

## WORKING PAPER

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# **Bridging Partner Lifecycle Earnings and Pension Gaps by Sharing NDC Accounts**

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CONTENTS: 1. Introduction. – 2. Overview of the Swedish pension system and parental rights within the context of family policy; 2.1 General overview of the public pension and welfare systems; 2.2 Overview of family benefits of importance for individual pension accounts in the public schemes. – 3. A picture of earnings and the impact of child year credits on individual accounts; 3.1 The Swedish NDC Pension database and the nomenclature used; 3.2 Development of parents' earnings in conjunction with childbirth. – 4. Estimation of future pensions and the income inequality of married couples; 4.1 Previous studies of sharing – the United States and Sweden; 4.2 Overview of the income status of married couples and assumptions underlying outside-sample projections. – 5. The risk of receiving a guarantee pension; 5.1 Projecting the risk of receiving a guarantee pension for presently working birth cohorts; 5.2 Circumstances and characteristics that increase the relative odds of becoming guarantee pensioners. – 6. The effects of sharing. – 7. Discussion and conclusions. – References

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## ABSTRACT

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# Bridging Partner Lifecycle Earnings and Pension Gaps by Sharing NDC Accounts\*

Sweden's gender pension gap is about 33 percent at retirement, reflecting the gender earnings gap – itself a reflection of a structural gender difference in low-pay jobs for women and men and career advancement opportunities. The individual nonfinancial defined contribution (NDC) account data examined show that the allocation of time to informal care work in the home versus formal market work is the main determinant of the gaps. A case is presented for sharing accounts as the default, making the cost of women's time in home care explicit and negotiable, reducing the minimum guarantee pension's role as an implicit tax-financed spousal subsidy. The paper also analyzes the likelihood of needing a guarantee and the effect of sharing under various circumstances.

**KEYWORDS:** Defined Contribution Pensions, Gender Pension Gap, Gender Earnings Gap, Retirement Income, Nudging Through Sharing of Pension Rights and Accounts

**JEL CODES:** H55, J16, J26

### Abbreviations and Acronyms

FDC	Financial Defined Contribution
NDC	Nonfinancial Defined Contribution
PQAC	Pension Qualifying Amount for Children

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## 1. Introduction

Sweden can take pride in being among the top five performers in the World Economic Forum's 2018 Gender Gap Index – beginning from when the index was created in 2006 (World Economic Forum 2018). Sweden's very generous family policy compensates parents for lost earnings from early child care and later absence from work to care for sick children. This is in addition to highly subsidized universal preschool and afterschool child care. So social policy already plays – and even before the introduction of the public nonfinancial defined contribution (NDC) and financial defined contribution (FDC) schemes in 1999 had begun to play – an important role in enabling parents to combine paid work with being present with their children, providing conditions for parents to give a caring and safe environment in the early years of the children's lives. This paper assesses what happens with the earnings and total account values of spouses after the initial years of children's lives and asks the question: Is the already generous policy sufficient, or is a piece of the puzzle still missing?

The track record of women's increased labor force participation since the introduction of the NDC reform in 1999 is impressive. What has happened since 2000? The number of years women have worked prior to claiming a retirement benefit increased from 37 years in 2001 (shortly after NDC was introduced) to almost 42 years in 2015, compared with an increase for men from 40 to 42 years (European Commission 2015, 2018). The gender pension gap, based on public earnings-related pensions alone, fell from 50 percent to 33 percent between 2003 and 2013 (Swedish Ministry of Social Affairs 2016). Nevertheless, no direct evidence enables one to attribute all progress since 2000 to the reform per se. Instead, it is more likely that the reform supported an already ongoing evolution, and that the remaining two-year gap reflects the fact that women are on average two years younger than their husbands and tend to retire at the same time.

Also taking into account the guaranteed minimum pension, means-tested housing allowance and – for women born prior to 1944 – the widow's pension to get the total public pension paid reduces the pension gender gap even more, from 33 percent to 17 percent.

These additional, minimum-income guarantee benefits fulfill an important function, but they also reveal that the lifetime earnings of many women fall short of those of men. The result of the current situation is that about 80 percent of Swedes aged 65 and older who “qualify” for a minimum pension are women (Swedish Ministry of Social Affairs 2016, 283).<sup>1</sup> In other words, more is needed to close the earnings-related gender gap in pensions.

There are three explanations for the gap in earnings and, ultimately, in the resulting pensions. The first is that labor market sectors dominated by women (e.g., care work) have considerably lower average pay than comparable male-dominated sectors (e.g., industry, construction, transportation, etc.). The second is the prevalence of part-time work among women. Statistics Sweden’s time-use surveys show that the likely root of the gender gap in earnings is the gap between women’s and men’s time devoted to work in the home (60/40), with care of younger children being the dominant component. The third explanation is the prevailing culture of male-dominated top positions – combined with the belief that women are generally more predisposed to providing care, whereas caregiving at home reduces the time left for formal supply of labor and opportunities to move up the career ladder. By definition, defined contribution (DC) pension schemes are linked directly to lifetime earnings, and since market mechanisms seek first-best solutions, gender pension equality implies spending equal time in the labor force and equal sharing over nonmarket work at home over a whole working life. Not sharing obviously comes at the expense of the caregiver, usually the mother. What remains is for partners to share individual claims on future pensions.

This means sharing (N)DC pension accounts, either over the life of the marriage or for a period of a specified number of years in conjunction with children born during their relationship. Presently, the result of not doing this is that over 60 percent of married and

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<sup>1</sup> Note that the income-gap between women and men is also reflected in individual disposable income, which by definition includes earnings below the ceiling for the public NDC and FDC schemes as well as earnings above the ceiling and other sources of taxable income, including capital income – after tax (Swedish Ministry of Social Affairs 2016, 292).

cohabiting women aged 66–90 have a guarantee pension (Swedish Ministry of Social Affairs 2016, 83).<sup>2</sup>

To understand what is happening, Sweden’s individual NDC account database is used, with individual accounts covering contributions of all working cohorts 1960–2012 (including generous account “add-ons” in conjunction with childbirth), to follow earnings careers of parents from the birth of the first child. The story told by the data is that women are more dedicated to parenthood than men.<sup>3</sup> This is in line with Akerlof and Kranton (2000, 2010), who argue that social status and social identity are the main drivers of preferences and choices, with pure economic incentives often taking second seat. Economic incentives compete with the preferences of the social and cultural environment, with traditions and expectations reinforcing this behavior.

The revealed preferences of families, as expressed through the labor supply choice of women (i.e., part-time work), provide utility returns to both parents at the micro level and enhance the quality of the inputs of each generation’s contribution to gross domestic product at the macro level – through higher quality of human capital. The implication is that sharing is the optimal state, which is what all married couples do anyway, whereas not sharing brings with it the risk that the dominant caretaker is penalized economically if the couple divorces (in Sweden and other advanced economic societies with a 50 percent probability) – with the economically dominant partner holding the best cards.

The conclusion easily reached is that a policy is needed that encourages sharing of pension rights between parents after the birth of the mother’s first child. This is the topic explored herein, relying on the research results of work on “nudging” by Thaler and Sunstein (2008). If the societal goal is to push parents in the direction of equal sharing of time at home and in market-based work, the instrument to achieve this in the context of pensions is sharing –

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<sup>2</sup> In 2013, 64 percent of cohabiting women aged 66–90 had a guarantee pension, whereas only 58 percent of women in single households did.

<sup>3</sup> This is confirmed, for example, by the fact that in couples where the mother has a high salary and her earnings make up a majority of the joint income, the mother still allocates more time to being at home with children (Swedish Social Insurance Agency 2013a).

i.e., creating a nudge in the right direction. Nudging in this context means setting the default option as sharing of pension accounts, for example, from the time of the birth of the first child forward to a designated stop time, with a formal mutual agreement required to opt out of the default.

The potential power of nudging in the present context finds support in related work of Chetty et al. (2014) that Danish pension savers defaulted into a financially “superior” option for retirement saving predominantly chose not to exercise their opt-out option. In the pension account-sharing context, sharing is expected to remain the dominant option chosen (by not opting out). In addition, mandating sharing as the default can be expected to lead to a conversation at the dinner table inducing the main breadwinner to “push” the “home” partner into the formal labor market, allocating more “own time” to afterschool care of children.

Section 2 describes the Swedish pension landscape and family policy in conjunction with childbirth. Using the Swedish NDC individual account database with data for the period 1960–2012 and simulated outcomes with unchanged career behavior through 2036, section 3 examines the development of the earnings careers of couples prior to and after birth of their first child, without and with the existing child care account add-ons usually claimed by mothers. In section 4 future pensions are estimated and income inequality of married couples is examined. Section 5 illustrates the change in the distribution of women’s and men’s individual accounts, before and after account sharing. Section 6 estimates the odds of women receiving a guarantee in terms of key characteristics and circumstances, without and with sharing of pension accounts. Section 7 provides a summary and conclusions.

## **2. Overview of the Swedish pension system and parental rights within the context of family policy**

### **2.1. General overview of the public pension and welfare systems**

Sweden’s public pension system consists of a large NDC scheme (16 percent contribution rate) and a small FDC scheme (2.5 percent contribution rate) with a defined benefit

minimum pension guarantee. Contributions are paid on earnings up to a ceiling, including social insurance compensation for lost earnings (see next paragraph). The ceiling is indexed to the nominal average wage rate based on the earnings of all contributors. In addition to the minimum pension guarantee, pensioners who risk a low standard of living due to high housing costs enjoy a fully means-tested housing allowance.

The public pension system is topped up by occupational schemes that cover about 80 percent of all employees in Sweden. These schemes provide additional coverage for earnings under the ceiling with, on average, another 4.5 percent contribution rate on earnings below the ceiling. The occupational schemes also provide benefits for earnings above the ceiling. This paper focuses solely on the public universal NDC and FDC schemes, treated in the calculations as one NDC scheme.

Contributions to the public pension schemes originate from two sources. The main source is taxable earned incomes. The other source is the pension-qualifying amounts provided by the general public welfare system, based on years of higher education, conscripted military service, and years with children up to five years old. The most important of the latter is the child year credit. Taxable earned income encompasses individual earnings, compensation from social insurance that replaces earnings for workdays lost due to sickness, staying at home in conjunction with a child's sickness, unemployment, partial or full disability, and parental leave of 480 days in conjunction with childbirth. All of these sources of income give rise to actual contributions paid to the NDC and FDC schemes and ascribed to individual accounts.

The source of money for the contributions paid in addition to contributions paid earnings is largely tax-financing via the public budget; in the case of NDC, this is noted on accounts and transferred into the NDC fund, and in the case of FDC directly to individual accounts, where it is invested in individuals' chosen financial portfolio. The data on income underlying individual accounts, which is the database used here, show that the ceiling on earnings on which contribution payments are made to the public pension scheme is within the range of the eighth income decile for men and the ninth income decile for women.

## 2.2. Overview of family benefits of importance for individual pension accounts in the public schemes

For the purposes of this paper, it is important to emphasize that Swedish family policy acknowledges the value of the care work of children by crediting the account of the parent with the lower earnings (usually the mother) with a tax-financed pension-qualifying amount – a child year credit for the first four years of a child’s life. The amount is the same for one or more children but is paid as long as there is one child below five in the household. The value of the child year credit is labelled as “PQAC” (Pension Qualifying Amount for Children) and is shown in the following empirical analysis to be of considerable importance for mothers’ individual account values.

The child year credit constitutes an add-on to individual accounts with the birth of a child. In preparation for implementation of the NDC reform in 1999, NDC accounts were created using data on earnings and contributions, already computerized from 1960. The amount of the PQAC is based on the per capita earnings corresponding to at least 75 percent of the Swedish mean for the same year<sup>4</sup>; credits were calculated ex post for childbirths from 1969; and child care rights were accredited to the accounts of mothers (ex post) by the Swedish Social Insurance Agency – in the late 1990s – also in preparation for the 1999 NDC pension reform. This paper relies on a statistical database of individual account data from 1960 onward – the same data used in practice to calculate NDC (including transition) pensions.

A child allowance compensates earnings in conjunction with childbirth. Compensation is paid for 480 days that do not have to be consecutive, of which 120 days are irreversibly devoted to each parent since 2016. In 2017 Swedish mothers claimed 72 percent and Swedish fathers 28 percent of the total available allowance days compensating for child care directly in connection with childbirth. The allowance replaces only 77 percent of lost earnings up to the contribution ceiling, in some cases filled out by occupational supplements

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<sup>4</sup> There are three ways of calculating the rights. The lowest contribution amount noted on an individual account corresponds to a taxable earned income of 75 percent of the mean income (Swedish Ministry of Social Affairs 2016, s. 285ff).

(Statistics Sweden 2018).<sup>5</sup> However, the parent can choose to replace fewer days with benefits than the amount of days off from work. In 2012, the last year of data available in the Swedish Pensions Agency's database, data from a separate source, Statistics Sweden, show that women were away from work in conjunction with childbirth on average 15.3 full months, while replacing income with child allowance days corresponding to 9.5 months of full-time work; men were away from work on average 3.8 full months, while replacing earnings with child allowance days corresponding to 2.2 months of full-time work (Swedish Social Insurance Agency 2013b, 5).

### **3. A picture of earnings and the impact of child year credits on individual accounts**

#### **3.1. The Swedish NDC Pension database and the nomenclature used**

The database made available for this paper was provided by the Swedish Pensions Agency and covers the period 1960–2012.<sup>6</sup> The empirical analysis uses the following terms: for taxable earned income (Inc), which in the present context encompasses earnings from employment or self-employment, as well as the various forms of social insurance that replace loss of earnings/income as described in the preceding section. In addition, Pension Qualifying Amounts (PQA) (the separate rights that take the form of add-ons to the accounts for those who qualify) are granted in conjunction with completed periods of higher education and conscripted military service, as well as in conjunction with the first four years of a newly born child's life, which are the child-care rights described in the preceding section.

Together these sources of income constitute the pension base (PB) on which contributions are paid into individual accounts. In the NDC scheme, individual accounts are accredited yearly with an annual rate of return based on the increase in the average nominal taxable earned income per contributor. At retirement the amount of yearly benefits to be paid

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<sup>5</sup> Days for care of children temporarily at home from preschool or school due to children's sickness were distributed 62 percent for women and 38 percent for men.

<sup>6</sup> Due to the introduction of a new data storage routine, it was not possible to extend the database beyond 2012.

throughout the remaining life of the retiree is calculated based on the individual's pension account at retirement and the annuity divisor, based on the average life expectancy of the retiree's birth cohort. The resultant pension is then also indexed to the rate of inflation and the rate of growth in real income, through another index encompassing a deduction of a fixed rate of 1.6 percent already included in the calculation of the annuity.

Also used in the analysis is available information on individual characteristics: birth year, country of birth, level of highest education, marriage year, number of children, and family relationships. The total number of individuals in the database is 6,781,839, from which different subsets are drawn for the different analyses. The selection criteria are: (i) married women born between 1954 and 1973 and their spouses, where (ii) the mother's first child born in the selected year – sorted with the criterion that it is the mother's first child since both spouses could have had children before the current marriage – depending on the analytical purpose.<sup>7</sup>

### **3.2. Development of parents' earnings in conjunction with childbirth**

The empirical analysis starts with a visualization of the impact of the birth of the first child on the relative income of parents. Figure 3.1 (left panel) shows the average levels of taxable earned income<sup>8</sup> (Inc) and the pension base (PB) for mothers and fathers around the birth of the mother's first child, from T-2 to T+17. T = 0 is the birth year of the first child. In the right panel of Figure 3.1, the average ratio of mothers' taxable income to that of fathers is compared to the average ratio of mothers' pension base to that of fathers for the same period.

Striking in Figure 3.1 (left panel) is the clear difference between mothers' and fathers' average earned taxable income before and after the birth of the mother's first child. Before the birth of the (mother's) first child, the average of mothers' income relative to that of

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<sup>7</sup> Some couples were excluded from the database because the data for when their children are born are missing.

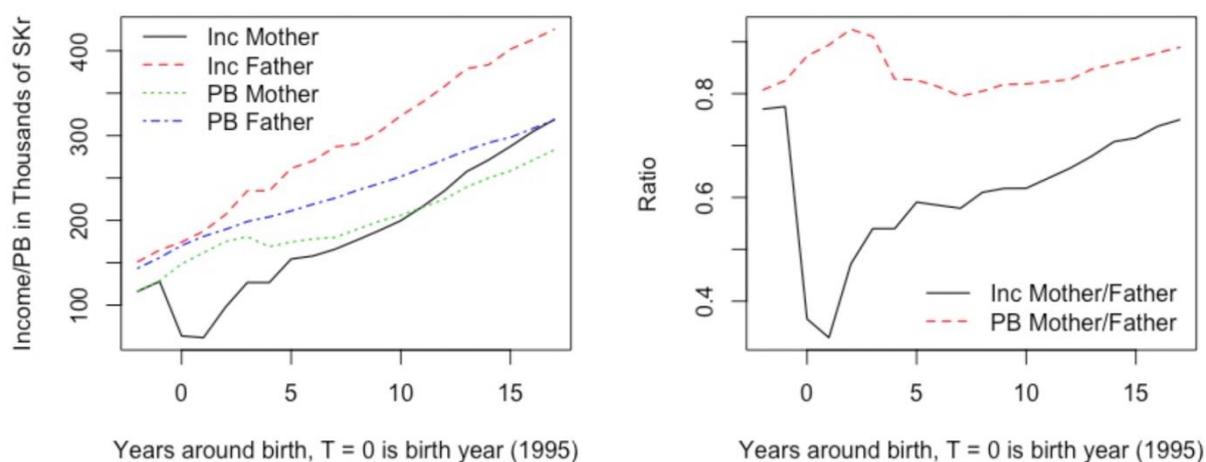
<sup>8</sup> This encompasses sick leave benefits, parental benefits, and compensation for time away from work for care of sick children.

fathers is just under 80 percent. Since the average age difference within couples is only two years, a possible difference in earnings due to age cannot be an important explanation of the gap.

Figure 3.1 (right panel) shows a large earnings gap during the early childhood years, when earnings also include the child allowance, of which about 80 percent is claimed by mothers. Comparison of the pension bases of mothers and fathers during the initial years shows that the gender gap is small.

This is largely explained by the child year credits granted to the parent with the lowest declared income each of the child's first four years; the majority are mothers. Clearly, the child year credit is fulfilling its function.

**Figure 3.1: Comparing the earnings and pension base of mothers and fathers before and after birth of the mother's first child**



Source: Swedish Pensions Agency's NDC database.

Note: The number of couples with a first-born child in these panels is 3,712.

Most significant, however, is the gender gap that emerges around year 5–6 in average incomes and remains largely unchanged during the 17-year follow-up period (Figure 3.1, left panel). In fact, it does not even match the gap before the birth of the mother's first child. As women tend to have higher education, the implication is that the gap mainly reflects the different circumstances men and women meet on the labor market and the consequences of women's part-time work.

Figure 3.2 (left panel) shows the ratio of the average mothers' to the average fathers' total pension base (the same as PB in Figure 3.1, right panel) divided into those who had only one child before 2012 and those who had two or more children. In the right panel, the same groups are shown but the pension base is net of child year credits. The solid line denotes mothers with only one child; the dashed line denotes mothers who have two or more children. Mothers are those with their first child born in 1992.

The average drop in average earnings of mothers relative to their partners is about 30 percent for women with one child and 37 percent for women with two children or more. For women having two children or more the gap is also prolonged relative to those having one child.

This suggests that for the average two-child family, the gender gap is long-lived. Finally, the difference between the left and right panels in Figure 3.2 supports the conclusion that the child year credits are very important in strengthening the pension base of mothers relative to fathers in the initial years following the births of their children.

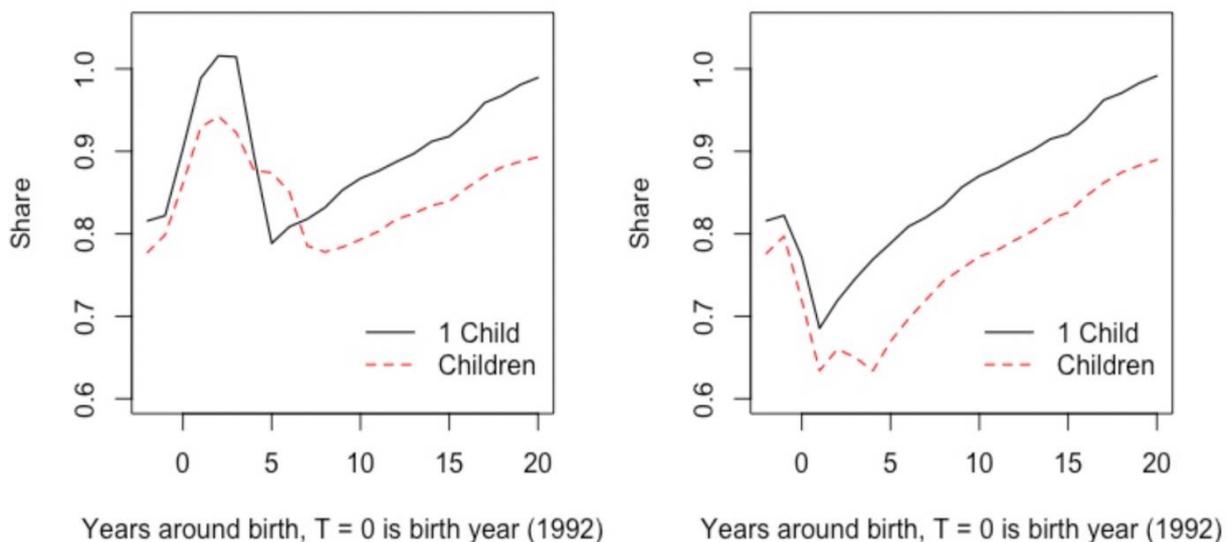
The majority of mothers will have a second child around the time when the first child turns three, thus taxable earnings drop again after having increased gradually after year 1, illustrating the importance of the PQAC. This is apparent in the left panel in Figure 3.2 from the small hump reducing the drop from its bottom value. At the same time, the long-term effect of part-time work is magnified for mothers of two or more children.

The left panel in Figure 3.2 also reveals that the taxable earnings of mothers with one child do not drop much relative to those of their spouse, so the child year credits (PQAC) compensate for lost earnings practically fully, and mothers' pension base is on average even higher than the average pension base of their spouse the third and fourth year after the birth, indicating mothers have also returned to work part-time.

The pension base of mothers with only one child also catches up with that of fathers faster than for those giving birth to two or more children. This may suggest that mothers of one

child have a relatively high income, or more equal income status with respect to their partner, for example due to career choice, but also possibly due to higher average age.

**Figure 3.2: Ratio of mothers' to fathers' pension base, by one-child-families and families with two or more children**



Source: Swedish Pensions Agency's NDC database.

Note: The number of mothers with only one child is 6,591 and the number of mothers with several children is 33,934.

Summing up, child year credits in the initial years are very important for continuity in the development of mothers' pension base. And after the initial years, women are still predominantly the ones to claim income compensation for care of sick children up to 12 years of age.

In other words, as the years pass the gender gap remains at slightly under 20 percent due to the direct effect of part-time work on earnings and the indirect effect of career choice/lack of possibilities and lower wages on average. However, the underlying issue is more complex.

Several studies show that the average working woman faces a wage penalty from parenthood relative to women without children, while men are rewarded a "father bonus" (e.g., higher incomes relative to men without children) (Boschini and Sundström 2018; Correll, Benard, and Paik 2007; Budig and Hodges 2010; Hodges and Budig 2010).

## **4. Estimation of future pensions and the income inequality of married couples**

### **4.1. Previous studies of sharing – the United States and Sweden**

This section begins with a short preview of some earlier studies of sharing of pension rights. Klerby, Larsson, and Palmer (2013) estimated the effect of defaulting into joint annuities in NDC at retirement using Swedish national income data on earnings to estimate pension accounts. The Swedish data are consistent – using national income data that paper also found that the estimated account balances of Swedish men at retirement were approximately 30 percent higher than women's. Others have also worked with analyses relating to sharing of pension rights. For example, Burkhauser (1982) concluded that the US Social Security spousal benefits were paid primarily to wives of high-earning males. Ferber, Simpson, and Rouillon (2006) suggested that US Social Security retirement payments to spouses of workers should be eliminated to “cut off” the economic dependency of wives on their husbands and this practice replaced with earnings sharing. Favreault and Steuerle (2007) estimated the outcome of a sharing using US data projected until 2049 and found that the effects were not as large as expected.

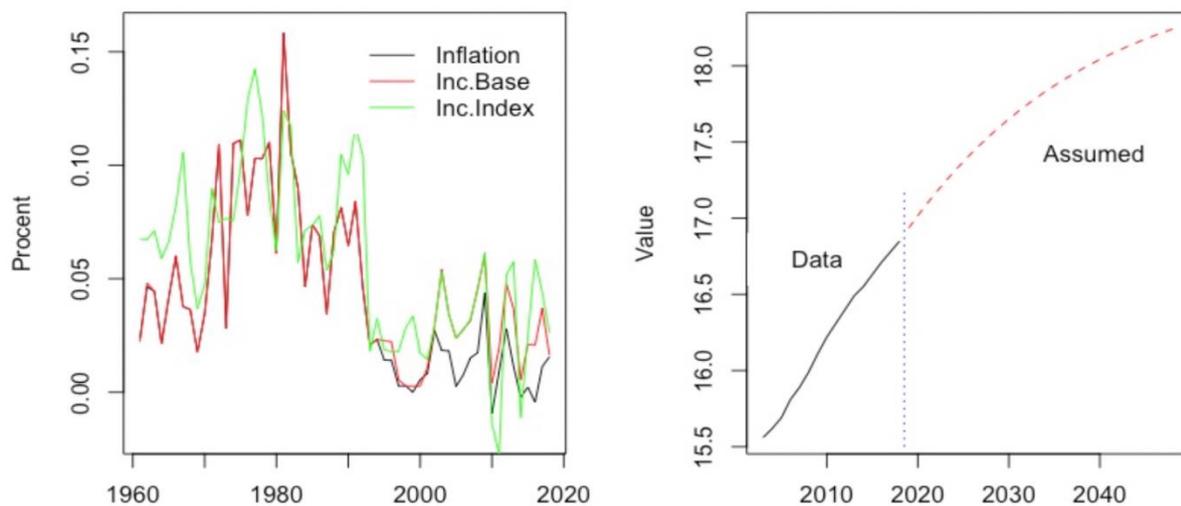
### **4.2. Overview of the income status of married couples and assumptions underlying outside-sample projections**

This section uses a sample from the Swedish Pensions Agency's NDC database of married women born 1954 to 1973 and their spouses to examine how sharing pension rights affects the pension outcome. The selected subset comprises couples that have been married once and are still married as of 2012 and whose husband's year of birth is within the range of +/- nine years of his spouse. The data for income and contributions use the entire database for 1960–2012.

In addition, individuals' pension base after 2012 is projected extrapolating previous earnings careers. Moreover, the rate of return given to account balances and the pension divisor used to convert individual pension balances into yearly benefits at retirement also have to be projected. For example, for the birth cohort of 1973, taxable earned income is projected

for the period 2013–2038 for women and to 2047 for spouses who are nine years younger. Figure 4.1 (left panel) displays the rate of inflation, the real rate of return on contributions paid, and the actual overall “income” index used to valorize accounts (adjusted for balancing according to a projection of the Swedish Pensions Agency, from the *Orange Report 2017*). Figure 4.1 (right panel) also shows the economic divisors (based on projected life expectancy and a 1.6 percent real rate of return on savings in the pension pool) used in the Swedish pension system, supplemented with the projections through 2047.

**Figure 4.1: The rate of growth of income (Inc. Index), return on NDC accounts (Inc. Base), inflation, and pension divisor**



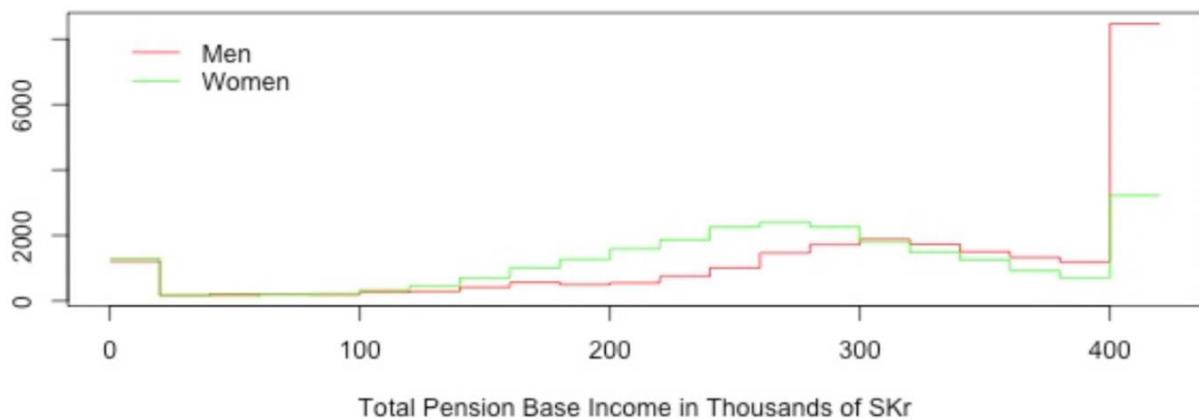
Source: Swedish Pensions Agency’s NDC database.

Average real wages grew at a rate of around 1.5 percent per year over 1960–2012. Nevertheless, a rate of 1.0 percent is used for the projections. A higher level would erode the guarantee pension threshold significantly as it follows the rate of inflation and not the growth of real earnings. Even with 1 percent real income growth the pension base, in real terms, will grow approximately 22 percent for women born in 1973 and 33 percent for their youngest husbands. Since the guarantee tapers off, increasingly fewer will have a pension below the threshold.

Figure 4.2 shows the taxable earned income for 2012 for the subsample of married women born in 1956, thus at age 56 with husbands younger than 65 – at that time. The information for this subsample is the basis for the continued analyses of contribution histories. Note that

the concentration of people at the top of the income scale is due to the income ceiling for contribution-based income, which was SEK 409,500 in 2012. The smaller concentration at the bottom is the group with hardly any taxable earnings. This group will qualify for a full guarantee (and no significant NDC/FDC pension). The sample of 25,544 consists of women in married couples who have been married only once (at the time the database was constructed) and are still married with a husband younger than 65.

**Figure 4.2: Taxable earned income for 2012 for married women born in 1956**



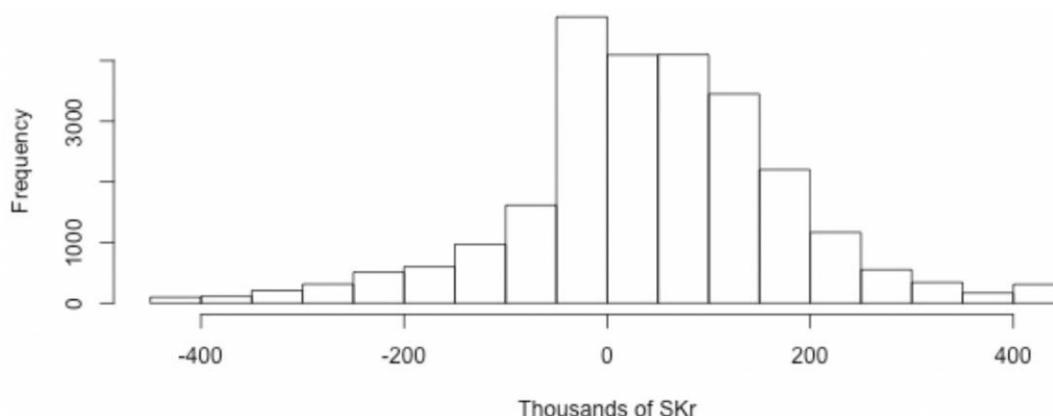
Source: Swedish Pensions Agency's NDC database.

Figure 4.3 shows a histogram of the difference in taxable earned income for married couples in 2012 (husband's taxable earned income minus wife's taxable earned income) where the woman is born in 1956 (women with retired husbands, husbands older than 64, and spouses who could not be identified in the dataset are excluded). Noteworthy is that 35 percent of the wives in the sample of 25,544 have a larger pension base than their husband in 2012.

The data in Figure 4.3 are representative of the overall population, looking back in time. These data patterns are used to complete earnings careers and accumulated contributions (with interest) at retirement to project the historical patterns forward.

Using the extended database with individual account information, and with projections, for the period 1960–2048, the analysis identifies the need for a guarantee benefit for women, all assumed to claim a pension at 65.

**Figure 4.3: Histogram of the difference in yearly taxable earned income for married couples in 2012**



Source: Swedish Pensions Agency's NDC database.

Note: Difference is defined as husband's income minus wife's income.

The question now asked is: What are the social circumstances and characteristics (assuming no change in their status after 2012 – the last actual data point) of persons who will get a pension that is below the guarantee pension threshold? The focus is first mainly on mothers' pensions (as a proxy for the main caregivers). The second focus is on the relation between (and "effect" of) the breadwinner's work pattern and the partner's pension. In this context, the focus is on the extent to which the guarantee pension, predominantly claimed by women (both with and without children), is correlated with marriage to a male high-income earner.

## 5. The risk of receiving a guarantee pension

### 5.1. Projecting the risk of receiving a guarantee pension for presently working birth cohorts

As the youngest person in the projection of future outcomes does not turn 65 until 2048, it is necessary to forecast a large number of account values and annuities from the last data point in the database of 2012.<sup>9</sup> Figure 5.1 breaks down the lowest forecasted monthly

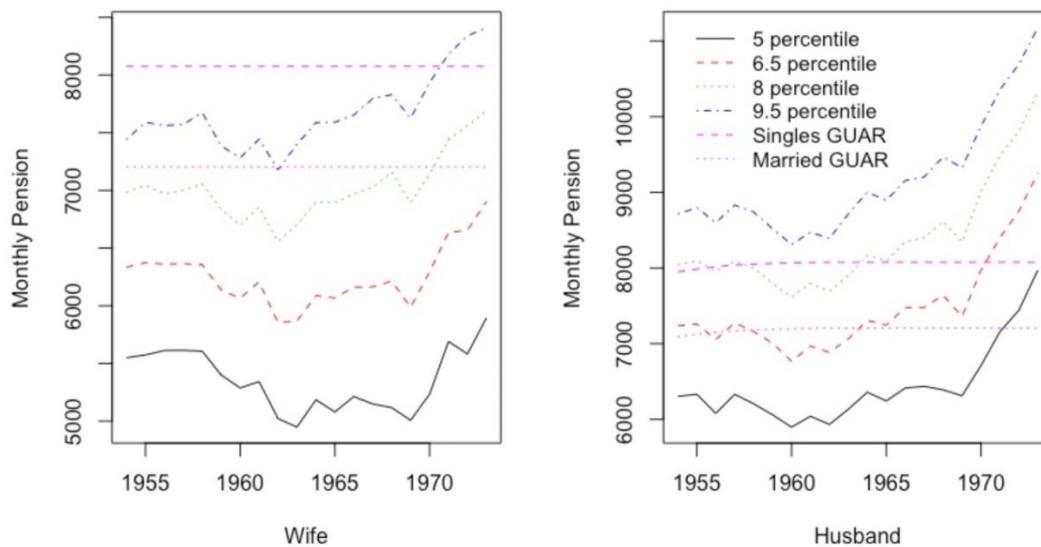
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<sup>9</sup> Pension base income consists of both regular earnings and several non-income supplements, such as child year credits (PQAC), which are named Pension Qualifying Amounts (PQA).

pensions decile (10 percent) of couples, presented through the projected monthly pension for the 5<sup>th</sup>, 6.5<sup>th</sup>, 8<sup>th</sup>, and 9.5<sup>th</sup> percentile for husbands and wives separately (women born 1954–1973 and their husbands). The threshold for the guarantee pension is displayed as horizontal lines for singles and married couples, respectively.

The pension needed for a single person to rise completely above the guarantee pension level in fixed prices – as the guarantee is indexed only to inflation – is slightly over SEK 8,100 per month, and SEK 7,200 for an individual cohabiting with another adult. It is estimated that a single household needs an income of 62.5 percent of a couple’s joint incomes (rather than 50 percent) to obtain the standard of living enjoyed as a couple (Klerby, Larsson, and Palmer 2013). If a couple divorces/separates, the relevant guarantee level to focus on is that of singles, therefore both are displayed.

**Figure 5.1: Projections of account balances from 2013 until the pension age of 65**



Source: Swedish Pensions Agency’s NDC database.

The projection shows that of the cohort of women born in 1955, about 8.5 percent will be below the threshold for the guarantee pension, but for younger cohorts born in 1970 and later, this falls to around 7 percent. For their husbands, the situation is better. Among the equivalent birth cohorts, the share below the guarantee pension threshold is around 6.5 percent, decreasing to less than 5.0 percent for the youngest birth cohorts. It is clear that

not only do men have higher taxable earned income, but this of course spills over to pensions and creates inequality, especially for those with extremely low pension account balances, at the bottom deciles. Finally, if these women and men were to divorce, the share of women below the guarantee pension threshold would increase to over 10 percent for the oldest and to around 9 percent for the youngest. The corresponding shares for their husbands are from 8 percent to around 5 percent.

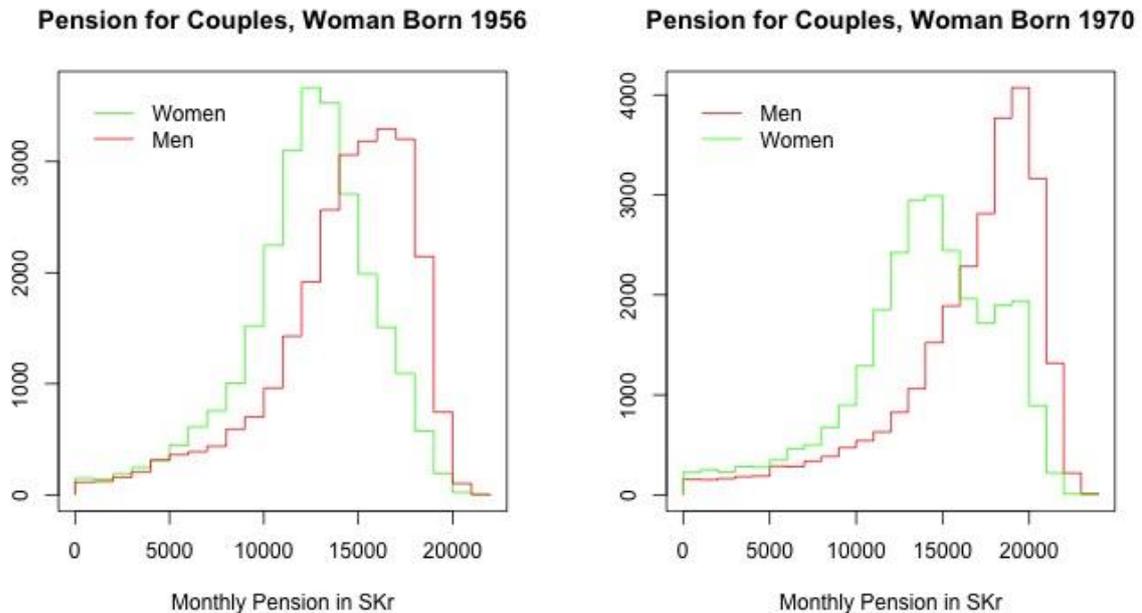
Since the guarantee level is a fixed level that is price-indexed over time, gradually fewer and fewer persons will fall under the line due to increased real wage growth. Note that single persons falling below the threshold for a guarantee are definitely in “relative” poverty (which is based on joint household income with a spouse). Persons in this group are likely to have the right to a means-tested (against living costs) housing assistance benefit, which gradually fills a growing gap between the price-indexed guarantee and earnings that are continuously growing at the average rate of real growth of 1 percent in addition to inflation . The reason for this is that the guarantee benefit is indexed only to inflation. In this respect, the information in Figure 5.1, reflecting relative incomes of spouses/partners with children, is relevant even in the future.

Figure 5.2 shows the predicted distribution of monthly pension amounts among the group of women born in 1956 and 1970 who in 2012 and earlier were married, where the husband’s birth year is in an interval of +/- nine years with respect to his wife. It is hard to predict what will happen with the low pension for married women over time, but what is most likely is that men’s future pensions will continue to dominate those of women’s, in line with Figure 5.2. Nevertheless, it is clear that the “top” fraction of women is expected to close the gap with the “top” fraction of men.

Note also from the difference between the cumulative distributions for each of the birth cohorts that men’s pensions are slightly more dominant for the later birth cohort despite the result that there are relatively more women with higher pensions. However, this reflects the ceiling on contributions to the public pension scheme and the resultant outcome that men’s earnings rise to a greater degree above the ceiling. Increasingly more women also

have earnings that surpass the ceiling, but they are likely to maintain their relative position vis-à-vis men. Finally, note that for the women in the example (and most of the men), the threshold for the guaranteed pension is SEK 7,200 per month, as in Figure 5.1.

**Figure 5.2: Predicted distribution of monthly public pension for married women and men (once and still married)**



Source: Swedish Pensions Agency's NDC database.

In conclusion, Figure 5.1 and Figure 5.2 indicate that a fairly large group of women is at risk of receiving a low pension in the future as they fall below the guarantee pension threshold. The next question addressed is: What is their socioeconomic profile? To determine the circumstances and characteristics that increase the relative odds of being in this group, a logistic regression is estimated with women below the guarantee pension threshold as the dependent variable. Table 5.1 presents the results.

## **5.2. Circumstances and characteristics that increase the relative odds of becoming guarantee pensioners**

In this segment of the analysis, all women are included, even those who have no children. One group clearly at risk is immigrants. Table 5.1 presents the results from four regressions,

where the dependent variable is a binary variable with the value of 1 for women below the guarantee pension threshold. Two regressions are without pension sharing and two are with sharing. To check whether the results are stable over time, the regressions are estimated for two birth cohorts of women – i.e., those born in 1956 and in 1970.

**Table 5.1: Logit model, explanatory factors for women’s guarantee pension**

	Individual		Sharing	
	1956	1970	1956	1970
Intercept	-2.39569 (0.1597)	-2.62002 (-0.1895)	-3.20789 (0.1814)	-4.28271 (0.2792)
Guarantee pension (husband)	2.13472 (0.0713)	2.36464 (0.0684)		
Not born in Sweden	1.99211 (0.0713)	1.99656 (0.0686)	2.58950 (0.0871)	2.50899 (0.1520)
Education	-0.07169 (0.0049)	-0.04818 (0.0046)	-0.06091 (0.0056)	-0.02439 (0.0062)
Children (at least one)	-0.92079 (0.0893)	-1.27250 (0.09079)	-1.34130 (0.09794)	-1.54499 (0.11484)
Education (husband)	0.02486 (0.0047)	0.01827 (0.0045)	-0.00172 (0.0054)	-0.00036 (0.0062)
Husband not born in Sweden	0.30406 (0.0774)	0.46890 (0.0705)	1.53150 (0.0808)	2.61670 (0.1483)
Age difference	0.01390 (0.0079)	0.01008 (0.0079)	-0.02473 (0.0090)	0.07732 (0.0106)
Marriage age	0.00710 (0.0030)	0.01147 (0.0042)	0.01414 (0.0034)	-0.02107 (0.0055)
Degrees of freedom:	25,989	26,719	25,990	26,720
McFadden Pseudo R <sup>2</sup> :	0.332	0.328	0.386	0.310

In the logistic regressions with sharing, the indicator for “husband expected to be below the guarantee pension threshold” is dropped, as it may be endogenous due to high correlation between the spouses’ incomes. This is because imposing sharing increases the probability of pushing the spouse with the higher income down into the guarantee region, resulting in an increase in the number of couples where both the husband and wife receive a share of the guarantee pension.

The correlation between being below the guarantee pension threshold increases by more than 20 percentage points when sharing is imposed, from 0.46 to 0.68.

A foreign-born immigrant will find it harder to land a job than a native, all other things equal, due to the need to learn Swedish. In addition, immigrants often enter the labor force when it no longer is possible for them to work a full working career in Sweden, which increases the risk of receiving at least a partial guarantee. To capture this effect, both the individual's and spouse's heritage (Swedish born/non-Swedish born) are included as binary variables in the regression.

Level of education can also be expected to play a role, and both (women's) own and (male) spouse's education are included (coded 0–25, representing the scale from no education up to PhD). A binary variable with the value of 1 is included for those having one or more children (where information is available up to the woman's age of 40) and a value of 0 for no children. The regression also controls for the couple's age difference (the man's age minus the woman's) and the woman's age at the time of their marriage.

Table 5.2 shows the effect on the odds of receiving a guarantee benefit with the results in Table 5.1 converted into odds ratios. The values shown in Table 5.2 are the result, as a factor, of a unit change in the explanatory variable. A value of 1.0 means that changes in the variable have neither a positive nor a negative effect; i.e., the odds that they will affect the outcome receiving a guarantee benefit are thus zero. Odds greater than 1.0 mean that the characteristic represented by the explanatory variable increases the probability of receiving a guarantee benefit and a value lower than 1.0 means the category is associated with lower odds of this outcome.

The most important variables explaining the incidence of women being entitled to a (partial or full) guarantee pension without sharing are "Guarantee (husband)" and "Not born in Sweden." Both increase the risk of having a guarantee pension, whereas the variable "Children" reduces the risk of having a guarantee pension (note that all three are 0-1 binary variables). Being born in 1956 and married to a man who is expected to be below the

guarantee pension threshold raises the odds that the wife will also be a guarantee pension recipient, by 8.46 times the neutral outcome.<sup>10</sup>

The other variables are: Education (an ordinal scale, proportional to the length of education, with a mean of around 10 years); Age difference (defined as the husband's age minus wife's age, a continuous variable with a mean around 1 and a range from -9 to +9); and Woman's age at marriage (with a mean of 31 for the still young 1970 cohort and a range of 16–42). Note that even if the effect from the husband's education has a low odds ratio of 1.025, completing high school (three more years of education after elementary school) compared to only finishing elementary school (nine years of education) raises the variable by a scale-factor of 6, thus the odds of a woman being below the threshold increase with her husband's increased education.

**Table 5.2: Odds ratios based on the estimated parameters in Table 1**

	Individual		Sharing	
	1956	1970	1956	1970
Guarantee (husband)	8.455	10.640		
Not born in Sweden	7.331	7.364	13.323	10.124
Education	0.931	0.953	0.941	0.959
Children (at least one)	0.398	0.280	0.262	0.180
Education (husband)	1.025	1.018	0.998	1.003
Husband not born in Sweden	1.355	1.598	4.625	4.223
Age difference	1.014	1.010	0.976	1.002
Marriage age	1.007	1.012	1.014	0.996

Without sharing, having a husband who is expected to receive a guarantee pension increases the odds more than eight and ten times for women born in 1956 and 1970, respectively. A husband not born in Sweden gives seven times higher odds of becoming a

<sup>10</sup> If the independent variables are such that women have a probability of 0.51 of ending up below the guarantee pension threshold when the husband is above the guarantee pension. Changing husband to a man with a pension below the guarantee pension threshold also increases the probability of the woman ending up below the guarantee pension threshold to 0.90. Odds are calculated as:  $odds = p(x)/(1 - p(x))$ .

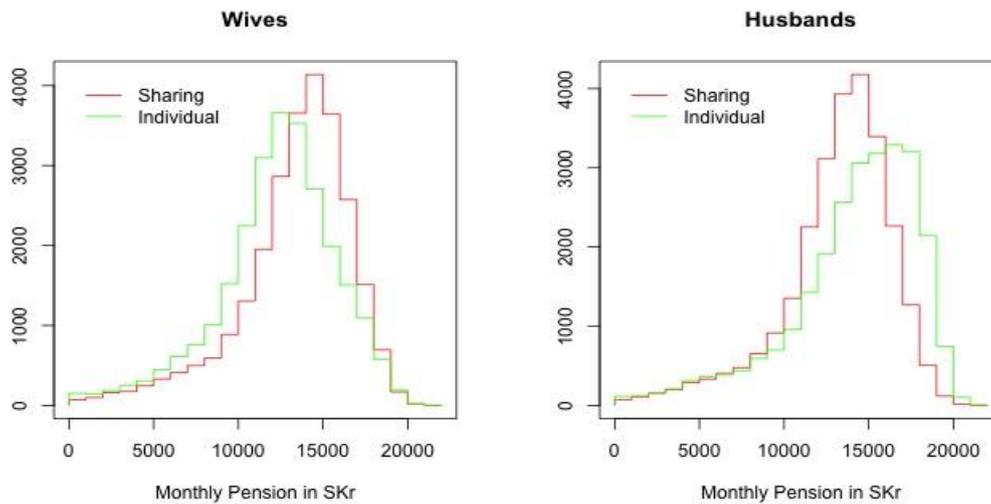
guarantee pensioner for both birth cohorts. Another large effect is coupled to having children, which lowers the odds of ending up with a guarantee pension by at least 60 percent (the factor change is 0.4). Having a husband who was born abroad also raises the odds of receiving a guarantee pension by 36 percent and 60 percent for women born in 1956 and 1970, respectively.

The odds of being below the guarantee pension threshold are roughly 0.09 for both birth cohorts without sharing. When sharing pension contribution rights, the odds fall to 0.065 and 0.058 for the two birth cohorts, respectively. Both being born abroad and having a husband born abroad raise the odds of receiving a guarantee pension, whereas having children lowers the odds substantially.

## **6. The effects of sharing**

This section presents the sharing model examined in the tables. It first refers back to Figure 5.1 and Figure 5.2, where the density in the lower tail of the income distribution for women is higher than that for men. Section 5 gave a good picture of the “characteristics” underlying this outcome. Earlier sections discussed what is known about what underlies the profile of the time dimension of the factors of the gender pension gap – going back to the point in time of the birth of the mother’s first child (the father can have children from a previous relationship). Figure 6.1 shows how sharing moves the central values of the distributions of men and women to a much denser central value. Note that the calculations stop the sharing of pension rights as soon as one spouse reaches the age of 65, regardless if s/he continues to work. Calculating the difference between the cumulative distribution function (CDF) for sharing and no sharing reveals that women’s pensions are raised more than men’s pensions shrink. However, most of the effect is above the threshold for the guarantee pension due to a positive correlation of spouses’ income. If the woman is a low-income lifetime earner and subsequently below the guarantee pension threshold, as seen in the preceding section it is fairly likely that her husband is below the threshold as well. The largest equalizing effect of a policy of sharing pension rights would of course occur if spouses’ incomes were negatively correlated.

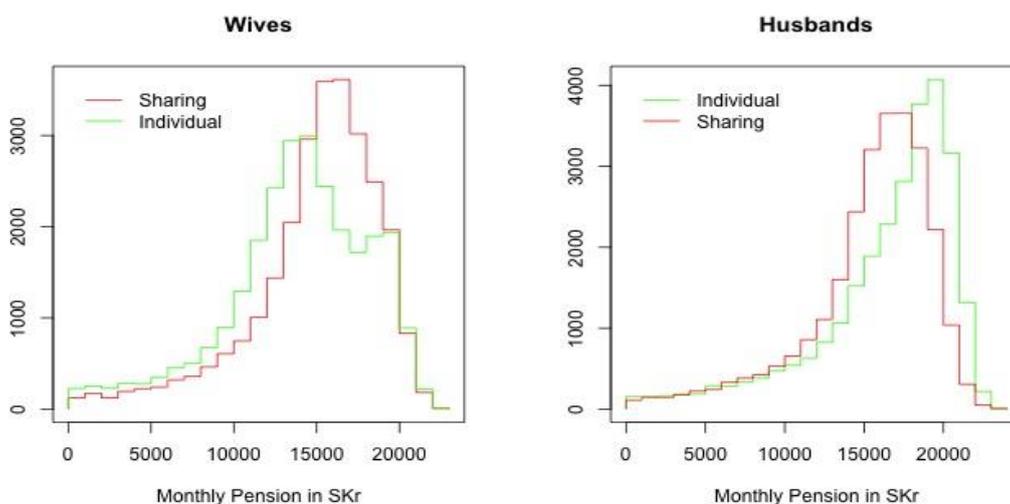
**Figure 6.1: Distribution of projected monthly pensions, with and without sharing, for couples where the woman is born in 1956**



Source: Swedish Pensions Agency’s NDC database.

Figure 6.2 shows the same picture as Figure 6.1 but for couples where the wife is born in 1970. The difference between sharing and not sharing is much larger in the lower tail for women born in 1970, suggesting an increasing gap between men with higher earnings and their female partners. The “shrinkage” in men’s pensions versus women’s is now virtually the same when calculating the difference between the CDFs.

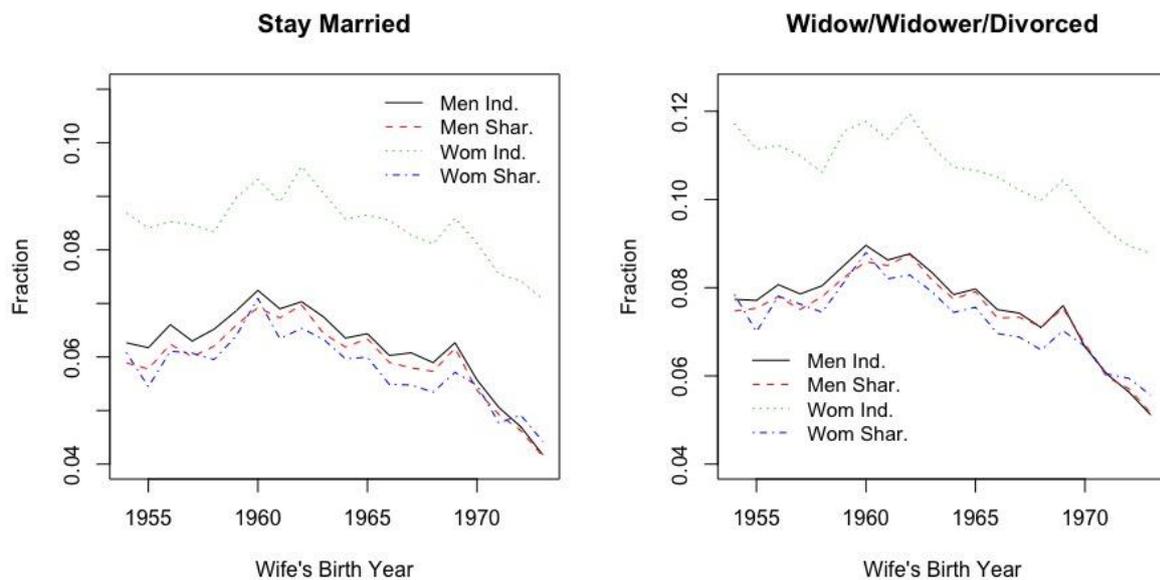
**Figure 6.2: Distribution of projected monthly pensions, with and without sharing, for couples where the woman is born in 1970**



Source: Swedish Pensions Agency’s NDC database.

Figure 6.3 returns to the uptake of the guarantee pension. The left panel shows the share of husbands and wives who are projected to receive a guarantee pension if they stay married, while the right panel shows projections if all of them were to divorce. Projections show both with (Sharing) and without (Individual) sharing. Note that some of the men in the sample already receive a guarantee pension as they are already retired. Slightly more than 8 percent of the married women born in the mid-1950s are expected to end up below the guarantee pension threshold. The shares rise with younger cohorts to a peak of 9.6 percent for those born in 1962. From 1963 the share falls to about 4 percent for married women born in 1973 (possibly as a result of the assumptions, and a resultant increasing distance down to the guarantee threshold, because the guarantee is only price-indexed by assumption, while wages experience real growth).

**Figure 6.3: Projections of the share of wives and husbands (for each age cohort) who will be below the guarantee pension threshold, with and without sharing, and the effect of divorce**



Source: Swedish Pensions Agency's NDC database.

This same effect increases relative poverty, especially among single, elderly women, in the absence of sharing and/or joint annuities. Notable in the left panel is that if the individual pension contribution rights were to be shared continuously, in the selected population the

share of women ending up below the guarantee pension threshold would drop by 2 percentage points.

If one considers the outcome of divorce (or being widowed), as forecast in the right panel, the fraction of women who would be expected to be below the threshold is as high as 11.5 percent for those born in the mid-1950s, peaks at roughly 12.0 percent in 1962, and then falls back to roughly 5.5–6.0 percent (a result of not indexing the guarantee pension to real income growth). A big difference with the higher threshold for singles is that now the reduction of those expected to end up below the threshold falls by 4 percentage points with sharing.

Moreover, the risk that some married women will end up single, willingly through divorce or sadly by becoming widowed, puts a much larger fraction of the population into the group of potentially poor elderly (i.e., relative poverty). In the Swedish context, this can be cushioned by the means-tested housing allowance (given a static guarantee), but only if its ceiling increases commensurate with the income index.

Finally, Klerby, Larsson, and Palmer (2013), which presented the case for joint annuities in (N)DC schemes, suggested the use of two policy instruments with dual effects evening out the distribution of income between couples. The first is sharing of pension contribution rights within couples to counteract differences in time use, which becomes particularly relevant given the approximately 50 percent risk of becoming divorced. The second is making a joint annuity the default when the youngest spouse retires. The joint annuity would enable the widow/er to maintain a standard of living on a par with that prior to the death of the first deceased partner. In practice, both are expected to yield a transfer of pension contribution rights to the low-income spouse (usually the wife), given the difference in life expectancy of men and women and the likelihood that the female partner is two or more years younger than the male partner. Finally, unless income is perfectly correlated, sharing will also lower the take-up of guarantee pension recipients (and taxpayers/government expenditures on these).

## 7. Discussion and conclusions

With Sweden's NDC reform in the 1990s came two gender equality goals: equalization of labor force participation and the sharing of informal work in the home, especially the care of children. Using individual pension account data, this paper digs deeper into the behavior of mothers and fathers by studying earnings careers – and hence the development of pension accounts – after the birth of the first child, typically followed by the birth of a second child two to three years later. The general conclusion from the data is that parents' behavior has not lived up to policy expectations.

This is shown by the first important result of this paper – the NDC account data show that the child care rights perform their job well and fill most of the earnings gap that arises between partners up to the six-year juncture after the birth of the first child. This is right in line with policy.

The second important result is that the gender gap in taxable earnings narrows only gradually to 25 percent on average, where it remains throughout a follow-up period of 17 years. This was not “the policy makers'” expected result. The conclusion from this finding is that allocating time during the normal work day to “being there” for children is a revealed preference of parents, where the mother shoulders the greatest responsibility.

With this result in hand, this paper suggests a policy of sharing pension accounts between parents as the default option, which is the unquestioned natural behavior for the over 50 percent of couples who do not separate after having children. Nevertheless, to date the option of sharing pension accounts – which most would agree is reasonable and fair – has been left outside the domain of options.

The consequences of sharing NDC accounts with sharing as the universal default are also examined, specifically the distribution of earnings before and after sharing. This yields the third important result: the distributions of men's and women's pension values – which are already strongly clustered around their means – move even closer to each other. And sharing of accounts as the default policy option finds support in the literature, based on a

still dominant culture underlying the revealed preference of parents to delegate a portion of their total time to being at home for children, no matter which parent is the main caregiver. Sharing by default has the additional merit of putting the dominant caregiver's opportunity costs of forgone formal labor market participation "on the table" – making transparent the economic disadvantage of the dominant caregiver.

A fourth conclusion is that sharing pension rights challenges "men's economic rationality" by emphasizing that the basis for a sound partnership should not be partnership coerced by economic dependence. The absence of an agreement on sharing is obviously to the detriment of the female partner, where in the context of Sweden and many other countries a 50 percent likelihood of divorce looms somewhere down the line. In this perspective, the default option of sharing is a form of mandated insurance for the partner who fulfills the family's joint interest in caring for offspring as they become young adults.

A fifth conclusion is empirical. It is derived from the simulated future earnings careers of the presently working NDC account holders and assuming the default of sharing of accounts applies to the whole population. Logistic regression analysis shows that sharing pension accounts reduces the likelihood of women receiving a guarantee from 9.0 percent to 5.8 percent. That said, on the margin it also increases the probability of receiving a guarantee benefit for some, namely by pulling the partner who from the outset did not have a guarantee benefit below the threshold to receive at least a partial guarantee supplement.

The analysis shows that the odds of the female spouse qualifying for a full guarantee benefit or benefit supplement decrease with increasing education but increase with an increasing age difference between her and her spouse. The odds of receiving a guarantee benefit are also very significantly greater for a foreign-born woman with a foreign-born husband.

In conclusion, assuming the overriding goal of social policy is to promote individual responsibility for both one's own lifetime economic results and the joint care of partners' children, the default option of sharing moves both partners in the "right" direction. At the macroeconomic level it reduces the need to tax already sharing couples and singles to support the spouse of the dominant income earner in a non-sharing partnership in old age.

A final argument for “nudging” into sharing is the expected positive macroeconomic effect on the generation of children of the sharing spouses – who are the main tax source for financing the guarantee. This is squarely in line with the welfare goals of society, and, as such, is simply both good social and economic growth policy.

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