0 in Chile and the advantage appears to be rising slightly over time. This suggests that annuity buyers are receiving a relatively generous flow of payments given their premium payments, which explains some of the product's appeal. Table 6 shows the

¹⁹ Here we assume that the only potential beneficiary is a spouse; no children are assumed as beneficiaries.

²⁰ See for instance Doyle, Mitchell and Piggott (2004), James, Martinez and Iglesias (2006), and Thorburn, Rocha and Morales (2007).

results from an OLS regression of the MWR on several controls including the participant's age, balance at purchase, sex*marital status, and other factors. All variables are significant and indicate that the Money's Worth ratio rises with age, the size of the pension balance, and for those who buy deferred rather than immediate products. Both single men and women fare worse than married women, suggesting that most of the value derives from what appear to be more than actuarially fair benefits to married women.

Tables 4-6 here

The relatively high MWRs just reported suggest that insurers selling these products will not make a positive profit over time, since in expectation they will be paying out more than they earn in premiums. But another way to look at the results is that we may have used an artificially low discount rate which of course enhances the expected present value of the income flow. Here we, like other analysts, measure the MWRs using what is conventionally deemed a "risk-free" rate, which is a long-term government bond rate. If instead we were to use a higher corporate bond rate (Figure 11), the results would be to have a lower annuity payout (and also a lower PW payout as well.) Thus the high MWRs do suggest that benefits are relatively generous under the conventional assumptions, though it would be unlikely that these high returns would be sustainable in the long run.

Figure 11 here

IV. Concluding Comments

One of the most interesting features of the Chilean pension system is that approximately two-thirds of all retirees purchase annuities, a very different result than the evidence reported in

other countries (Finkelstein and Poterba 2004; James et al. 2006; Rocha and Thornburn 2006).

In our view, this phenomenon is attributable to several factors:

1. High value of annuity payments. As we have shown, money's worth ratios for the Chilean pension system are high in comparison with international experience and appear to be rising.
2. Information transparency in the annuity bidding process. The transparency and ease of the online mechanism clearly made it easier for retirees to find better information on annuity premiums than was feasible in the past. In addition AFPs are now required to issue a list of people nearing retirement age to all the pension providers, as a means to boost competition.
3. Access to early retirement. The Chilean law permits people to retire early if their pension accrual meets certain payout thresholds. Since one need not leave the labor force in order to claim the pension, those who have sufficient wealth in their AFP accounts will value access to the funds. Most of these retirees with decent balances will not expect to see their benefits fall to the MPG threshold, so they are more likely to annuitize.
4. Small incentives for the AFPs to promote PW. The AFP managers are mainly paid based on affiliates' contributions, and they are prohibited from paying commissions to brokers. Further, AFP's are prohibited to charge a front-end load to retirees who leave their money with the AFP and take the PW amounts.²¹

To date, then, the Chilean payout process appears to have been working well for retirees, and the fact that the life annuity market is continuing to grow bodes well for future retirement security. Nevertheless, some important policy issues remain to be resolved. One is that the

²¹ All AFPs charge a fee of 1.25% on the pension balance in order to provide pension payouts.

system currently uses sex-specific mortality tables to price system benefits, and women are able to file as young as age 60. These facts, combined with women's generally lower earnings levels, mean that women's benefits are relatively low compared to men's. By contrast, in many European nations and in the US, retirement ages are the same for both men and women, and unisex tables apply to the benefit formulas (Bertranou 2001). If a common mortality table were used for the calculations, men's benefits would fall and women's would rise; if one took the PW, men would deplete their pension balances later and females earlier. Berstein and Tokman (2005) suggest that males' annuities would fall by 5% while women's would rise by the same percentage. Raising women's retirement age to 65 would boost their annuities by one-third to 47%, according to Berstein and Tokman (2005)

A second issue is that until recently, poverty benefits under the first pillar were rationed. That is, some poor retirees were unable to qualify for poverty-based old-age income support benefits due to lack of funding for this program. As a result, risk-averse consumers would have been likely to demand an annuity to help smooth old-age consumption, as long as the chance of welfare support was not 100%. Also the MPG benefit level has been relatively low and to receive this benefit, people had to meet strict eligibility requirements (e.g. contributing 20 years to the system). Both factors would raise the attractiveness of annuitizing instead of relying purely on the payouts from one's own AFP account via PWs.

Nevertheless, several reforms were enacted in a 2008 effort to enhance coverage and boost first-pillar benefits (Godoy 2008). Specifically, access to the minimum benefit was made easier and the 20-year contribution requirement has been dropped. Additionally, the minimum old-age benefit level was increased for those with low or no contribution histories. Both of these facts will likely to reduce the demand for annuitization in the future, on top of which, the

insurance sector is paying what appears to be quite high benefits in exchange for the premiums charged. This latter pattern may however be challenged, however, in the few years, as the financial turmoil of 2008-9 takes its toll on insurance company investments.

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Table 1. Characteristics of Alternative Payout Modes under the Chilean Retirement System

Attribute	<i>Payout Structure</i>		
	Phased Withdrawal (PW)	Immediate Annuity (IA)	Temporary Withdrawal (TW)+ deferred annuity (DA)
Managed By:	AFP	Life Insurance co.	AFP + Life Insurer
Can Payout Be Changed?	Always	No	DA can happen earlier.
Who Controls Funds	Retiree	Life Insurer	Retiree (TW) + Life Insurer (DA)
Benefit Amt.	Variable	Constant or Variable	Variable + Constant
Eligible for MPG	Yes	Yes	Yes
Bequest feasible	Yes	No	Only for TW

Source: Authors' tabulation.

Table 2: Evolution of Requests for Annuity Quotes under the SCOMP System

Year	N requesting	Average # requests	Accepted requests	<i>Channel (% of total)</i>		
				Broker	Life Insurer	AFP
2004	14,426	1.20	9,849	40.75	27.91	31.35
2005	33,714	1.29	28,294	36.58	25.19	38.23
2006	29,154	1.28	23,146	38.95	26.66	34.40
2007	37,606	1.36	32,524	40.20	27.79	32.01
2008*	28,992	1.24	22,386	33.92	26.49	39.60
Total	143,892	1.29	116,199	37.93	26.71	35.36

* : As of Sept. 2008

Source: Superintendencia de Valores, SCOMP, Sistema de consultas y ofertas de montos de pensión, <http://www.svs.cl/sitio/estadisticas/seguros.php>.

Table 3: Annuity Quotes Accepted Based on Ranking of Benefit Offered

Ranking	Year					Total
	2004	2005	2006	2007	2008*	
Best quote	66.40%	63.42%	61.96%	63.32%	59.39%	62.49%
Second best quote	15.50%	15.42%	14.15%	13.53%	14.29%	14.44%
Third best quote	7.52%	7.31%	7.37%	7.36%	7.23%	7.34%
Others	10.59%	13.85%	16.53%	15.80%	19.09%	15.74%
Total quotes	6,640	18,351	16,193	19,711	16,405	77,300

* : As of Sept. 2008

Source: Source: Superintendencia de Valores, SCOMP, Sistema de consultas y ofertas de montos de pensión, <http://www.svs.cl/sitio/estadisticas/seguros.php>.

Table 4. Previously Computed MWR's: Chile (*Risk-free rate*)

	James et al. 2006*		Rocha and Thorburn 2006	
	1999	2003	1999	2003
Male 65	---	1.01	1.00	1.07
Male 55	0.98	0.98	0.98	1.05
Female 60	---	0.96	1.02	1.08
Female 55	0.96	0.93	0.99	1.05
Joint	1.00	1.01	1.00	1.05
Mortality Table Used	RV-98	RV-98	RV-04	RV-04

*Computed for a balance of
UF1000

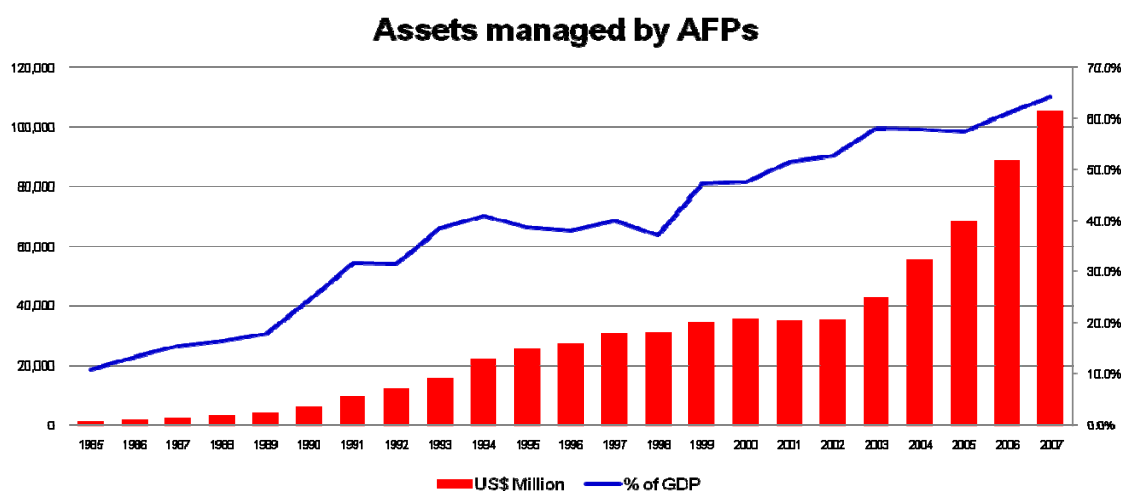
Source: Compiled by authors from cited sources.

Table 5. Updated MWR's, Chile (*Risk-free rate*)

	<i>Ave. 05-08</i>
Male, age 55	1.07
Male, age 65	1.07
Female, age 55	1.09
Female, age 65	1.11
Joint life	1.11

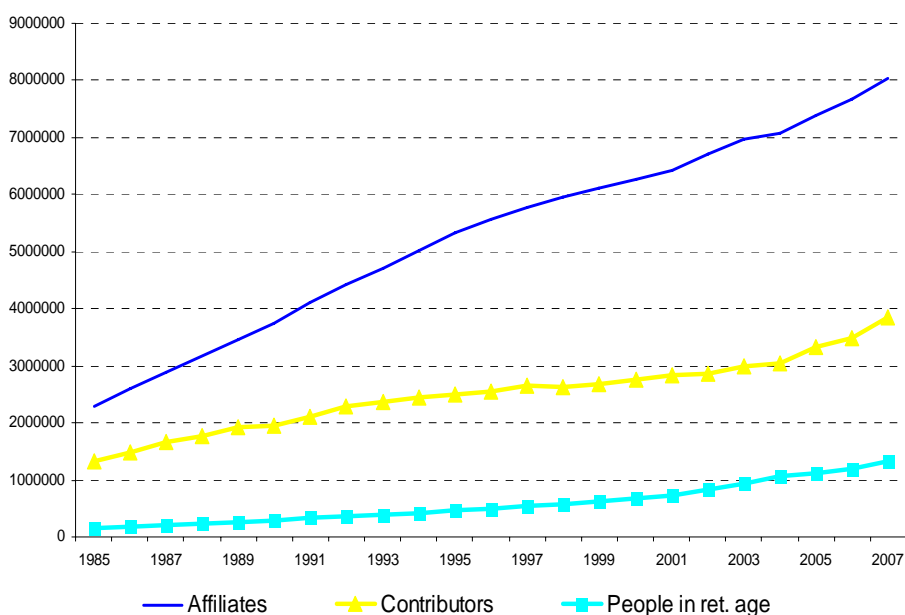
Source: Compiled by authors from SVS dataset.

Figure 1: Growth of the Chilean AFP Pension System



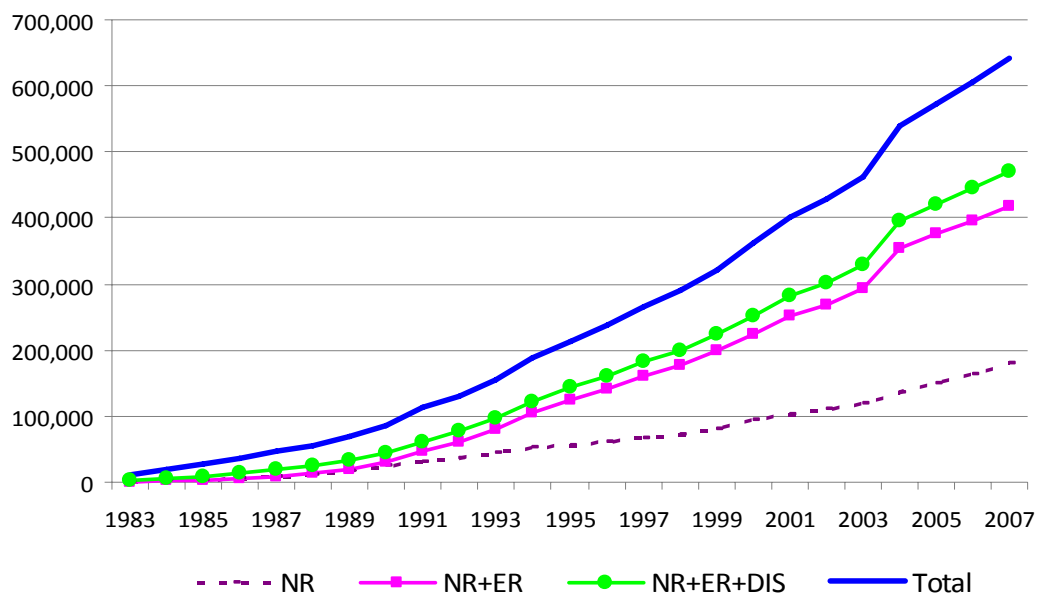
Source: Superintendencia de Valores, Activos de los Fondos de Pensiones y Aseguradoras como % del PIB, http://www.svs.cl/sitio/estadisticas/seg_mercado.php, viewed 1/20/09.

Figure 2: Chilean AFP System: Time Trend in Affiliates and Retirees



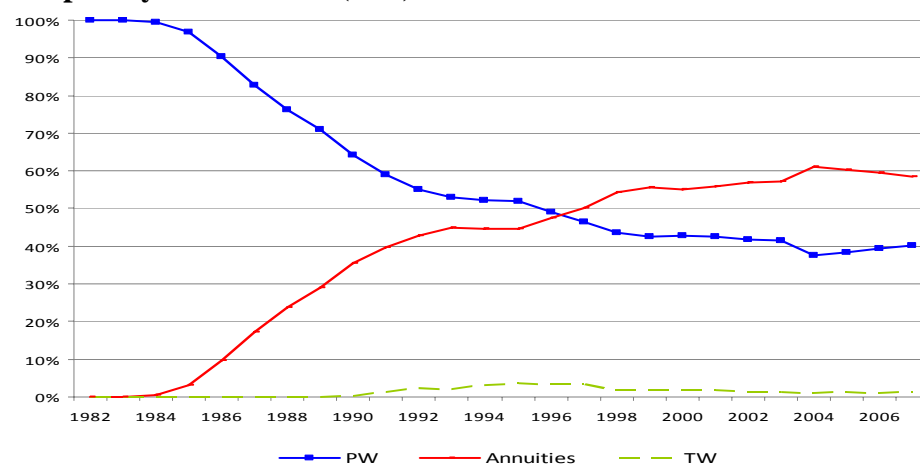
Source: Superintendencia de Pensiones, Statistics for contributors and affiliates, http://www.spensiones.cl/safpstats/stats/.sc.php?_cid=41. Viewed 1/20/09.

Figure 3: Retirees by Type



Source: Superintendencia de AFP; Número y monto promedio en U.F. de las pensiones pagadas en el Sistema Previsional (anuales); http://www.spensiones.cl/safpstats/stats/.sc.php?_cid=45
Viewed 20/01/09

Figure 4: Fraction of Retirees Taking an Annuity vs Phased Withdrawal (PW) or Temporary Withdrawal (TW)



Source: Superintendencia de AFP; “Número y monto promedio en U.F. de las pensiones pagadas por Retiros Programados en el Sistema Previsional (anuales)”;

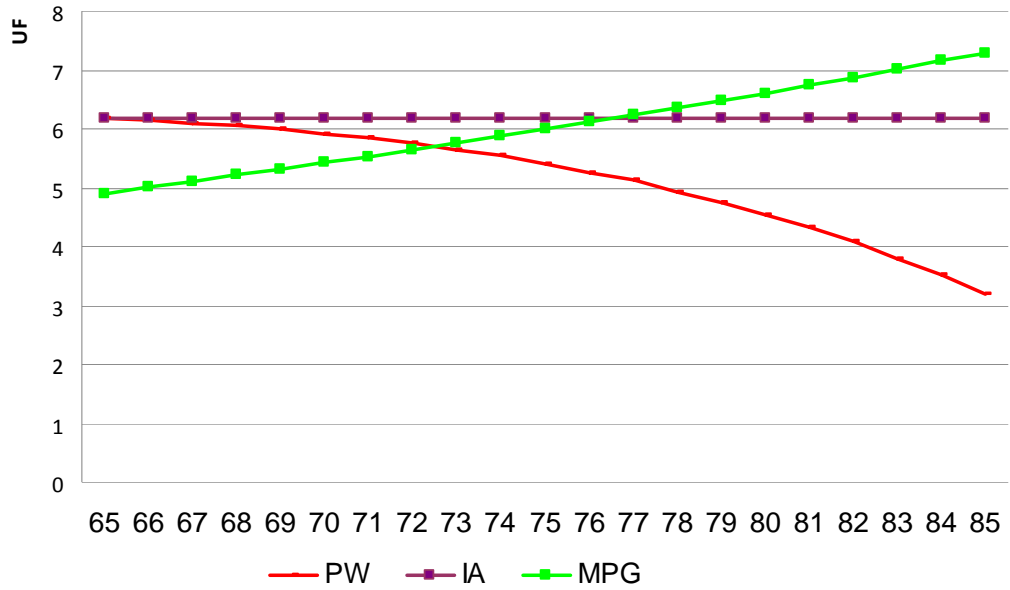
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“http://www.spensiones.cl/safpstats/stats/.sc.php?_cid=45.”

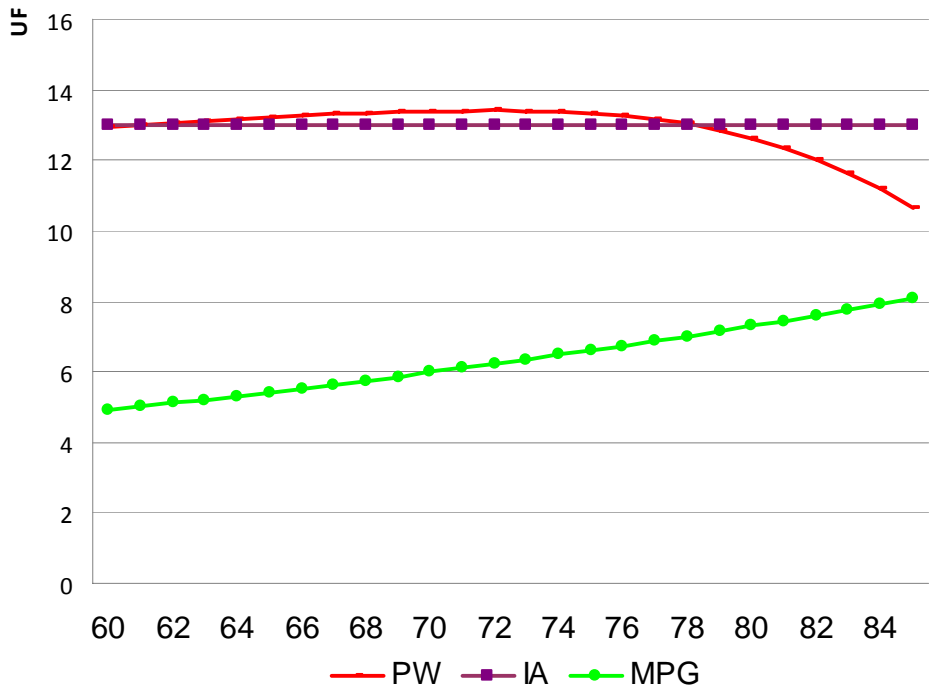
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**Figure 5. Phased Withdrawal and Annuity Payments Over the Life Cycle
A. For Single Male, Retire at 65 (no dependents)**



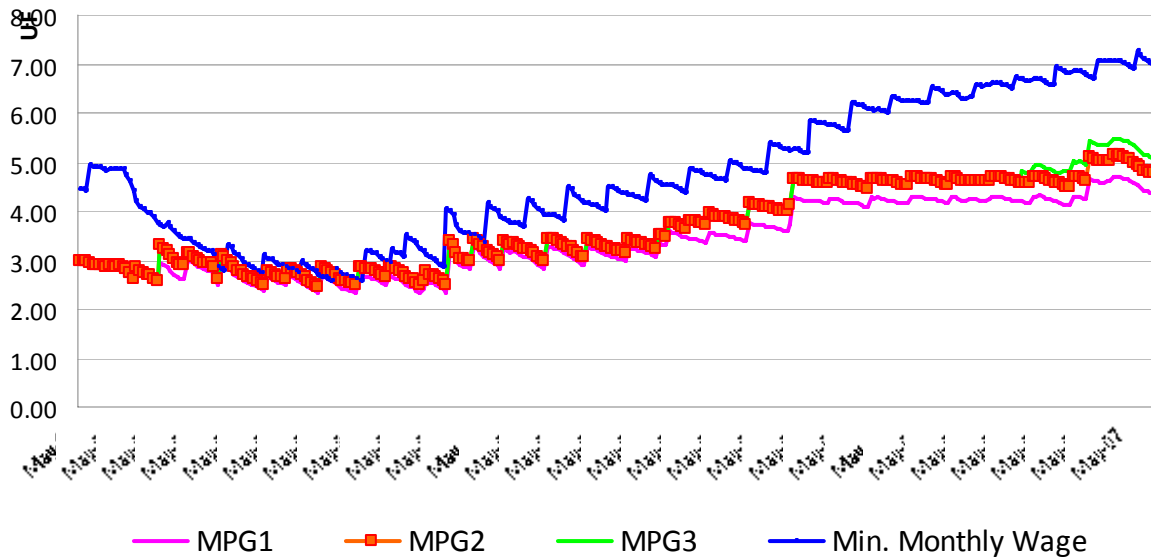
Source: Superintendencia de Pensiones; Actual SCOMP quote for life annuity. Pension balance of UF962 (~US\$33,230 in '08)

Figure 4B. For Single Female, Retire at 60 (no dependents)



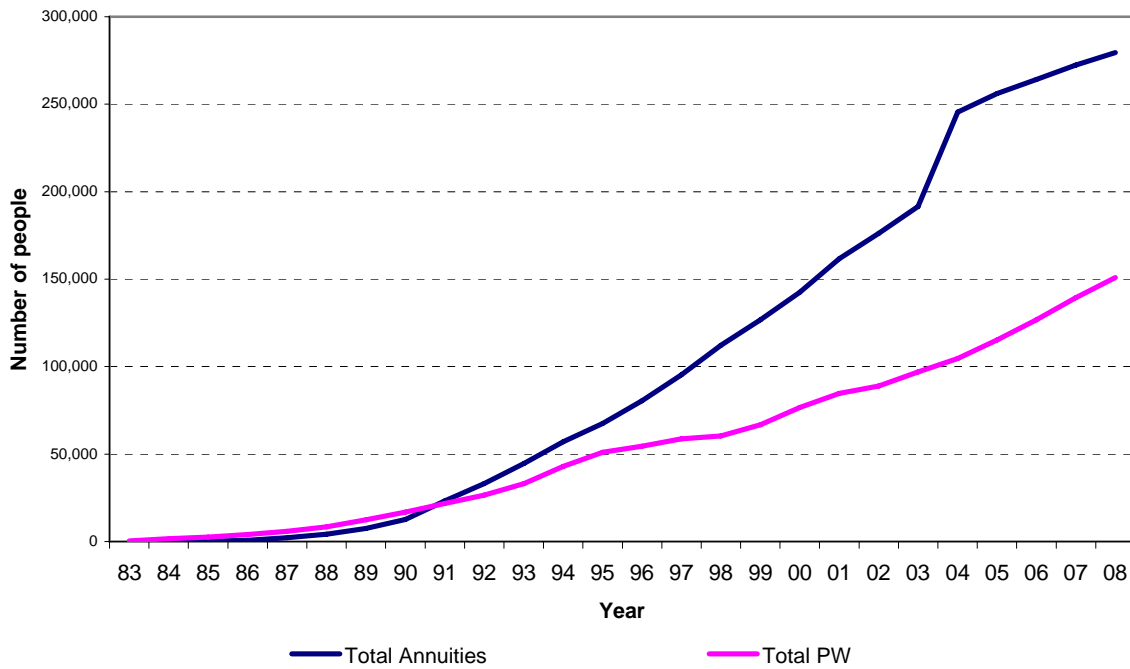
Source: Superintendencia de Pensiones; Actual SCOMP quote for life annuity. Pension balance of UF2632 (~US\$90,540 in '08)

Figure 6: Minimum Pension Guarantee Levels and Minimum Monthly Earned Income



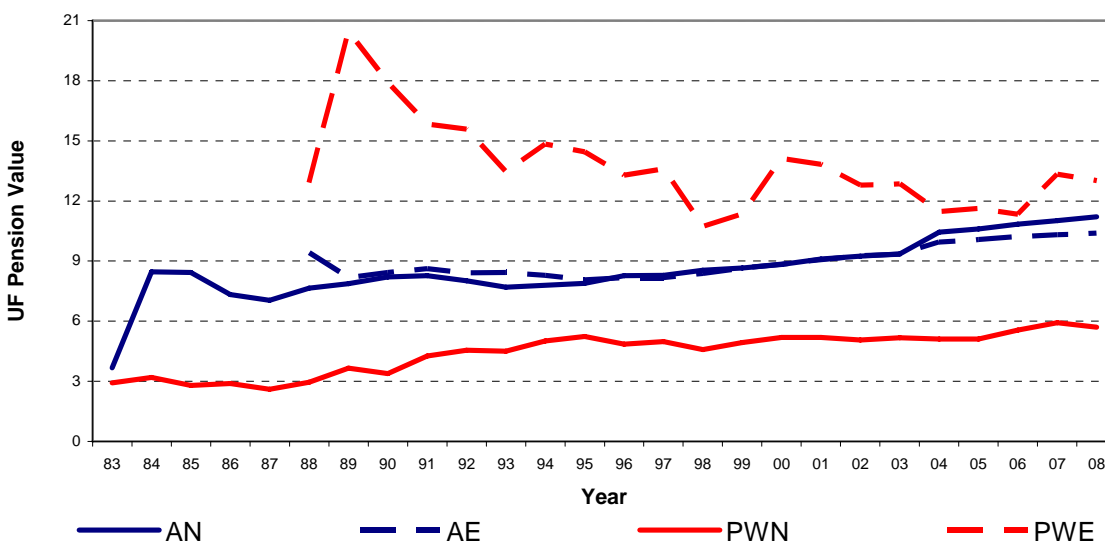
Note: MPG1 applies to those <age 70; MPG2 to ages 70-75; MPG3 for age 75+. The minimum monthly earned income is set by the government as the lowest salary a formal sector worker may earn. Source: Department of Statistics, Superintendencia de Pensiones.

Figure 7: Total Number of Annuities Purchased and Phased Withdrawal Benefits Elected



Source: Superintendencia de Pensiones, www.spensiones.cl/safpstats/stats/.sc.php?_cid=45.

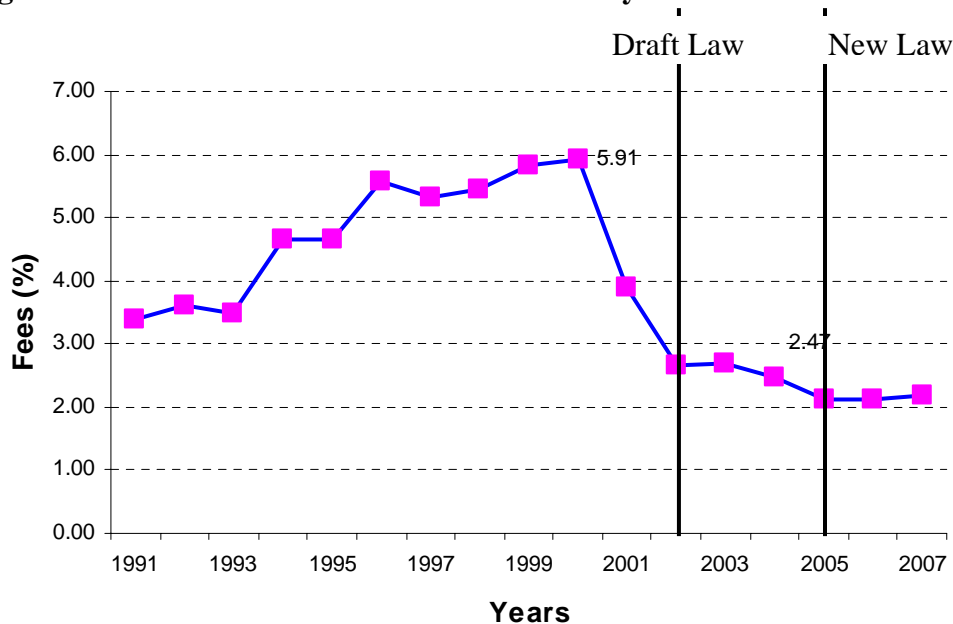
Figure 8: Pension Value According To Payout Method Elected



Note: AN corresponds to the value of the annuity purchased at the Normal Retirement Age; AE corresponds to value of the early retirement annuity; PWN refers to the value of a phased withdrawal benefit taken at the normal retirement age; and PWE refers to the value of the phased withdrawal taken prior to the normal age.

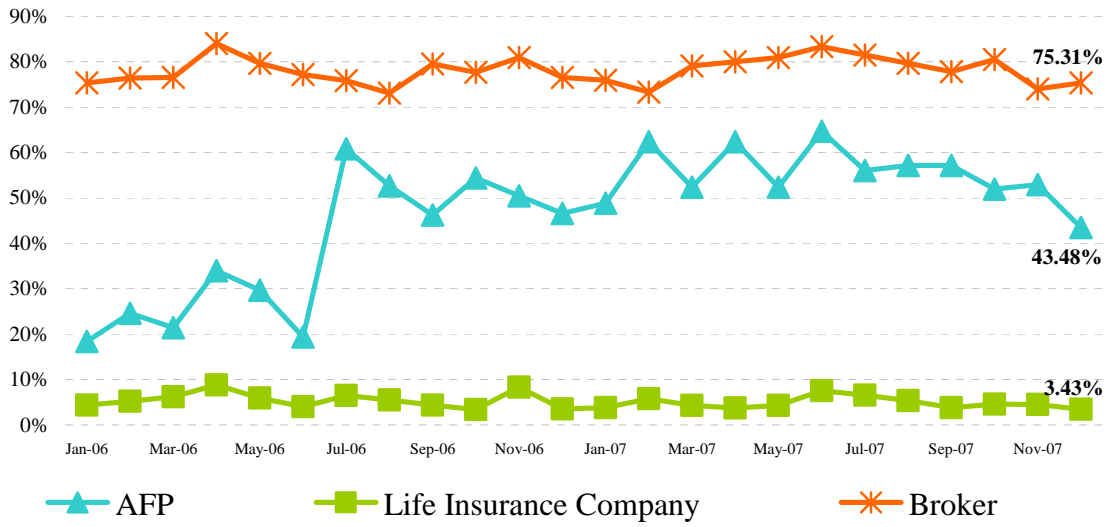
Source: Superintendencia of Pension Funds of Chile. Number and average amount of the annual benefits paid, http://www.spensiones.cl/safpstats/stats/.sc.php?_cid=45.

Figure 9: Time Path of Commissions for Annuity Sales



Source: Superintendencia de Valores, Comisiones de intermediacion de rentas vitalicias previsionales, http://www.svs.cl/sitio/estadisticas/svtas_com_int_rvp.php.

Figure 10: Proportion of People Electing the Lowest-Cost Annuity Quote by Access Channel Utilized

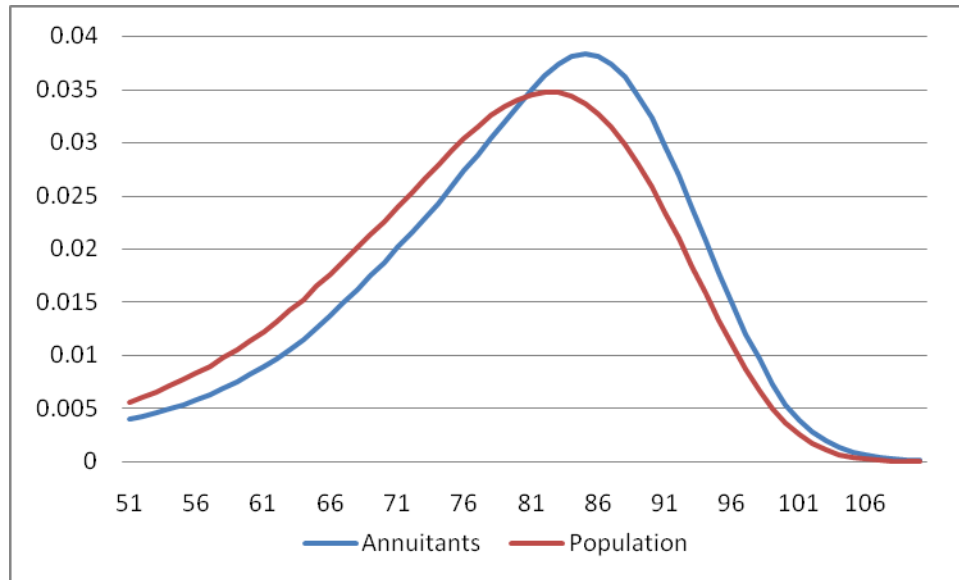


Source

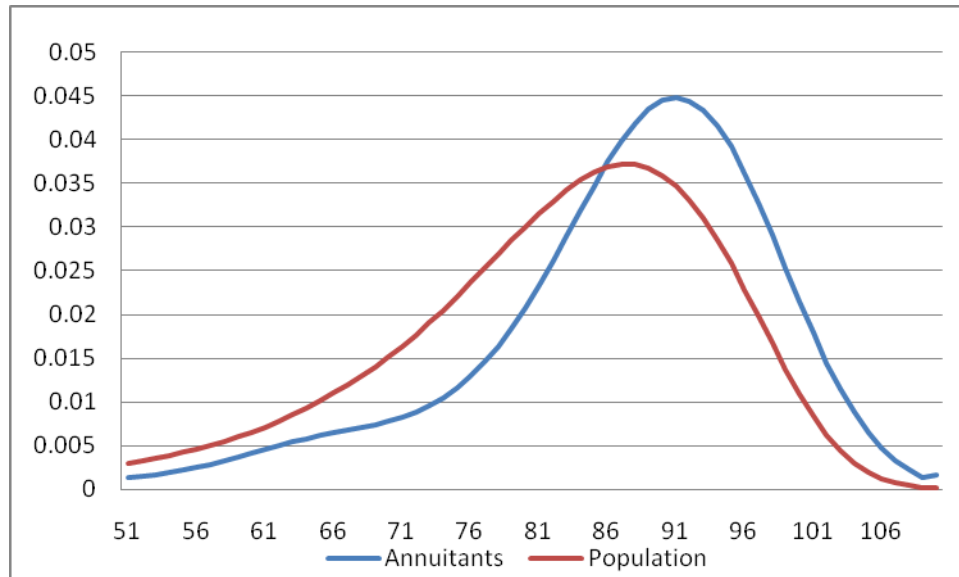
: Source: Superintendencia de Pensiones.

Figure 11: Distribution of Age at Death of Chilean Population and Annuity Purchase Conditional on Attaining Age 25.

A. Male



B. Female



Source: Authors' calculations based on data from RV-2004, National Institute of Statistics of Chile (INE, 2004).