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Chile's Solidarity Pillar: A Benchmark for Adjoining Zero Pillar with DC Schemes

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ABSTRACT

Chile's Solidarity Pillar: A Benchmark for Adjoining Zero Pillar with DC Schemes*

In 2008, Chile introduced a New Solidarity Pillar (NSP) designed to eliminate the incidence of poverty among elderly adults by setting a floor at around 40 percent of the minimum monthly income for the poorest 60 percent of the population. This paper describes the NSP's main characteristics and the main results achieved during its first seven years of operations: coverage, fiscal cost, poverty reduction, and the system's role in reducing the significant gender gap in pensions. Its effects on incentives to contribute are discussed, as well as the literature that has attempted to measure these effects. Finally, the main challenges facing the NSP and the implications for other countries under defined contribution pension schemes are summarized.

KEYWORDS Social Security, Income Protection, Redistribution

JEL CODES: H55, H21, H23

Abbreviations and Acronyms

AFP	*Administradora de Fondos de Pensiones* (Pension Fund Administrator)
APS	Pension Solidarity Complement
GDP	Gross Domestic Product
MPG	Minimum Pension Guarantee
NSP	New Solidarity Pillar
PASIS	Assistance Pension
PAYG	pay-as-you-go
PBS	Basic Solidarity Pension
PMAS	Maximum Pension with Solidarity Subsidy

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1. Introduction to the Chilean pension scheme and the New Solidarity Pillar

The Chilean pension system has attracted the attention of the research community as Chile was the first country to replace a traditional pay-as-you-go (PAYG) scheme with a unique contributory pillar based entirely on individual savings accounts, managed by private fund managers (known as the AFP system).[1]

Prior to 2008, individuals with little or no pension rights could apply for an Assistance Pension (PASIS) or a Minimum Pension Guarantee (MPG). The PASIS program was targeted to poor individuals with no pension entitlements, providing a subpoverty benefit (as of 2008, US$110 per month) and subject to budget availability.[2] On the other hand, the MPG established a floor (equivalent to a monthly payment of US$222 of 2008) for individuals with at least 20 years of contributions and personal income (wages or pensions) below the guaranteed level.[3] The MPG's combined restriction of minimum density and maximum income led to low coverage and a very limited poverty reduction effect.

In 2008, Chile enacted a new comprehensive pension reform that, among other changes, introduced a new poverty prevention pillar known as the New Solidarity Pillar (NSP). The reform replaced the above-mentioned programs with the NSP, a unique scheme that guarantees that all individuals in the 60 percent less affluent fraction of the population will have a guaranteed basic pension, regardless of their contribution history. This new program provides old-age and disability subsidies financed by general revenues.

[1] AFP stands for *Administradora de Fondos de Pensiones*, a pension fund manager. A description of the Chilean pension scheme and the 2008 reform can be found in Berstein et al. (2009).

[2] In contrast, the NSP is considered an entitlement for qualifying individuals. In the case of PASIS, eligible individuals could apply for benefits but their allocation would depend on the annual budget.

[3] The contribution requirement corresponds to 240 months with paid contributions. It can also be complemented, among other cases, with periods receiving unemployment benefits, contributions made to the old PAYG scheme (for which no benefit has been paid), or periods of work in another country (subject to a bilateral social security agreement between the two countries). All local wages and pension income (including survivorship benefits) are considered in the assessment of the low-income requirement. This also excludes beneficiaries of the former PAYG scheme. The MPG had no citizenship or residence requirement.

1.1. The NSP design

1.1.1. Eligibility requirements

To be eligible for NSP benefits, an individual must comply with five basic requirements:[4]

- *Age requirement*: Old-age recipients must be at least 65 years old while disability benefits are paid from age 18 to age 64 to individuals previously assessed by a disability commission as having a permanent diminishment of their work capacity.[5]
- *Armed forces:* Individuals who, at the moment of application, are participants or retirees of one of the armed forces' PAYG pension systems (CAPREDENA or DIPRECA) are not eligible for NSP benefits.
- *Residence requirement*: To qualify for old-age benefits, individuals must have resided in Chile for at least 20 years since the age of 20, and at least three of the five years prior to requesting the benefit. In the case of disability benefits, individuals must demonstrate residence in the country for at least five of the six years prior to applying for the benefit.
- *Affluence test:* The affluence test is a form of means testing applied to assess whether a person's household belongs to the 40 percent richest fraction of the population. Currently, this test is based on a Pension Targeting Score (*Puntaje de Focalización Previsional, PFP*).[6, 7] The score is constructed by combining the different sources of income for all members of the household of the applicant and dividing by an index of necessities, a function of the number of members in the household, their ages, and

[4] Alternatively, when the system was put in place, beneficiaries of old-age or disability PASIS were automatically eligible for a Basic Solidarity Pension (old-age or disability, depending on the age) under the new scheme.

[5] It is important to notice that legal retirement age in Chile is set at 65 for men and 60 for women. Among the recommendations made by the Pension Reform Commission that gave rise to the 2008 reform was to increase women's age to equal that of men. This recommendation was not included in the reform bill. Starting noncontributory benefits at age 65 (for both men and women) was meant as a signal that women should try to postpone retirement.

[6] A detailed description, in Spanish, of the PFP calculation procedure is presented in the Pension System Compendium of Regulations (Book III, Title V, Letter B, Chapter IX), available on the pension supervising agency's website (www.spensiones.cl).

[7] During the first two years of implementation, affluence testing was based on the *Ficha de Protección Social*, a means-testing instrument that calculates the vulnerability of the members belonging to a household based on information about their capacity to generate income, self-reported earnings, administrative data on pensions, and needs adjustments based on age and disability status.

special needs conditions. Income sources include administrative information (such as covered wages, pensions, self-employment, and capital and property income), self-reported information (labor income), and imputed income (based on a measure of income-generating capacity).

- *Base pension*: To be eligible for old-age subsidies, the sum of all contributory pensions received by the applicant (the base pension) cannot exceed the maximum pension with solidarity complement (known as PMAS, equivalent to approximately US$463 per month, as of September 2018).[8] Contributory pensions include old-age, disability, or survivors' pensions, either from the individual capitalization scheme or the previous PAYG programs (but not including the armed forces regimes). If a person is not yet retired at application time, an approximate pension is imputed based on his pension savings balance, age, potential beneficiaries, and life expectancy (a formula equivalent to a constant annuity).

1.1.2. Benefits

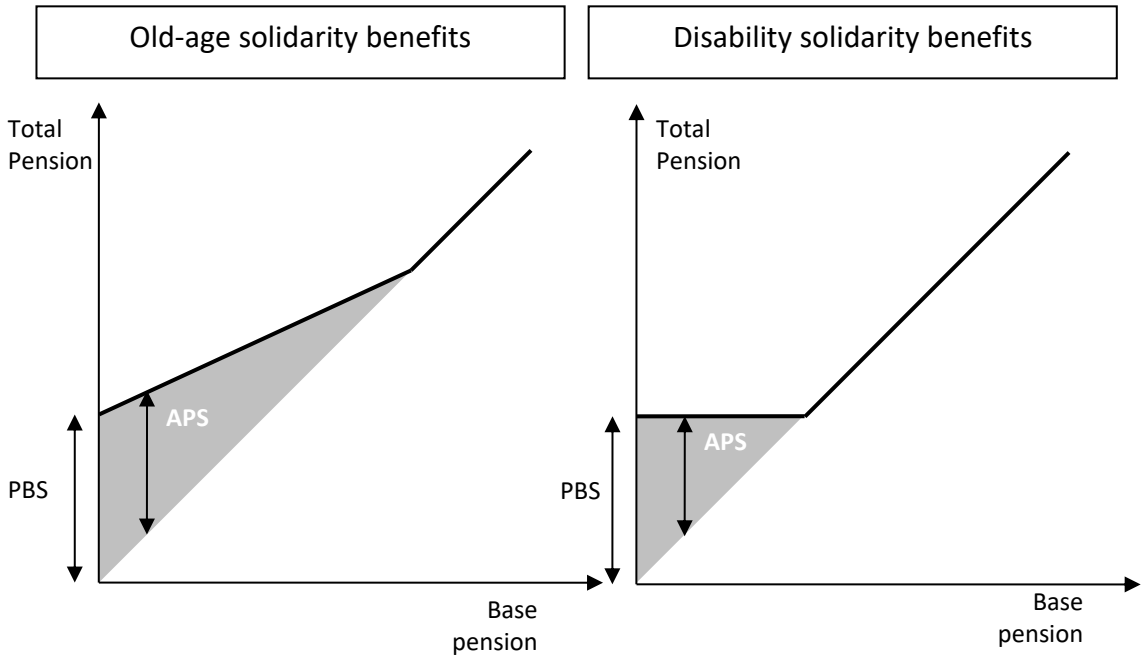
The NSP provides two types of benefits (both for either old-age or disability): a Basic Solidarity Pension (PBS) to eligible individuals with no other pension rights and a Pension Solidarity Complement (APS) to eligible individuals with positive pension rights (but with a base pension below the PMAS threshold).[9]

The schedule of subsidies is best described in Figure 1.1, which presents solidarity subsidies and total pensions as a function of contributory pension entitlements (the base pension) for both old-age and disability benefits. The horizontal axis corresponds to the base pension, originated in the contributions made by the individual to a pension system (or survivors' benefits derived from a deceased spouse or parent). For pensioners of the PAYG regime, the contributory pension corresponds to the public pension paid by the system until death. For participants in the AFP scheme, the contributory pension corresponds to the pension currently being received or, for someone in the process of retiring, is calculated as an equivalent lifetime annuity based on the accumulated balance in the individual account.

[8] To be eligible for disability subsidies, the base pension must be below the Basic Solidarity Pension (PBS).
[9] The PBS is equivalent to approximately US$157 per month (as of September 2018).

Survivors' pensions are also included in the concept of base pension (they are added to the other pensions).

Figure 1.1: Subsidies and final pensions under Chile's New Solidarity Pillar



The vertical axis corresponds to the total pension that the individual would receive, given the benefit structure of the NSP. In the absence of subsidies, the total pension would be equal to the base pension and the relationship would lie on the 45° line. With the existence of the NSP, however, the total pension corresponds to the sum of the base pension and government subsidies. In particular, individuals who were not entitled to a pension under any pension retirement scheme (individuals with zero base pension) could be eligible – if they fulfill the other eligibility requirements – for the PBS, and their total pension would be equivalent to the PBS level.

Similarly, people who did accumulate pension rights but for whom the base pension lies below the PMAS level could be eligible for the APS, which would increase the pension level but in an amount lower than the PBS. The magnitude of this complement depends on the contributory pension: individuals with pensions close to zero would receive a complement similar to the PBS and participants with pensions close to PMAS would receive a complement close to zero. Workers with contributory pensions above PMAS would not be eligible for

subsidies (for that reason, the benefit schedule lies on the 45° line when pensions are above the PMAS level).

The scheme was introduced gradually. In the first year, beginning in July 2008, the PBS was equivalent to US$138 and restricted to the 40 percent less affluent individuals. This benefit was increased to US$173 in July 2009, and covered up to the 45 percent poorest individuals. The final schedule of benefits was put in place in July 2011, covering up to the 60 percent poorest individuals.

The PMAS parameter was also gradually increased over time. Originally set at US$161 in July 2008, PMAS was increased to US$276 in July 2009, US$345 in September 2009, and US$460 in July 2010, and set to its permanent level (US$587) starting in July 2011.

The 2008 law established that the PBS and PMAS parameters would be maintained in real terms from July 2012 onwards, with annual inflation adjustments (or more frequent if the accumulated inflation within a year exceeds 10 percent). As a result, all NSP benefits are inflation-indexed. The only increase in real terms occurred in January 2017, when a law was passed that implied an extraordinary increase of the PBS level of 10 percent.

General tax provisions for the pension system are as follows: compulsory contributions and the financial returns earned by pension savings are tax-exempt but contributory pensions resulting from these contributions are subject to regular income tax. Benefits from the NSP are exempt from taxes.

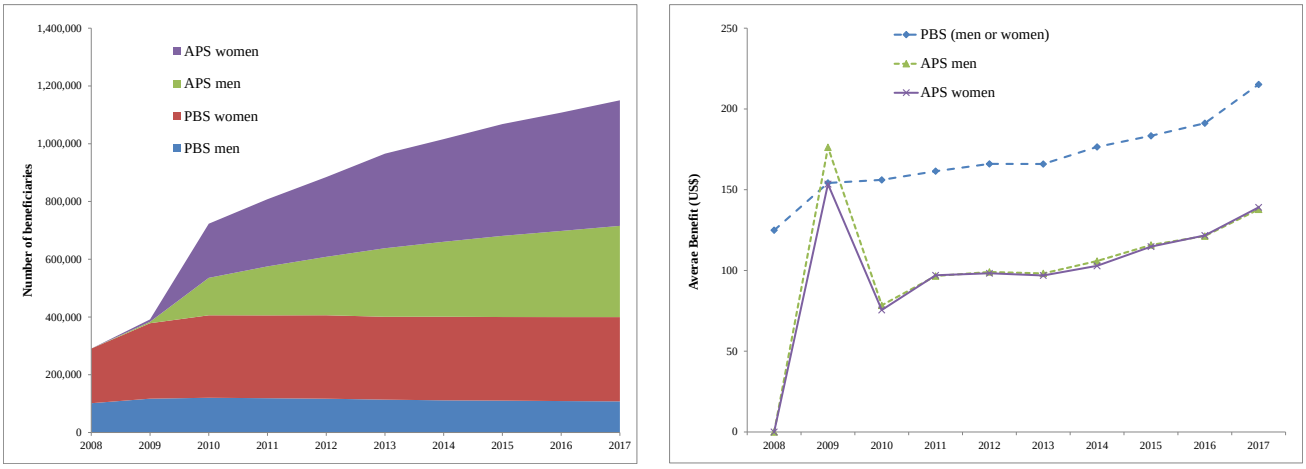
Two particular elements of this design are worth noting: (i) the strong integration between the contributory system and the solidarity pillar; and (ii) the concern for contributory incentives that this integration raises. Integration allows guaranteeing that everybody in the first three income quintiles will receive a pension equivalent to, at least, the PBS. If the benefit had been established as a top-up (as in the disability case), low-income individuals would have strong disincentives to contribute, as their retirement income would not increase with the number or amount of contributions. With the chosen design, old-age total pensions monotonically increase with self-financed savings; i.e., every dollar saved always increases retirement income. An implicit tax is associated with the subsidy reduction as the pension

increases, however: for every dollar of additional self-financed pension, the total benefit of a NSP beneficiary increases by only 66.3 cents (a 33.7 percent implicit tax rate). Whether this implicit tax actually affects workers' decisions is a subject of section 2.

1.2. Recent evolution of the NSP

Figure 1.2 depicts the recent evolution of NSP benefits. After the first two years of sharp eligibility expansion, the program gradually increased, reaching 1.15 million old-age beneficiaries in July 2017. Given the significant gender difference in contributory pension entitlements, most beneficiaries are women (63 percent), and in recent years, predominantly of the APS type (65 percent). Average benefits are gradually increasing over time (in real terms) and show no significant difference by gender.[10]

Figure 1.2: Old-age beneficiaries and average benefits (2008–2017, July of each year)



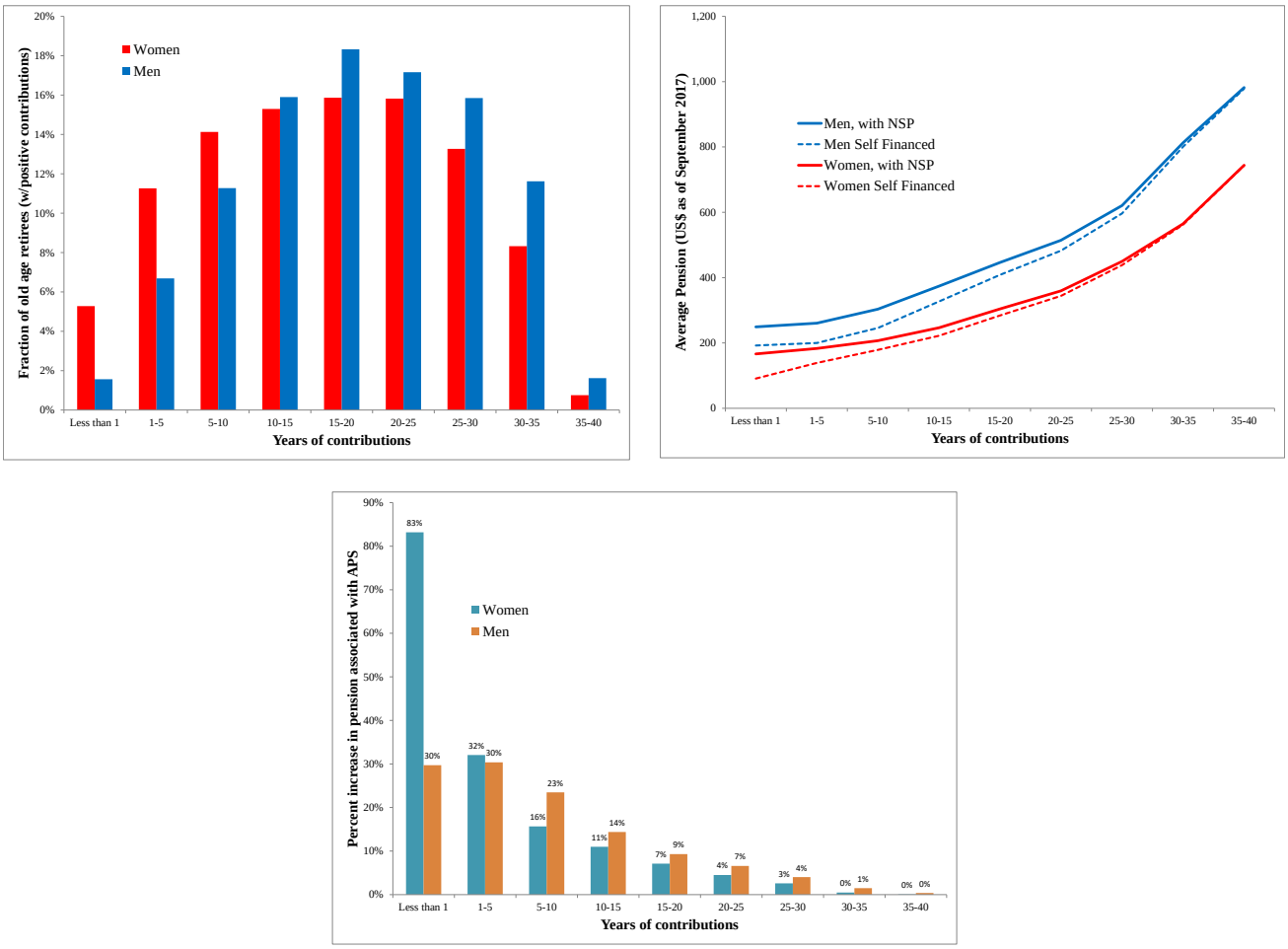
Source: Author's calculations, based on data from www.spensiones.cl.
Note: Amounts in US dollars as of September 2017. Data are available in the appendix.

The APS provides a pension complement as a decreasing function of self-financed pensions. Figure 1.3 presents the distribution (as of July 2017) of APS beneficiaries and the APS's impact on total pension as a function of gender and the number of contribution years. The average density of contributions is approximately 50 percent among Chilean workers, but as the first graph shows, the distribution for women is more skewed to the left than that of men. As expected, the pension increase provided by the APS decreases with the number of

[10] In 2008, the first year of the reform, only PBS benefits were delivered. The relative increase of the APS is directly related to the gradual expansion of the PMAS.

contribution years, starting with 83 percent for women with less than 5 years (30 percent for men), and decreasing to 8 percent for individuals who contributed between 15 and 20 years.

Figure 1.3: Distribution of old-age pension beneficiaries and average benefits (with and without APS) by gender and years of contributions (as of July 2017)



Source: Author's calculations, based on data from www.spensiones.cl.
Note: Amounts in US dollars as of September 2017.

1.3. Coverage and fiscal projections

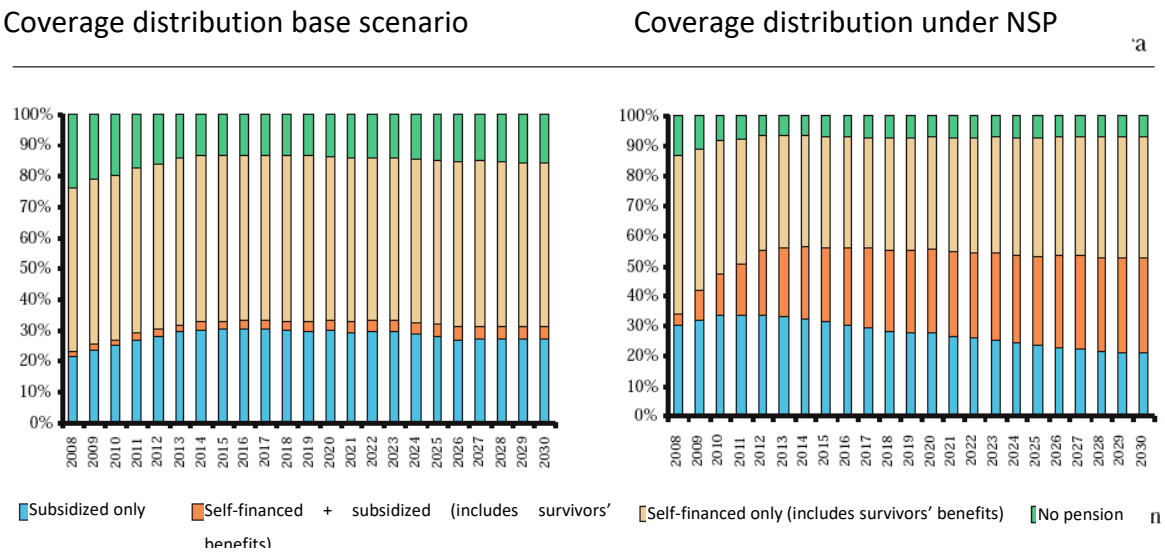
Given its design, the NSP should increase both the level and quality of pension coverage of the system as a whole.

In terms of coverage level, the PBS should reach a vast segment of the population that did not participate in the formal contributory system and were not covered by the limited PASIS

scheme.[11] At the same time, the APS allows a significant improvement in average pensions in the bottom part of the distribution.

Figure 1.4 shows an estimation of the reduction in the fraction of the population above 65 without pensions, associated with the introduction of the NSP. At the same time, the fraction of individuals with mixed financing (individual savings and state subsidies) would significantly increase as a consequence of the reform. Despite the NSP, a small fraction of the population remains uncovered, corresponding to individuals with no pension but other sources of income or wealth that would prevent them from qualifying under the affluence test.

Figure 1.4: Coverage of Chile's pension system, with and without the NSP



Source: Figure 8.1 in Berstein et al. 2009.

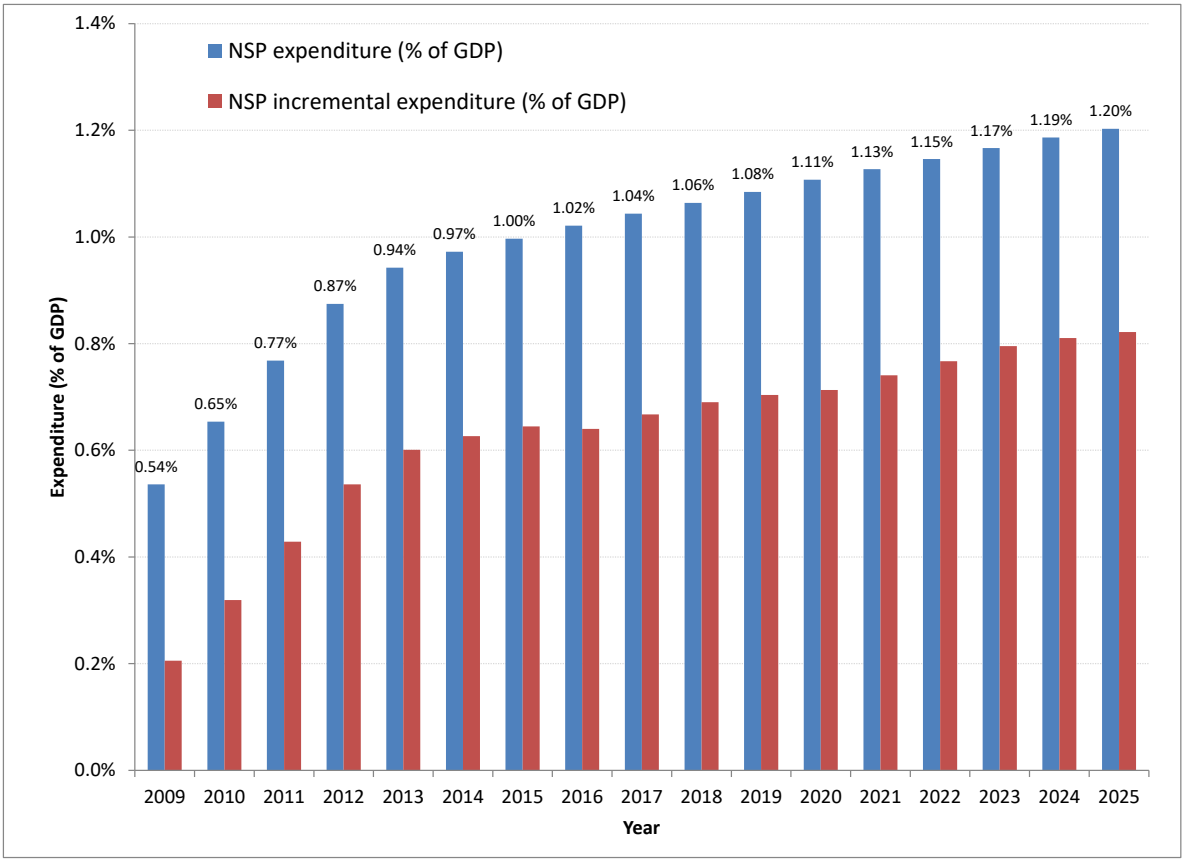
The decision to introduce the NSP was taken in a very particular context: pension-related public expenditure was starting to decline as a consequence of the 30-year transition from the previous system. This is a nontrivial matter; as Figure 1.4 shows, the new benefits increase the state's significant role in pension financing.

Official projections suggest that introduction of the NSP only (without taking into consideration other benefits introduced by the reform) will imply over the next few years a

[11] The other noncontributory program present before the 2008 reform was the MPG. However, as mentioned earlier, its combined restriction of a minimum number of contributions and a maximum income level (including pensions) led to low coverage and a very limited poverty reduction effect.

gradual increase in public expenditure, going from 0.65 percent of gross domestic product (GDP) in 2010 and reaching 1.2 percent of GDP by 2025.[12] However, it is important to remember that the NSP replaced other programs (the PASIS and the MPG) that would have incurred their own public expenditure had the reform not been passed. The reform thus implied an "incremental" expenditure of approximately 0.3 percent by 2010 and 0.8 percent by 2025 (Figure 1.5).

Figure 1.5: Public expenditure (total and incremental) on Chile's NSP (% of GDP)



Source: Author's calculations based on Arenas de Mesa et al. 2008.

[12] These figures are calculated based on projections included in Arenas de Mesa et al. (2008). Estimations are based on an actuarial model that combines administrative data on the stock of retirees and population and labor market projections for the flow of future retirees. The model does not explicitly include endogenous reactions to the introduction of the NSP, nor does it conduct sensitivity analyses of some key parameters (like returns, wage growth, or women's labor force participation). One of the key assumptions in these projections is that NSP benefits, following the rule included in the law that defined them, are kept constant in real terms (i.e., inflation-indexed). This assumption, combined with positive real wage growth, implies that the average subsidies of beneficiaries would tend to decrease for younger cohorts. If, on the contrary, political or social pressure cause some real benefit increases over time, projected expenditures should increase at a faster pace than expected.

In summary, implementation of the NSP, with its character of entitlement guaranteed by law, implied a significant increase in the contingent liabilities of the Chilean state.

2. A literature review of the impact of the New Solidarity Pillar

By design, the NSP's effects may have multiple dimensions, the two most important being the potential increase in pension coverage and reduction of poverty among the elderly. Second, due to its income and substitution effects, it could also affect the incentives to work or at least to participate in the covered labor market. Third, being a large income redistribution program – mediated by the tax system – one would expect an effect on the income distribution of the Chilean population. In addition, as its design is gender-neutral (in contrast to the contributory pension pillar, where benefits are actuarially calculated, differentiating between men and women), the NSP may help reduce the significant pension gender gap.

This section surveys the existing literature that has evaluated the different impacts of the NSP along different dimensions.

2.1. Pension coverage and poverty reduction

A study by CEEL (2017) analyzes the effects of the NSP on elderly life quality and poverty alleviation, using both quantitative and qualitative methods. Data from the CASEN 2015 survey and the VI Round of the Social Protection Survey, linked with administrative contribution records,[13] were used to analyze the effects of the NSP on elderly income. Results show that 33.9 percent of the elderly receive income from the NSP – 28.9 percent receive the PBS while the rest receive the APS – representing, on average, 26.5 percent of their monetary income (16.5 percent for men and 34.3 percent for women). For 8.9 percent of the elderly, the NSP constitutes their only income (5 percent for men and 12 percent for women). When considering only the first income quintile (constructed from per capita income at the household level, the indicator used for income poverty measurement), the data show that

[13] CASEN, the main household survey in Chile, collects data on education, health, living conditions, and different sources of income. It is the main instrument used to measure poverty and inequality. Following the US Health and Retirement Survey, the Social Protection Survey (EPS) was constructed to understand individuals' participation in social protection programs. It provides the possibility to link individuals' self-reported answers to administrative data on contributions into the social security scheme.

65.3 percent of the elderly receive benefits from the NSP (59.8 percent from the PBS, 5.5 percent from the APS), which represents 56.7 percent of their monetary income; for 17.4 percent of them, NSP benefits constitute their only source of income. CEEL find that the PBS is more frequently given to elderly persons who are not household heads, while older people who are head of the household more frequently receive the APS. Finally, some individuals from the fourth and fifth income quintile also receive NSP benefits (18.3 percent and 8.2 percent, respectively). This could be a result of differences in the per capita income measure used for poverty measurement and the Pension Targeting Score used in the NSP affluence test (which uses an age-dependent measurement of income-generating capacity and includes administrative data on income and pensions).

To analyze how the cost of a consumption basket is modified when older people are part of the household and when income levels change (for example, when receiving benefits from the NSP), CEEL study the most recent income and expenditure survey (the VII *Encuesta de Presupuestos Familiares*). For households from the first income quintile and only constituted by (one or more) individuals over 65 years old, the old-age consumption basket's monthly cost is worth an estimated US$300 (as of February 2017). The PBS is thus equivalent to 56 percent of the cost of this basket, and the average APS (approximately US$105, according to official statistics) represents a 35 percent share. When considering all income quintiles, the average PBS represents 17 percent of the monthly cost of the old-age consumption basket; the average APS represents 11 percent.

CEEL's results show that income poverty among the elderly is reduced from 14.1 percent (higher than the general estimated poverty rate of 11.7 percent) to 5.9 percent (of which 1.2 percent is extreme poverty) when income from the NSP is considered in the calculation. Similarly, using a multidimensional measure of old-age poverty, the reduction is from 28.3 percent to 19.2 percent through the NSP effects on the retirement indicator.[14] Nevertheless, the study suggests analyzing poverty among individuals and not households when possible,

[14] The multidimensional poverty measure was introduced in Chile with the 2015 CASEN survey, including five dimensions: education, health, work and social security, housing and living environment, and access to social networks and social cohesion.

considering that only 9.3 percent of households are constituted only by people older than 65 years.[15]

In summary, CEEL's study finds that the NSP constitutes an important source of income for the targeted population over 65 years old, and that it greatly contributes to alleviate income and multidimensional poverty among them. This is also consistent with the general (and in particular, women's) evaluation of the PBS: the qualitative analysis of the study shows that the NSP is positively evaluated across all socioeconomic strata, but especially by the lower ones.

2.2. Labor incentive effects

Under the NSP design, the amount of noncontributory benefits decreases with the level of individuals' contributory effort during their working life, translating to an implicit tax on formal work.[16]

Although special attention was given in the design of the new scheme to minimize these adverse effects on incentives, the theory suggests that both the level of benefits and their gradual reduction, conditional on the level of the self-funded pension, could affect contributory participation: greater future wealth is likely to reduce the incentive to save in the present (income effect); this effect is magnified by the fact that the future subsidy is partially reduced if the person saves more in the present (substitution effect).

This section reviews the literature that has formally modeled these incentive effects and attempted to assess the empirical magnitude of their impact.

Attanasio, Meghir and Otero (2011) estimate the impact of the 2008 pension reform on formal and informal labor market participation in Chile using two sources of longitudinal data: the Social Protection Survey and the Pension System Administrative Records.

[15] The authors suggest it would be important to develop an elderly consumption index and a specific multidimensional poverty index (MPI) for this group, considering some of the actual dimensions of the MPI do not apply for people over 65 years old.

[16] A detailed analysis of the effect of noncontributory benefits on the labor market and formality decisions can be found in Valdés-Prieto (2008).

They estimate the relationship between pension wealth/accrual rate and participation rates to the labor market. Some of their outcomes of interest, before and after the reform, are changes in: the distributions of pensions; the distribution of the pension gap between men and women; accumulated pension wealth; poverty levels among the elderly; the probability of contributing and the frequency of contributions; coverage of the system; men's and women's formal labor market participation; and the effects of having a child on labor force participation.

The study uses a difference-in-differences estimator to address the effect of the expected pension wealth on labor market participation, exploiting the differential effects on individuals who belong to different birth cohorts and groups. To assess the long-run effects of the reform and effects for younger cohorts, they forecast a set of variables.

It is estimated that the reform increased self-financed pension wealth as well as the final pension. For workers retiring before 2015, self-financed pension wealth would increase on average by 0.6 percent, and the final pension by 15 percent on average.

They find that the probability of contributing to the pension system decreased as a result of the reform, reducing formal labor market participation by around 4.1 percent for workers older than 40 years old. For female workers between 56 and 65 years old, the reform reduces the probability of being formal by 3.2 percent, while for men of the same age range, the reduction is 2.8 percent. Finally, they find that women's pension improvement has been 56 percent higher than that of men, significantly reducing gender inequalities.

Behrman et al. (2011) evaluate how Chile's 2008 pension system reform – specifically, the PBS – influenced economic outcomes (such as hours worked, self-reported health status, household expenditures, alcohol and cigarette consumption, health insurance, and ownership of consumer durables) for targeted poor households with at least one member aged 65 or older. They also analyze two other sets of outcomes: if there are any changes in knowledge and receipt of these new transfers between 2006 and 2009.

They use data from the Social Protection Survey (waves corresponding to 2006 and 2009), linked with administrative contribution data. They measure the "intent-to-treat" impacts of

the PBS. The estimation strategy for transfers received and behavioral outcomes exploits reported changes between the two years, along with discontinuities in the applicability of the reform, related to household members' age and the score in the means-testing instrument, the *Ficha de Protección Social* (FPS).

They control for observed characteristics unaffected by the program. The measured impact is stated as a triple-difference estimator since there are two eligibility criteria (age 65+ and being poor) plus the time difference between 2006 and 2009. Regarding the knowledge of the pension reform, since only the 2009 wave contains relevant information, they generate double-difference estimates using only data for that year (eliminating the "time difference" variable).

Results for pension reform knowledge and reports of transfers show that the poor are less well-informed than the nonpoor, but more likely to report receiving the PASIS/PBS targeted transfers. Regarding household transfers received, the 2008 reform positively and significantly impacts PASIS/PBS and total public transfers, but not private transfers, suggesting that little evidence exists of crowding out of private transfers. Targeted households received 2.4 percent more household annual income, with little evidence of a reduction in private transfers.

Finally, for the impacts of the PBS on household behavior, results suggest that household welfare probably increased due to a number of factors: higher expenditures on basic consumption (an increase of US$13 in annual expenditures on food, and of US$16 on medicine, for example), including health care; enhanced leisure time as a result of reduced hours worked (a reduction of 1.6 hours per week); and improved self-reported health.

However, the authors note that the results found are not quantitatively large and not significantly different from zero at a significance level of 5 percent (the two most significant coefficients are for self-reported health status, significantly nonzero at the 10 percent level, and hours worked per week, significantly nonzero at the 15 percent level). The authors mention that the short-run effects found are small, so follow-up analyses would be crucial to measure longer-run outcomes and to evaluate the evolution over time of the different effects and responses.

Encina (2013) estimates the effect of Chile's 2008 pension system reform over labor participation outcomes, such as months spent working, months in inactivity, months in unemployment, months with contributions (all measured as a percentage of total months in the labor history), and per capita income (measured in monthly Chilean pesos). To do so, she uses the Social Protection Survey (panel for years 2006 and 2009) and a difference-in-differences propensity score (nearest neighbor) matching estimation; the treated group comprised beneficiaries of the PBS in 2009, while the control group was selected by matching from people who satisfied conditions for the reception of the benefit, but did not receive it in that same year. These conditions include being 65 years or older, belonging to the 40 percent poorest population, receiving the PASIS, and not receiving another pension.

In general, results show that beneficiaries of the PBS showed deeper withdrawal from the labor market, made lower contributions, worked less, and showed longer periods of inactivity. In detail, results find that the treated group increased months in unemployment by 2 percent, relative to the control group, and worked, on average, 8 percent fewer months than the control group in 2009. The treated group also contributed 18 percent fewer months and spent 6 percent more months in inactive status, on average, all relative to the control group. Finally, no significant difference is found in per capita income; the treated group increased per capita income by US$34 per month in 2009, which is considered a small effect compared to the poverty line.

The author concludes that the PBS is reducing incentives to participate in the labor market, which could explain the fact that people receiving the PBS do not have higher incomes: it seems that the new pension has a crowding-out effect, whereby the higher income of the PBS is compensated with lower incomes from working activities. Using longer panel data and exploring the consumption patterns of PBS beneficiaries is suggested to analyze the effects of the PBS in more detail.

Wong (2016) analyzes the shift in the labor market between the formal and uncovered sector by exploiting the differential impact of the 2008 Chilean pension system reform on the relative attractiveness of formal and uncovered sector jobs for different subgroups of the population.

The first subgroup consists of people who would reasonably expect that the 2008 pension reform would generate a jump in their implicit marginal tax rate on pension contributions from 0 percent to 29.4 percent (based on the original benefit schedule, APS beneficiaries would expect to receive only 70.6 cents worth of incremental benefits from each dollar of contribution to their individual accounts). This is the largest subgroup.

The second subgroup under analysis faced a drop in its implicit marginal tax rate, from 100 percent to 29.4 percent (as before the reform, for low-wage individuals who have just over 20 years of pension contribution, additional pension contribution would not increase their total pension benefits; elimination of the MPG lowered the 100 percent implicit marginal tax rate to 29.4 percent), increasing incentives to work in the formal sector. These changes in the incentives to make pension contributions may significantly affect formal sector labor supply since the uncovered sector of self-employed and informal jobs had no mandatory pension contribution. Using data from the Chilean Social Protection Surveys (2006, 2009) linked to the administrative Social Security record, Wong estimates a difference-in-differences model with individual fixed effects (among other models like conditional logit estimators) for both subgroups separately.

Results from the difference-in-differences estimations show that the first subgroup is, on average, about 2.9 percentage points less likely to work in the formal sector after the reform. The second subgroup is found to be about 8 percentage points more likely to work in the formal sector after the reform. It is noted, however, that this cannot be precisely estimated given the small number of individuals in this subgroup. It is also found that formal sector labor supply responses are stronger among the young (less than 30 years old) and people who are close to retirement (ages 55–59). No effect is found for people 40–54 years old. Finally, the author concludes that although in a small subgroup of the population the 2008 Chilean pension reform eliminated certain perverse incentives for pension contribution, it introduced a new disincentive to pension contribution for a much larger subgroup.

Summarizing, empirical results are consistent with theoretical predictions in terms of labor market behavior, but the estimated impacts are relatively small, and the effect on total pension income seems to be positive, with little evidence of crowding out of private transfers.

2.3. Income and gender inequality

The NSP is probably one of the largest income distribution policies to have been introduced in Chile in the last three decades.[17] The transparent and clearly targeted subsidy program is expected to modify the income distribution structure of the country, especially as the contributive pillar is essentially distribution-neutral (as benefits are actuarially calculated as a function of savings balance, age- and gender-differentiated mortality tables, the presence of survivorship beneficiaries, and prospective interest rates). In addition, the NSP design (which is neutral to beneficiaries' gender) should reduce the significant pension-related gender gap. This section surveys some of the recent literature evaluating the distributional impacts of the introduction of the NSP.[18]

Fajnzylber (2012a) studies how two alternative approaches to pension design – a traditional PAYG scheme and the Chilean scheme based on individual account plus the NSP – affect the overall distribution of lifetime wealth.[19] Using administrative micro-data, he simulates entire histories of income and benefits. As expected, no redistribution is found within the contributory pension scheme (individual accounts), but the inclusion of a solidarity component (financed by a fixed income tax rate) greatly reduces income inequality: the Gini coefficient diminishes from 0.499 (based only on lifetime income, without a pension scheme) to 0.462 when the AFP + NSP is put in place. The redistribution occurring through the pension system is in fact progressive. In contrast, the counterfactual defined benefits scheme has only a marginal impact in reducing income inequality but leads to a significant reduction in the gender income gap.

[17] A general description of the context in which the 2008 reform took place (in contrast with the Argentinian pension reform in the same period) can be found in Rofman et al. (2009). Fajnzylber and Paraje (2013) provide the Chilean demographic context and how public policy has been modified to take into account the increased relevance of the elderly in the general social protection system, including the introduction in 2005 of the health program known as the Universal Access with Explicit Guarantees (*Acceso Universal con Garantías Explícitas,* AUGE).

[18] Earlier analysis of the gender impact of the Chilean pension system and the 2008 reform can be found in Berstein and Tokman (2005) and James, Cox Edwards, and Wong (2003).

[19] The simulated PAYG scheme is based on the Chilean Social Security program, the largest defined benefits scheme before the 1980 reform that introduced the current defined contributions scheme: a 10-year minimum contribution requirement, an initial replacement rate (on the average income over the last five years) of 50 percent, and an increase of 1 percent for every contributed year, with a 70 percent ceiling and a minimum pension equivalent to the PBS.

Joubert and Todd (2011) examine whether the reform to the pension system promotes gender equity and whether it might generate unintended behavioral responses by altering incentives to work and save.[20] They use longitudinal data from the Social Protection Survey, the Chilean supervising agency for pension fund administrators, and data on the returns achieved by Chile's fund administrators. The authors estimate a dynamic structural model of labor supply and household savings decisions that considers dimensions of individual heterogeneity, allowing them to capture the distributional aspects of the reform's impacts. The model incorporates uncertainty, incomplete information, and forward-looking behavior under a rational expectations assumption. Its parameters are estimated by the method of simulated moments using prereform data (based on 2004 and 2006 EPS surveys), and forecasting for 2004, 2006 (in-sample), 2009, and 2014 (out-of-sample).

With this methodology, they simulate the differential, five-year ahead impact of the reform on: women's pension levels relative to men's, labor supply, poverty levels, contribution densities, participation in the formal sector, and age of effective retirement. They find that the reform will: (i) greatly increase women's savings through the AFP system (increases of about 95 percent in the mean level of women's balances), reducing the gap between women's and men's pension benefits (a decrease of 7.7 percent in men's pension savings is also estimated due to the shift toward working in uncovered sectors); and (ii) reduce poverty levels at older ages (but slightly increase poverty rates for younger age groups due to work disincentive effects). The reform also leads to a slight decrease in the density of contributions for women and men of 50 years or older, which reflects changes in labor supply and labor force sector participation decisions. In other words, some negative behavioral responses are anticipated due to the income effect: lower labor force participation at older ages and lower participation in the covered sector (which would result in lower contribution densities), for both men and women over 50 years old. This reduced participation in the labor market, relative to the prereform scenario, would be particularly high in the covered sector and for women.

[20] A more general treatment of this analysis can be found in Joubert (2015).

Fajnzylber (2012b) analyzes the four main factors that affect pension differences by gender in the context of the Chilean pension system: the accumulation of pension rights, retirement age, the type of pension, and differences in longevity. Using aggregate statistics and simulation results, the author evaluates the relative importance of these factors and how the different measures included in the 2008 reform (including the NSP but also a bonus per child and the suggestion to increase legal retirement age to 65) affected this gap. The results suggest that introduction of a bonus per child can significantly raise pensions of women in the lower part of the pension distribution. The NSP will have a tremendous impact on all individuals with small pensions but especially among women, as they are more likely to be eligible for these benefits. Finally, a hypothetical increase in women's legal retirement age to 65 would have an important effect (9 percent on average), but would be especially important among women who are not eligible for the NSP.

3. Conclusions

Poverty prevention pension pillars are a fundamental part of any modern, diversified pension system, particularly in low- or middle-income countries, where pension coverage is usually inadequate (Holzmann and Hinz 2005). The extension of coverage by means of the contributory pillar is limited by the capacity of low-income households to make savings efforts for old-age protection and the tension created by the existence of an informal sector. Noncontributory benefits have proven to be an effective tool to extend social protection to the elderly population.

The New Solidarity Pillar (NSP) introduced in Chile in 2008 represents a relatively novel design for noncontributory benefits that tries to balance the tension between extending universal coverage while maintaining an affordable fiscal cost and minimizing the formal labor disincentive effects associated with government subsidies. In contrast with the implicit redistribution existing in traditional PAYG schemes or minimum pension provisions (usually available for individuals with a minimum number of contributions), subsidies provided by the NSP are transparent and clearly targeted to individuals who need it most. They also provide a means to compensate for gender differences associated with culturally assigned roles, labor market discrimination, or differential longevity.

The reviewed literature suggests that the NSP has played a significant role in extending pension coverage to the population that needs it most, reducing poverty levels (both in terms of income and from a multidimensional perspective) and reducing lifetime income and gender inequality, with only minor disincentive effects or crowding out of private transfers. The relatively small labor market effects are not so surprising, as the new benefits replace an existing incentive structure (provided by the PASIS and the MPG) that also tended to discourage formal labor market participation.

These results are particularly important for countries with defined contributions pension schemes (both of a financial or notional nature), which tend to reproduce labor market distributional patterns into the old-age income inequality.

Many unanswered questions should be taken into account when considering adopting a similar program in other contexts, such as: how to provide sustainable financing; how to set the minimum pension level or the maximum pension eligible for subsidies; and which additional features to include to reduce the pension gender gap.

Introducing a noncontributory program like the NSP requires a sustainable fiscal effort from the government that should be sustained over the long run. A permanent source of income should be available to sustain the permanent source of fiscal expenditure.

In the Chilean context, financing came largely from the gradual reduction in the transition cost associated with the 1980 reform that, by 2008, was starting to phase out. Alternative sources of financing could come from reducing fiscal imbalances in other pension programs (such as programs for civil servants) or redirecting resources from other assistance programs. Redistribution within the contributory program (which could interpreted as an earmarked form of taxation) is also an alternative (when increased taxation is not an option), though the formality disincentives are likely to be more important in this case, as labor-related contributions usually affect the entire income distribution (in contrast with general revenues, usually more concentrated on more well-off individuals).[21]

[21] A reform bill sent to Congress in August 2017 proposes to create a new redistributive pillar, financed by a 2 percent raise in the pension contribution rate. The new contributions would finance a 20 percent improvement

An important design option is the level of the minimum benefit (in the NSP context, the PBS). As mentioned in the reviewed literature, this amount represents in many cases the main source of income in the household so its level should be high enough to ensure protection above the poverty line for the typical old-age household. But at the same time, setting it at too high a level results not only in higher fiscal cost but also in potentially greater disincentive effects associated with more important income and substitution effects.

Similarly, the maximum pension with solidarity complement (PMAS) determines the range of individuals covered by the program, the fiscal cost, and the extent of disincentive impacts (given by substitution effects): a higher PMAS implies reaching a larger share of the population, with a higher fiscal cost but at the same time a lower implicit tax rate. Its level should therefore take into account a country's fiscal capacity and the importance of extending solidarity benefits to the middle class.

Although the NSP played an important role in reducing the gender gap, it was not explicitly designed with that purpose. In fact, allowing for a differential PMAS value for men and women could have allowed the system to eliminate the gender gap associated with women's higher longevity, so that a man and woman with the same savings balance and retirement age would receive exactly the same benefit.[22]

in the pension of current retirees (intergenerational redistribution), some redistribution between high-income and low-income participants (intragenerational redistribution), and a longevity-related compensation for women's pension, should they accept to postpone their retirement until age 65. The government that took office in March 2018 is more keen to extend tax-financed subsidies, rather than redistributing within a contributory program.

[22] This is particularly important in a context when other options (like compulsory unisex tables or differentiated contribution rates) are not viable from a political or economic standpoint.

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Appendix. Beneficiaries and average benefits of the NSP, 2008–2017

	Beneficiaries (as of July of each year)				Average benefit (as of July of each year, US$ of Sept. 2017)			
	PBS men	PBS women	APS men	APS women	PBS men	PBS women	APS men	APS women
2008	101,420	189,150	-	-	$125	$125	$ -	$ -
2009	117,124	261,334	4,882	8,395	$154	$155	$176	$153
2010	120,293	285,566	129,748	187,484	$156	$156	$78	$75
2011	118,793	286,810	169,626	232,716	$161	$161	$97	$97
2012	117,059	288,929	202,381	276,215	$166	$166	$99	$98
2013	113,823	286,900	237,441	327,498	$166	$166	$98	$97
2014	111,373	289,553	259,553	355,536	$176	$176	$106	$103
2015	110,438	289,446	281,099	387,145	$183	$183	$116	$115
2016	108,892	290,754	298,366	409,755	$191	$191	$121	$122
2017	107,824	291,786	316,011	434,836	$215	$215	$138	$139

Source: Author’s calculations, based on data available at www.spensiones.cl.