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# **A Nudge to Quit? The Effect of a Change in Pension Information on Annuitization, Labour Supply, and Retirement Choices Among Older Workers**

Johannes Hagen, Daniel Hallberg, and Gabriella Sjögren Lindquist<sup>1</sup>

## **Abstract**

We study the effects of two exogenous modifications in the Swedish pension system application form nudging individuals towards a fixed-term payout. Meanwhile, the set of available options and the default option — life annuity — were unchanged during the period under study. We examine the effects on individuals' payout decisions and the spillover effects on labour supply and other pensions using a difference-in-difference framework and detailed administrative data on actual payout decisions and a wide range of individual-level outcomes. Each modification increased the demand for the nudged payout by around 30 percentage points. The first modification also induced individuals to work less.

**Keywords:** annuity, pension, nudge, decision framing

**JEL codes:** D91, G41, J26, J32

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## 1 Introduction

Nudges are intended to affect behaviour through making small changes in the choice architecture while leaving intact the available options and the right to choose. In the context of retirement, examples of effective nudging for savings decisions abound.<sup>2</sup> However, less attention has been paid to the role of nudging in retirement savings decumulation decisions. Drawing down assets is a hard problem and the possibility of exhausting financial resources poses a significant risk to older individuals' wellbeing (Benanti et al., 2011).<sup>3</sup> In this context, nudging may provide a powerful tool for policy makers and pension sponsors to steer prospective pensioners to better and more informed decumulation decisions. In this paper, we provide credible quasi-experimental evidence that small framing modifications to pension application forms have substantial, direct effects on annuitization decisions as well as spillover effects on other retirement related decisions, including labour supply.<sup>4</sup>

We study the effects of two modifications in the pension application form by a Swedish pension management company, KPA. These changes, which occurred in 2008 and 2011, nudged individuals toward different payout options. The population under

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<sup>2</sup> For example, Madrian and Shea (2001), Beshears et al. (2009), and Choi et al. (2004a,b) show that enrollment rates in workplace pension plans are much higher when employees are automatically enrolled (with an option to opt out) compared to when employees have to make a decision to opt in. Studies that explore employees' contribution rates include Thaler and Benartzi (2004), Benartzi and Thaler (2007), Benartzi and Thaler (2013), Benartzi et al. (2013), Beshears et al. (2009, 2011), Brown et al. (2006), Choi et al. (2002, 2003, 2009, 2017), Goda et al. (2014), Clark et al. (2000), Duflo et al. (2006), Dworak-Fisher (2011), Engelhardt and Kumar (2007), Even and Macpherson (2005), Mitchell et al. (2007), Huberman et al. (2007), and Chetty et al. (2014). Cronqvist and Thaler (2004) and Cronqvist et al. (2018) evaluate the role of default allocation for portfolio decisions in the Swedish Premium Pension. Some studies analyze the effects of receiving personalized pension information or general information about the pension system on the retirement decision (Finseraas and Jakobsson, 2014; Liebman and Luttmer, 2015; Mastrobuoni, 2011; Engström et al., 2019).

<sup>3</sup> Pensioners may also be at risk of underspending their wealth, i.e. not getting to enjoy one's money in one's lifetime. Such judgements are, however, difficult to make without knowing the underlying utility functions.

<sup>4</sup> Previous studies showing that behavioural factors, such as default and framing, influence the demand for annuities are either based on incentivized laboratory settings (Agnew et al., 2008) or hypothetical choice experiments (Brown et al., 2008, 2013; Beshears et al., 2014; Bockweg et al., 2017; Merkle et al., 2017; Brown et al., 2019). Such approaches can be useful in eliciting respondents' valuation of different payout scenarios and in analyzing specific mechanisms that might be at play. A major advantage of a quasi-experimental approach, however, is that it includes real-life decisions with higher stakes.

study are local government employees, who constitute about a quarter of the Swedish labour force. Three months before their 65<sup>th</sup> birthday, which customarily signals their retirement, these employees receive an application form from the pension company that manages their occupational pension wealth. Pensioners could choose between a life annuity and fixed-term payouts, where the pension capital is paid out over a pre-specified number of years ranging from 5 to 20 years. The shorter the payment period, the higher the monthly payout.

In the old version of the form, only the default option — life annuity — stipulated a monthly payment. If individuals preferred a fixed-term payout, they had to specify the payment period, and complete and mail in the application form. Individuals who do not mail in the application form will receive the default option of a life annuity.

In 2008, KPA revised their application form. The existence and economic implications of a 5-year payout was made salient by stipulating the monthly payment for that option. In addition, a checkbox for a 5-year payout was included, thus providing a clear nudge from the default option of a life annuity to this option.

In 2011, the 10-year payout replaced the 5-year payout as the salient fixed-term payout alternative to the life annuity. The organization of information in the 2008 application form was unchanged; the only difference was that the monthly payment and checkbox for a fixed-term payout was now associated with a 10-year payout instead of a 5-year payout.

Importantly, the set of available options remained intact during this period. The default option — life annuity — was also unchanged. This quasi-experiment implies that changes in payout demand following the 2008 and 2011 modifications to the application form can be directly linked to differences in the framing of the available payout options.

The monetary amounts at stake were significant; the average capital stock in the treatment group was close to USD 11,000.

Our empirical strategy adjusts for many of the potentially confounding factors that influence payout demand. We estimate the effects of the modifications in the application form using a difference-in-difference framework. The control group comprises local government workers of the same age, who made the payout decision in the same calendar month, and had the same pension agreement, but belonged to another pension company, AMF, which did not change their application form during this period. We use detailed administrative data on both actual payout decisions and various longitudinal individual-level outcomes.

We first examine the effect of the modifications in the application form on payout decisions. The 2008 modification, which nudged employees towards a 5-year payout, more than doubled the share of employees choosing a 5-year payout, from about 26 percent to 54 percent from one birth-month cohort to the next. Parallel to this, the demand for life annuities fell by almost the same magnitude. The 2011 modification, which nudged employees towards a 10-year payout, tripled the share of employees choosing a 10-year payout, from about 14 percent to 45 percent. At the same time, the proportion choosing a 5-year payout decreased by the same magnitude, while the proportion choosing a life annuity did not change.

A likely explanation for these substantial effects is that the new application forms increased awareness of the existence of fixed-term payouts. Notably, these individuals were not just nudged *away* from the default to any fixed-term payout; rather, they were nudged specifically to the highlighted payout. This change in their decisions is evident from the 2011 modification, where the increase in demand for 10-year payouts can be exclusively attributed to individuals who would otherwise have chosen the 5-year payout

— the payout option that was highlighted in the 2008 application form. The specificity of the effects suggests that many individuals were made aware only of the nudged payout, even though fixed-term payouts of other periods were available as well. Individuals may have spent very little time thinking about the payout decision before filling in the application form. Payout decisions, like many other human decisions, may be characterized by the so-called What You See Is All There Is (WYSIATI) bias — relying on knee-jerk reactions and available information — rather than deliberative thought (Kahneman, 2011).

An alternative explanation for the nudges' powerful impact is that people went for the payout option that was salient and effortless. Checking a box indicating a pre-specified payout period of 5 years or 10 years requires very little effort. Salient and effortless choices may also be easier for individuals to rationalize (Shafir et al., 1993), especially if the highlighted option is perceived as the recommended choice. This explanation does not rule out that individuals may have known of payouts beyond the life annuity and the highlighted fixed-term payout.

The heterogeneity analysis shows that women were more likely than men to choose the highlighted payout option following the 2008 and 2011 modifications. The fact that women, who on average live longer than men, were more likely to choose the 5-year payout after the first nudge suggests that life expectancy did not play a key role in the payout decisions of these individuals. Rather, we interpret this finding as being consistent with the evidence on gender differences in receptivity to informational interventions in other contexts (Bhargava and Manoli, 2015; Liebman and Luttmer, 2015).

The heterogeneity analysis also shows that those with a college degree were less likely than those without a college degree to choose the nudged payout option. They were, however, equally affected in terms of not choosing the default. Thus, college

graduates needed salient information about a fixed-term payout in order to opt out of the life annuity, but they were more inclined to choose a fixed-term payout that was not nudged upon receiving this new information. The highly educated have been shown to possess higher levels of financial literacy and pension knowledge than individuals with less education (Almenberg and S  ve-S  derbergh, 2011; Gustman and Steinmeier, 2005). For this reason, they may have been in a better position to evaluate the economic implications of different payout options on their own. They may also have become more aware of the fixed-term payout options that were not nudged – i.e. exhibited less WYSIATI bias – compared to the less educated. Irrespectively, we conclude that the highly educated were significantly less responsive to the nudges.

We then examine whether the two nudges had any spillover effects on labour supply. We hypothesize that increasing the salience of a larger monthly payout over a shorter period may raise the perceived opportunity cost of working and induce some individuals to substitute labour income with pension income. Therefore, we expect the 2008 modification emphasizing the 5-year payout to decrease labour supply. On the other hand, the 2011 modification, which replaced the 5-year payout with the 10-year payout, is associated with a smaller monthly payout relative to the 2008 modification. Consequently, we expect the 2011 modification to increase labour supply.

We find that the substantial increase in the demand for 5-year payouts following the 2008 modification had negative and significant spillover effects on labour supply as measured by labour earnings at the ages of 66–67. The 2011 modification had no significant effect on labour supply (as defined by labour earnings) but delayed claiming public pension. Hence, given that retirement status can be defined as either leaving the labour force and thus not receiving labour income, or claiming pensions, or a combination of both, the empirical results of the analyses of the 2008 and 2011

modifications appear to support our hypothesis. The decrease in labour supply and the deferral of pension claims following the 2008 and 2011 modifications, respectively, are driven by highly educated workers. That the highly educated drive these effects seems at odds with the previous finding that they were less responsive to the nudges. We believe that these findings can be reconciled by an education gradient in job flexibility – possibilities to choose between retirement and continued work – and income flexibility – affording a lower monthly pension and early retirement.

Our analysis on spillover effects contributes to a growing literature in economics and psychology on behavioural spillovers. Behavioural spillovers exist when the initial behaviour, triggered by the nudge, affects subsequent related behaviours (Ghesla et al., 2019).<sup>5</sup> Knowing the full range of effects of an intervention is necessary in order to evaluate the effectiveness of the intervention, regardless of whether the spillover effects reinforce or offset the effects originally envisaged by the decision-maker (d’Adda et al., 2017). However, most of the evidence to date considers spillovers occurring in the same domain, such as environmental behaviour (Truelove et al., 2014, 2016; Sintov et al., 2017; Lanzini et al., 2014; Jacobsen et al., 2012; Tiefenbeck et al., 2013), pro-social behaviour (d’Adda et al., 2017; Peysakhovich et al., 2015; Ghesla et al., 2019; Merritt et al., 2010; Zhong and Liljenquist, 2006; Ploner and Regner, 2013; Gneezy et al., 2014), and health behaviour (Wisdom et al., 2010; Dolan and Galizzi, 2015; Wilcox et al., 2009; Chiou et al., 2011a, 2011b). Moreover, since many of these studies are based on experiments in the lab or in the field, we know very little about the longevity of spillovers. In this paper, we provide evidence of behavioural spillovers in the context of retirement. The change in payout demand, triggered by the modified application forms,

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<sup>5</sup> The term “spillover” is also used in the literature to describe the backfiring of policy interventions due to adverse effects on the targeted initial behaviour (Schultz et al., 2007), or to explain so-called rebound effects to relative price changes (Alcott, 2005).



spilled over to individuals' withdrawal of other pensions and choice of labour supply up to two years after the nudge. As retirement is usually terminal, and the payout choice that we study cannot be modified or altered once payout has begun, what we observe is likely to persist well beyond the two years after the nudge.<sup>6</sup>

This study also contributes to the literature on the so-called annuity markets participation puzzle. While standard economic models predict that risk-averse consumers facing uncertainty about their life expectancies should choose annuities since annuities eliminate longevity risk (Davidoff et al., 2005; Yaari, 1965), empirical studies usually find that relatively few individuals choose annuities. Our findings support existing evidence for framing effects in annuity demand (Agnew et al., 2008; Brown et al., 2008, 2013; Beshears et al., 2014; Bockweg et al., 2017; Merkle et al., 2017; Brown et al., 2019). Apart from adopting a novel, quasi-experimental approach to address this issue, we are also the first to examine how the salience of different payout options affects annuitization decisions. In addition, we propose that individuals choose to withdraw their pensions over a short period of time instead of annuitizing so that they can reduce their labour supply and retire early.<sup>7</sup> The possibility that short-term payout options could encourage earlier retirement is important from a policy perspective. With many developed countries facing the challenges of aging populations, encouraging older workers to remain in the labour force is important.

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<sup>6</sup> In a related paper, Chetty et al. (2014) study the effect of automatic contributions on private savings. Such effects can be seen as behavioural spillovers in the sense that private savings are related to but not directly targeted by automatic contributions. There is a large literature in public finance estimating "crowd-out" in retirement savings accounts (Poterba et al., 1996; Engen et al., 1996).

<sup>7</sup> Other explanations involve the presence of load factors arising from administrative costs, incomplete markets, and adverse selection (Finkelstein and Poterba, 2002, 2004; Hagen, 2015; Mitchell et al., 1999), bequest motives (Ameriks et al., 2011; Brown, 2001), high annuity prices (Chalmers and Reuter, 2012), the presence of pre-annuitized first-pillar pension income (Bernheim, 1991), the qualification criteria of means-tested government benefits (Bütler et al., 2011; Pashchenko, 2013), and default options (Agnew et al., 2008; Bütler and Teppa, 2007; Hagen, 2015; Mitchell and Utkus, 2006). In a recent paper studying Swedish white-collar workers, Hagen (2021) shows that annuitants (those who chose the default option) were much less likely to recall their choice of payout length than those who opted for a fixed-term payout.

The remainder of the paper is structured as follows. Section 2 provides the background of the Swedish pension system and payout decisions in the occupational pension plan for local government workers. Sections 3 and 4 describe the modifications in the application form and the data, respectively. Section 5 discusses the empirical strategy and the results, and Section 6 concludes.

## **2 Background Information**

### **2.1 The Structure of the Swedish Pension System**

Sweden's pension system has two main pillars: a universal public pension system and an occupational pension system for workers whose employer is tied to some occupational pension plan.

The public pension is the most important source of pension income, amounting to 50–80 percent of an individual's total pension income. Mandatory annuitization applies to all pension wealth in the public pension system.<sup>8</sup> The public pension can be withdrawn at age 61, and there is no legislated retirement age. Workers are, however, obliged to leave their employment at age 67 if requested by the employer to do so.<sup>9</sup>

The second pillar consists of several different occupational, employer-provided pension plans. Most occupational pension plans are designed and implemented at the union level. There are four large agreement-based occupational pension plans that cover around 90 percent of Sweden's labour force. Two of these plans cover workers employed in the public sector. The other two pension plans cover white-collar workers and blue-

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<sup>8</sup> The public pension system has three tiers, of which two are earnings-related and defined contribution pensions. The earnings-related tiers insure income up to a certain threshold level called the "income ceiling". The third tier is called the minimum guarantee pension and is paid out to retirees who have low or no earnings-related pension. See Hagen (2017a) for more details.

<sup>9</sup> The mandatory retirement age was raised to 68 in 2020.

collar workers in the private sector, respectively. This study focuses on payout patterns in the pension plan for local government workers.<sup>10</sup>

## **2.2 The Occupational Pension Plan for Local Government Workers**

The pension plan for local government workers is called KAP-KL. The universe of approximately a million Swedish local government workers, constituting 25 percent of the labour force, belong to this plan. Typical professions are teachers, physicians, nurses, medical personnel, and caregivers.

KAP-KL has one defined contribution component (DC KAP-KL) and one defined benefit component (DB KAP-KL). The contribution rate to DC KAP-KL is 4.5 percent of the individual's wage whereas DB KAP-KL accrues only to earnings that exceed the so-called income ceiling in the public pension system.<sup>11</sup> In this paper, we focus on DC KAP-KL. DC KAP-KL can be withdrawn from the age of 55, and there is no upper age limit. It is paid out as a life annuity at the age of 65 if no action is taken.

KAP-KL has 11 pension companies that administer pension contributions and payouts for all local government workers in Sweden. The largest company is KPA Pension (henceforth KPA), which is the default, i.e., workers are assigned to KPA unless they actively move their pension capital to a different company. The second largest company is AMF. In addition to managing pensions of local government workers, AMF is the default managing company for blue-collar workers in the private sector. Workers whose pensions are managed by AMF will form the control group in our study.

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<sup>10</sup> There is also a third pillar for voluntary savings available to anyone who cares to supplement the retirement income provided by the first two pillars. The deduction for private pension savings was removed in 2016.

<sup>11</sup> The income ceiling is an upper limit for how much pensionable annual income is considered as the basis for the public pension. The income ceiling corresponds to a yearly income of approximately USD 34,465 (1 USD≈9 SEK). Around 15 percent of local government workers have wages above the income ceiling in the public pension system.

## 2.3 Payout Options

DC KAP-KL can either be withdrawn as a life annuity or as a fixed-term payout with a minimum of 5 years and a maximum of 20 years.<sup>12</sup> The life annuity guarantees the retiree a stream of money right up until the point of death, whereas the fixed-term payout option issues payments only for a certain period of time. Fixed-term payments cease if the individual dies before the end of the term.<sup>13</sup> Each payout option is associated with a conversion factor, i.e., the factor at which the accumulated pension capital is converted into a monthly payment. The conversion factor depends on assumptions about average life expectancy at each claiming age and the rate of return on the pension capital, but is independent of gender.<sup>14</sup> The resulting monthly payment is adjusted for the inflation rate.

Individuals who receive occupational pension income from different companies will make more than one payout choice. These are individuals who worked in different sectors during their careers and were therefore covered by more than one pension plan, or who invested their pension capital with different companies.<sup>15</sup>

Table A2 in the appendix reports a standard measure of the value of a life annuity — the “money’s worth ratio” (MWR) — for a range of plausible discount rates, and for men and women, separately. The MWR is defined as the ratio of the expected present discounted value of the life annuity to the expected present discounted value of a fixed-term payout (5 or 10 years).<sup>16</sup> The calculations are made for a KPA customer who claims

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<sup>12</sup> Mandatory annuitization applies to pension income from the defined benefit component.

<sup>13</sup> However, under both life annuity and fixed-term pension, the insured can buy a co-insurance, which ensures that the beneficiary receives the pension either as a life annuity or as a fixed-term payout.

<sup>14</sup> The conversion factors of each of the companies that we study in this paper were unchanged during the period of study.

<sup>15</sup> The other major occupational pension plans also offer fixed-term payouts as an alternative to annuitization. The share of retirees choosing to withdraw their pensions over a fixed number of years typically range between 20 and 50 percent, and has increased over the years (Hagen, 2015, 2017b; ISF, 2015, 2017).

<sup>16</sup> Specifically, the EPDV of payout option  $p$  purchased by an individual of gender  $g$  and age  $a$  in year  $t$  is given by  $EPDV_{g,a,t}^p(B) = B^p \sum_{i=1}^T \pi_{g,a,a+i} (1 + r_t)^{-1}$  where  $\pi_{a,a+i}$  is the probability of someone at age  $a$

his pension at age 65 in 2008. We see that fixed-term payouts are attractive relative to life annuities when the discount rate is high. For example, the value of the life annuity is 13 percent lower than that of the 5-year payout when the discount rate is three percent. For women, fixed-term payouts are worth more when the discount rate exceeds two percent. Men, on the other hand, should prefer fixed-term payouts even at discount rates close to zero. The differences between the 10- and 5-year payouts are small, with MWR's close to unity.

### **3 The Pension Claiming Procedure and the Application Forms in Place during our Study**

Three months before they turn 65, local government workers who have not already claimed their DC KAP-KL pension receive an application form that provides information on the payout decision and a possibility to opt out of the default — a life annuity. Unless the worker sends in the application form for a fixed-term payout, the pension company will commence paying out a life annuity starting from the month the worker turns 65. Once the payout has begun, no modifications can be made to the payout plan.

#### **3.1 The Application Form at KPA**

KPA, the default managing company of the pension plan KAP-KL, modified their application form in 2008 and again in 2011. The pre-2008 application form stated the monthly payment under the life annuity. If the individual preferred to opt out, he or she would have to indicate the desired number of years (5–20) of the fixed-term payout on a

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living  $i$  more years,  $B^p$  is the annual gross benefit received by the individual under payout option  $p$ ,  $r_t$  is the appropriate discount rate for payments received in year  $t$ , and  $T$  is the last period of payment. For life annuities,  $T$  is chosen so that  $\pi_{t,T} \approx 0$ , which happens when  $T = 45$ . For the 5- and 10-year payouts,  $T = 5$  and  $T = 10$ , respectively. Gender-specific mortality tables from Statistics Sweden for years 2009–2013 are used (Statistics Sweden, 2013).

separate form that was enclosed with the letter. There was no information on the monthly payment under the various fixed-term payouts. To find out the monthly payment of a specific fixed-term payout, the applicant would have had to contact customer support. An English translation of the old application form is shown in Figure 1.

In 2008, the existence and the economic implications of a 5-year payout became more salient. In the 2008 application form, shown in Figure 2, a checkbox for a 5-year payout was added. The 2008 form also provided information on the monthly payments under a life annuity and under a 5-year payout. As before, individuals could choose a fixed-term payout of any period between 5 years and 20 years. The 2008 application form was sent to those who turned 65 in September 2008 or later.<sup>17</sup>

In 2011, KPA once again modified their application form.<sup>18</sup> This time, a 10-year payout was presented as the alternative to the default. The checkbox for a 5-year payout was replaced by a checkbox for a 10-year payout. Information on the monthly payments under a life annuity and under a 10-year payout were provided. The 2011 application form was sent to those who turned 65 in August 2011 or later.<sup>19</sup>

### **3.2 The Application Form at AMF**

While KPA is the default managing company of the pension plan KAP-KL, local government workers may also choose to move their pension capital in the DC component

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<sup>17</sup> According to officials at KPA, complaints by retirees about their small monthly payments under a life annuity prompted the amendment of the application form (ISF, 2015). The modification was intended to increase beneficiaries' awareness of the possibility of withdrawing the pension over a shorter period and thus receiving a larger monthly payment than under a life annuity.

<sup>18</sup> An English translation of the 2011 application form is shown in Figure A1 in the Appendix. As can be seen, this application form has strong resemblance to the one from the second half of 2008 (Figure 2). Note that the application forms also included a row where the beneficiary could indicate the year and month in which the pension payment should begin.

<sup>19</sup> There was a cost motivation behind the 2011 modification. The dramatic increase in the demand for 5-year payouts had become too expensive for KPA. Although interest rates were decreasing between 2008 and 2011, they were still at levels that made the fixed-term payouts relatively attractive from the beneficiary's point of view.

to a different pension company. According to our data, about 45 percent of local government workers have moved their pension capital to AMF before the application form changes (i.e. before their 65<sup>th</sup> birthday). Hence AMF's clients serve as a control group to KPA's clients.

AMF's application form was similar, but not identical, to KPA's application form before the first modification in 2008. However, importantly, AMF made no change to their application form during the period under study. The control group (AMF) thus had the same pension plan, the same default option of a life annuity, and the same payout options as the treatment group (KPA) but experienced no change in their own application form.

*Figure 1: An Example of KPA's Application Form Before the Modification in September 2008*



PAYMENT OF PENSION INSURANCE  
Defined contribution old age pension KAP-KL/AKAP-KL

2008-03-03

Payments of your occupational pension insurance will begin soon.

In June 2008, we will start your pension insurance payments. If you do not contact us to make any changes, we will make pension payments to you during your whole life (a life annuity).

#### Monthly payment

Your pension insurance will be paid from June 2008 and the preliminary payment for a life annuity will be SEK 346, including a dividend payment of SEK 134.

#### Payment period

You may choose an alternative payment period to those stated above and you may also postpone your first withdrawal to a later date. If you want your pension to be paid out as a life annuity and decide not to change anything concerning your payments, you do not have to send this pension application form back to us. If you choose to postpone your first withdrawal for more than 6 months, you will not be able to change the length of the payment period now. In that case, you will receive a new application letter before the first payment is made, which you can use to choose your preferred payment period. Please note that no changes of your pension payment can be made after November 1st 2008.

#### Send in your application form on time

To be able to fulfill your requirements, you must send us your application form no later than May 1st 2008.

#### Changing the payout period

You can change the payment period of your pension insurance below. If you do not make any changes, your pension insurance will be paid as a life annuity starting in November 2008. **Please note that no changes of the date of the first payment or the length of the payment period will be allowed after June 1st 2008.**

I would like to change my payment period to: ..... (between 5–20 years)

I would like to postpone my first pension withdrawal to a later date:    
Year Month

I hereby confirm my above choices with my signature:

.....  
Signature

.....  
Date

.....  
Name

.....  
Telephone daytime/mobile phone

.....  
Email address

The application form should only be returned if you wish to make any changes to your pension insurance payments, but no later than October 1st 2008. The address is KPA Pension, 106 85 Stockholm.

*Note: This is a translated and cropped version of the original Swedish application form.*



*Figure 2: An Example of KPA's Application Form after the Modification in September 2008*



PAYMENT OF PENSION INSURANCE  
Defined contribution old age pension KAP-KL/AKAP-KL

2008-08-03

Payments of your occupational pension insurance will begin soon.

In November 2008, we will start your pension insurance payments. If you do not contact us to make any changes, we will make pension payments to you during your whole life (a life annuity).

#### Monthly payment

Your pension insurance will be paid from November 2008 and the preliminary monthly payments will be the following if you choose for example:

- Life annuity SEK 264, including a dividend payment of SEK 101.
- 5-year payout SEK 1 082, including a dividend payment of SEK 343.

#### Payment period

You may choose an alternative payment period to those stated above and you may also postpone your first withdrawal to a later date. If you want your pension to be paid out as a life annuity and decide not to change anything concerning your payments, you do not have to send this pension application form back to us. If you choose to postpone your first withdrawal for more than 6 months, you will not be able to change the length of the payment period now. In that case, you will receive a new application letter before the first payment is made, which you can use to choose your preferred payment period. Please note that no changes of your pension payment can be made after November 1st 2008.

#### Send in your application form on time

To be able to fulfill your requirements, you must send us your application form no later than October 1st 2008.

#### Changing the payout period

You can change the payment period of your pension insurance below. If you do not make any changes, your pension insurance will be paid as a life annuity starting in November 2008. **Please note that no changes of the date of the first payment or the length of the payment period will be allowed after November 1st 2008.**

I would like to change my payment period to:

<input type="checkbox"/> 5 years	Own choice:.....(between 5–20 years)
----------------------------------	--------------------------------------

I would like to postpone my first pension withdrawal to a later date:  Year  Month

I hereby confirm my above choices with my signature:

.....  
Signature Date

.....  
Name Telephone daytime/mobile phone

.....  
Email address

The application form should only be returned if you wish to make any changes to your pension insurance payments, but no later than October 1st 2008. The address is KPA Pension, 106 85 Stockholm.

*Note: This is a translated and cropped version of the original Swedish application form. The highlighted parts are additions compared to the old application form shown in Figure 1.*

## 4 Data

### 4.1 Data Sources and Sample Restrictions

We use data from two pension companies — KPA and AMF. The data consist of information on KPA's and AMF's clients who belong to the pension plan for local government workers, and who claimed their occupational pension between 2008 and 2014. These data are merged with rich register data from Statistics Sweden's Longitudinal Integration Database for Health and Insurance and Labour Market Studies (LISA).<sup>20</sup> The register data include, among other things, longitudinal information on incomes from pensions, work, and benefits.

We restrict our sample in the following manner. The 2008 KPA modification affected those born on or after September 1943. In our analysis of the 2008 modification, we sample all local government workers who turned 65 in 2008 (i.e., the 1943 cohort). Those born between January and August 1943 are the “pre-modification cohort,” and those born between September and December 1943 are the “post-modification cohort.”

Meanwhile, the 2011 KPA modification affected those born on or after August 1946. We sample all local government workers who turned 65 in 2011 (i.e., the 1946 cohort) to analyze the 2011 modification. The “pre-modification cohort” are those born between January and July 1946 while the “post-modification cohort” are those born between August and December 1946.

Second, we further restrict our sample to individuals who begin claiming their occupational pension on or after their 65<sup>th</sup> birthday. We wish to focus on individuals who were exposed to the new application forms, which are sent out three months prior to their

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<sup>20</sup> <https://www.scb.se/en/services/guidance-for-researchers-and-universities/vilka-mikrodata-finns/longitudinella-register/longitudinal-integrated-database-for-health-insurance-and-labour-market-studies-lisa/>

65<sup>th</sup> birthday. This is not a major restriction since 81 percent of the treatment group and 82 percent of the control group claimed their occupational pension at age 65 or later.<sup>21</sup>

Third, we restrict our sample to individuals who are classified as active in the labour market prior to the distribution of the application form, i.e., prior to the 65<sup>th</sup> birthday, as they would be making decisions on labour supply and retirement when they are 65 and older. We classify active workers as those who have annual labour income exceeding 2 price base amounts (about SEK 90,000 or USD 10,000) between the ages of 61 and 64, who are not claiming any old age pension at age 64, and who are not receiving any type of disability pension between the ages of 55 and 64.<sup>22</sup> An annual income of 2 price base amounts corresponds to around 30 percent of the average labour income among 60–64-year-old local government employees at that time.<sup>23</sup>

The final sample consists of 17,949 and 21,955 individual-year observations for the 2008 and 2011 modifications, respectively, of whom 55 percent are clients of KPA. We will focus on labour supply effects in the two years following the typical retirement age of 65, i.e., 66–67 years of age, as employees have the right to remain in employment only until age 67.

## 4.2 Descriptive Statistics

Table 1 shows descriptive statistics for pre- and post-modification cohorts for the treatment and control groups. Panels A and B show, respectively, the 1943 cohorts (the 2008 modification) and the 1946 cohorts (the 2011 modification).

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<sup>21</sup> Comparable claiming behaviour is found in other occupational groups in the labour market. About 85 percent of occupational pensions are withdrawn at the age of 65 or later (ISF, 2018).

<sup>22</sup> The price base amount is determined by the government each year and is, among other things, used for calculations in the social insurance system and tax system. It is linked to changes in the general price level in the economy.

<sup>23</sup> The pension company data do not include individuals who were deceased in 2014, which implies that the samples are somewhat positively selected in terms of health status, and that the sample for the 1943 birth cohort is somewhat more positively selected than the sample for the 1946 birth cohort.

Individuals in the treatment and control groups have very similar characteristics. Both groups are dominated by women (around 75 percent), and about two-thirds are married. Labour force attachment, income history, health insurance income ten years prior to retirement, and work history outside the local government sector are also close to identical.

We highlight two ways in which the treatment and control groups differ. First, individuals in the treatment group are somewhat more likely to have completed at least three years of college. Second, the size of the pension capital that can be withdrawn as a fixed-term payout (Pension capital, DC KAP-KL) is larger among the control groups in both the 1943 and 1946 cohorts. The control groups have on average fewer years of education, yet similar income levels from age 55. Note also that both groups are obligated to save the same share of their income toward this pension. The differences in pension capital are therefore likely driven by differences in the age at which they entered the labour market, and/or differences in the rate of return.<sup>24</sup>

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<sup>24</sup> Table A1 in the appendix reports corresponding descriptive statistics for the main outcomes considered in this paper, including payout decisions, occupational pension income, public pension income, and labour supply.

*Table 1: Descriptive Statistics for the 1943 Cohort (2008 Modification) (Panel A), and the 1946 Cohort (2011 Modification) (Panel B)*

	Treatment (KPA)		Control (AMF)	
	Pre	Post	Pre	Post
<b><u>Panel A: 2008 modification</u></b>				
<i>Education level</i>				
Compulsory	0.16	0.16	0.16	0.16
High school 1–2 yrs.	0.29	0.29	0.34	0.37
High school 3 yrs.	0.06	0.06	0.06	0.06
College 1–2 yrs.	0.15	0.16	0.14	0.13
College 3 yrs. or more	0.33	0.31	0.28	0.26
Doctoral (PhD)	0.02	0.02	0.02	0.02
Not married (y/n)	0.37	0.38	0.35	0.36
Female (y/n)	0.74	0.74	0.77	0.77
Household disposable income, ages 55–64 (100s SEK)	39,204	39,348	38,719	38,662
Labour income as share of total income, ages 55–64	0.96	0.96	0.96	0.96
Health insurance income as share of total income, ages 55–64	0.01	0.01	0.01	0.01
Working in private sector at age 55	0.08	0.09	0.06	0.06
Pension capital, DC KAP-KL (100s SEK)	871	882	1,036	1,044
<b>Number of observations</b>	<b>6,357</b>	<b>3,454</b>	<b>5,380</b>	<b>2,758</b>
<b><u>Panel B: 2011 modification</u></b>				
<i>Education level</i>				
Compulsory	0.11	0.12	0.13	0.14
High school 1–2 yrs.	0.29	0.28	0.35	0.38
High school 3 yrs.	0.07	0.06	0.07	0.06
College 1–2 yrs.	0.17	0.16	0.15	0.15
College 3 yrs. or more	0.35	0.35	0.29	0.27
Doctoral (PhD)	0.02	0.02	0.02	0.01
Not married (y/n)	0.40	0.38	0.36	0.34
Female (y/n)	0.74	0.72	0.75	0.78
Sum household disposable income 55–64 (100s SEK)	43,104	43,496	42,942	42,458
Share labour income of total income 55–64	0.96	0.96	0.96	0.96
Share health insurance income of total income 55–64	0.01	0.02	0.02	0.02
Working in private sector at age 55	0.12	0.12	0.10	0.09
Pension capital, DC KAP-KL (100s SEK)	1,315	1,355	1,493	1,455
<b>Number of observations</b>	<b>7,291</b>	<b>4,947</b>	<b>5,873</b>	<b>3,844</b>

*Note: The sample comprises local government workers born in 1943 (Panel A) and in 1946 (Panel B) who claimed their occupational pension (DC KAP-KL) from either KPA (treatment group) or AMF (control group). Household disposable income and DC KAP-KL pension capital are expressed in 100s of SEK (USD 1 ≈ SEK 9) on an annual basis. All incomes are at the 2016 price level.*

We note that the control group is a selected group since they actively moved their capital to AMF from the default company KPA. If the individuals who moved to AMF are more involved with and more informed about their pension situation, we would expect them to make more informed pension choices. The administrative nature of our data makes it difficult to examine potential differences with respect to personal involvement in retirement matters. However, the fact that the average education level in the control group is lower than that in the treatment group suggests that the control group may even be marginally *less* financial literate.<sup>25</sup>

In our view, an equally likely explanation of why workers moved to AMF is that they may have been more responsive to the extensive advertisement campaigns undertaken by AMF. In the last 20 years in Sweden, as more and more components of the pension system have come to involve individual investment choices, advertisement campaigns from various pension managing companies have become increasingly frequent.<sup>26,27</sup>

Although the treatment and control groups are similar in many respects, we cannot rule out the possibility that observed and potentially unobserved differences may be correlated with the outcomes of interest, i.e., payout decisions and labour supply. To mitigate such concerns, we employ a difference-in-difference approach, comparing KPA and AMF workers before and after each of the modifications. The identifying assumption

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<sup>25</sup> Earlier studies (Bhargava and Manoli, 2015; Liebman and Luttmer, 2015; Almenberg and S  derbergh, 2011; Gustman and Steinmeier, 2005) have found that education level correlates with the level of financial literacy.

<sup>26</sup> According to the Swedish daily *Svenska Dagbladet* (September 24, 2012), AMF had the largest advertisement budget among the pension managing companies in Sweden. <https://www.svd.se/stor-reklambudget-for-pensionsbolag>

<sup>27</sup> Another possible reason for moving to AMF is that these workers may have had prior knowledge (and a positive experience) of AMF due to their earlier careers in the blue-collar sector when their pensions were managed by AMF. This would mean that they were already clients of AMF when they started to accumulate pension in the local government pension plan. Table 1, however, which reports the fraction in each group employed in the private sector at age 55, provides no evidence for this hypothesis; this fraction is smaller than 10 percent in both groups.

here is that unobservable individual characteristics influencing the outcomes are invariant over time (Blundell and Costa Dias, 2009). Thus, it is reassuring that the characteristics of pre-modification and post-modification cohorts in each treatment/control group are not demonstrably different, as shown in Table 1. More importantly, however, we examine the identifying assumption by comparing pre-trends for our outcomes in the next sections.

## **5 Empirical Strategy and Results**

We first present our empirical strategy to estimate the causal effects of the modifications in the application form on payout decisions and other outcomes in Section 5.1. Next we show the impact of the modifications in the application form on the payout decision in Section 5.2. We then study the effect on pension income, including pensions not directly affected by the modifications in the application form, in Section 5.3. Section 5.4 examines the spillover effects on labour supply.

### **5.1 Empirical Strategy**

We first estimate the effect of the nudges on payout decisions, before estimating the spillover effects of the change in payout decisions on other pension and labour supply decisions. The spillover outcomes are measured at age 66–67, both because we are interested in measuring the immediate effect of the modifications in the application form on retirement and labour supply decisions, and because few local government workers continue working after the mandatory retirement age of 67.

For individual  $i$  born in month  $m$  receiving pension from company  $c$ , the difference-in-difference equation is written as:

$$y_{i,m,c,a} = \alpha + \delta(KPA_c * Post_m) + \phi KPA_c + \psi Post_m + \beta X_{i,m,c} + u_{i,m,c,a} \quad (1)$$

where  $y_{i,m,c,a}$  represents an outcome of interest (i.e., payout decision or a measure of labour supply) at age  $a$ .  $KPA_c$  is an indicator for being a client of KPA, and 0 otherwise.  $Post_m$  signifies treatment assigned by month of birth, i.e., 1 for those with birthdays between September and December for the 1943 cohort, and those with birthdays between August and December for the 1946 cohort, and 0 otherwise.  $X_{i,m,c}$  is a vector of control variables that include gender, marital status at age 64, education level, labour market sector, various measures of historical incomes such as sickness absence benefit income, and controls for pension capital.<sup>28</sup> In the model, general differences in outcomes between the treatment and the control groups are captured by  $\phi$  while general differences between treatment assignments (i.e., birth month) are estimated by  $\psi$ . Single-monthly dummies are included to adjust for general birth-month trends. The effect of the modifications in the application form is measured by the difference-in-difference estimator  $\delta$ .

The identifying assumption of the effect of the modifications in the application form is that in the absence of the modifications, KPA clients and AMF clients would have experienced similar trends in payout decisions, pension income, and labour supply. To examine the validity of this assumption, we provide graphical evidence of pre- and post-trends for each of the considered outcomes in Figures 3–9. Additionally, we use a series of separate F-tests to formally test whether pre-reform cohort trends in the studied outcomes are parallel for the treatment and control groups. Table A3 in the Appendix shows the results. None of these tests indicate that we can reject the null of equal gradient between the two groups at the 5 percent level. All pre-reform trends can thus be regarded as parallel, suggesting that our empirical strategy is credible.

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<sup>28</sup> We include pension capital dummies for percentile ranking less than p10, p10–p25, p75–p90, and greater than p90. The pension capital refers to DC KAP-KL capital in either of the two companies.



When interpreting these graphs, it is important to keep in mind that incomes are measured on a calendar year basis. Any birth-month effects will therefore spill over systematically to the difference between pre-modification and post-modifications cohorts in such a way that cohorts born later in the year will, on average, have higher labour incomes (and lower pension incomes) measured on a calendar year basis than cohorts born earlier in the year. The birth-month fixed-effects that are included in our regression models should account for such calendar effects.

## **5.2 The Impact of the Modifications in the Application Form on Payout**

### **Decisions**

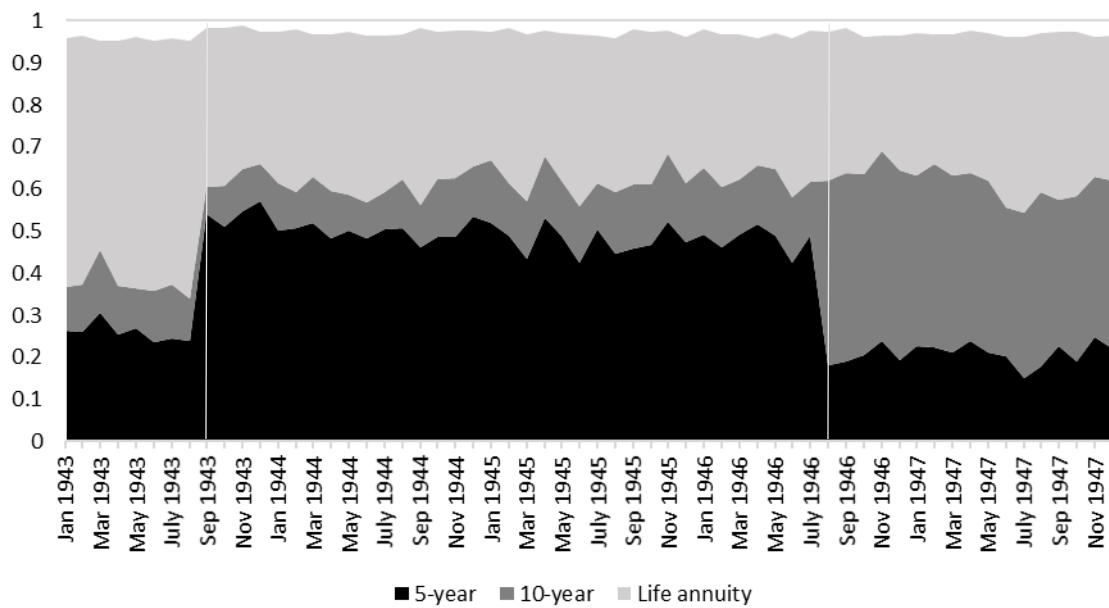
Figure 3 shows the proportion of individuals choosing the 5-year payout, the 10-year payout, and the life annuity by birth-month cohort for individuals born between 1943 and 1947. Panel A, depicting KPA clients (treatment group), shows that among those who were born between January and August 1943, approximately 25 percent chose the 5-year payout. The proportion choosing the 5-year payout increased by more than 30 percentage points for the September 1943 cohort, who were the first cohort to receive the 2008 modified application form that made the 5-year payout more salient. The increase in the proportion of 5-year payouts corresponds to a decline of a similar magnitude in the share of life annuities, suggesting that the modification in the application form nudged individuals from the life annuity default to the 5-year payout.

In 2011, the KPA application form was modified, with the 10-year payout replacing the 5-year payout as the salient alternative to the default. Among those who were born before August 1946, approximately 15 percent chose the 10-year payout. For the August 1946 cohort — the first cohort to receive the 2011 modified application form — 45

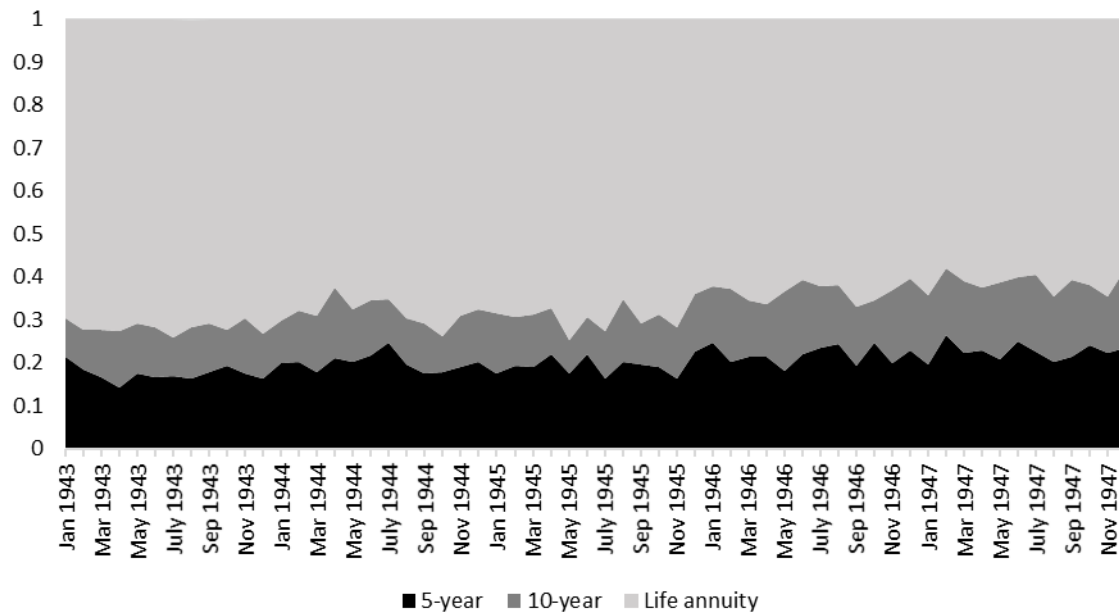
percent chose the 10-year payout, signifying an increase of 30 percentage points. At the same time, the proportion choosing the 5-year payout decreased by the same magnitude.

*Figure 3: Payout Decisions by Birth-Month Cohort for Individuals Born between 1943 and 1947.*

*Panel A: KPA clients (treatment group)*



*Panel B: AMF clients (control group)*



*Note: The black area represents 5-year payouts, the dark grey area represents 10-year payouts, and the light grey area represents life annuities. Some of KPA's clients chose other payouts, as indicated by the white area in Panel A. The vertical lines in Panel A indicate the modifications in the application forms; the 2008 modification affected those born on and after September 1943, while the 2011 modification affected those born on and after August 1946. Pensions are claimed at age 65.*

Panel B, depicting AMF clients (control group), shows that the proportion choosing each option remains relatively steady throughout the entire period. The 5-year payout is preferred by 15–25 percent, the 10-year payout is preferred by 10–20 percent, with the rest adopting the life annuity.

We estimate the effects on payout decisions using equation (1). The results, shown in Table 2, Panels A and C, support the conclusions from the graphical analysis. The 2008 nudge towards the 5-year payout increased the proportion choosing the 5-year payout by 28 percentage points, while the proportion choosing the life annuity decreased by around the same magnitude. When the 5-year payout was replaced by the 10-year payout as the salient alternative in 2011, the proportion choosing the 10-year payout increased by 31

percentage points, while the proportion choosing the 5-year payout decreased by around the same magnitude.<sup>29</sup>

We discuss several potential explanations for the sizable effects of the modifications in the application form on payout decisions. One explanation is that the modified application forms increased individuals' awareness of the existence of fixed-term payout options. The increased demand for the 5-year payout may thus be a rational response to new information. As discussed in Section 2.2, the 5-year payout is an attractive alternative to the life annuity, particularly at high discount rates and for individuals with low life expectancy. However, the effects of the 2011 modification cast some doubt on the interpretation that individuals chose the 5-year payout just because its expected value was higher than that of the life annuity. Despite small differences in the expected present discounted value of the 10-year and 5-year payout, many opted for the 10-year payout when it replaced the 5-year payout as the salient alternative to the default. In fact, the increase in demand of 31 percentage points for the 10-year payout in 2011 was even larger than the corresponding increase in demand of 28 percentage points for the 5-year payout in 2008.

The effects of the 2011 modification also cast some doubt on another plausible interpretation of the effects of the 2008 modification, namely that the results are driven by individuals with present-biased preferences. Individuals with present-biased preferences have been documented to be more likely to opt for a short-term payout than a life annuity (Brown and Previtro, 2014). We expect our sample to include these types of individuals since our sample comprises those who had not yet made any active decision

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<sup>29</sup> Specifically, we estimate equation (1) as a linear probability model with robust standard errors. The left-hand side variable is a dummy that takes on the value of one if the individual chooses the 5-year payout and zero otherwise. The procedure is repeated for the 10-year payout and the life annuity. Each cell therefore represents the difference-in-difference estimate from a separate regression. Additional estimates (not reported) suggest that individuals did not postpone the payout to after age 65 because of either modification.

on their pension three months before their 65<sup>th</sup> birthday — the date on which the pension is automatically paid out.<sup>30</sup> If individuals have present-biased preferences, a nudge towards a longer-term payout of 10 years should have less impact than a nudge towards a shorter-term payout of 5 years. However, as we have seen, the 10-year nudge’s effect of 31 percentage points is slightly larger in magnitude than the 5-year nudge’s effect of 28 percentage points. When viewed in relative terms, the proportion of those choosing the 10-year payout *tripled*, while the proportion of those choosing the 5-year payout *doubled*.

Our results suggest that decision-framing plays a key role in explaining these results. Before the first modification in the application form in 2008, individuals had to choose a *specific* payout length between 5 and 20 years to opt out of the life annuity. The modified forms offered individuals the option of checking a box indicating a pre-specified payout term of 5 or 10 years. Checking a box requires less effort than deciding on a specific payout length, which might have induced some individuals to opt out of the default. At the same time, the checkbox might have been perceived as a recommended alternative to the default. The idea of “reason-based choice”, i.e., that individuals tend to gravitate towards choices that are easy to justify (Shafir et al., 1993) could also explain the persistent appeal of the highlighted fixed-term payout option.

A related interpretation is that new application forms reduced information costs for individuals who already knew about the existence of fixed-term payouts but lacked the capacity or motivation to understand the financial consequences of different decumulation strategies. Recall that the application forms specified the (higher) monthly payment under the highlighted fixed-term payout alongside that of the life annuity. The fact that the 2008 modification also caused the demand for 10-year payouts to fall,

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<sup>30</sup> Brown and Previtro (2014) show that procrastination is a manifestation of present-biased preferences. The tendency of older people to be less likely to annuitize than younger people is attributed by Schreiber and Weber (2016) to hyperbolic discounting.

although only by a few percentage points, provides some evidence in favour of this hypothesis.

A final interpretation is that these decisions were made hastily with limited attention to details beyond what was most salient, i.e., the checkbox on the front page of the application form. Like many other human decisions, payout options may be characterized by the so-called What You See Is All There Is (WYSIATI) bias, that is, relying on knee-jerk reactions and available information rather than deliberative thought (Kahneman, 2011). This interpretation suggests that the nudges increased awareness of the existence of the nudged payout, and not of fixed-term payouts in general. Although we cannot know for sure whether individuals who chose in line with the nudge meanwhile knew that there were other fixed-term payouts to choose from as well, the specificity of the nudge effects seems to support the WYSIATI interpretation.<sup>31</sup>

The heterogeneity analysis in the next section provides some interesting insights with respect to these results, although distinguishing between these explanations is empirically difficult.

### 5.2.1 Heterogeneous Effects

We study heterogeneous effects by gender and education level. For each outcome of interest, we extend Equation (1) to include several triple-difference estimates, one for each sub-group of interest.<sup>32</sup> The difference-in-difference estimate thus captures the treatment effect for a “reference group” while each of the “added effects” represents the

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<sup>31</sup> When interpreting the results, we should bear in mind that we are looking at the response of “passive” savers in the sense that they did not choose to move their capital from the default company, KPA. On the other hand, the control group may be viewed as the more easily nudged group because they might have switched to AMF in response to an advertisement campaign.

<sup>32</sup> Note that the triple-difference estimates include all levels and second-order interactions as controls, i.e.,  $KPA_c$ ,  $Post_m$ ,  $group_x$ ,  $KPA_c * Post_m$ ,  $Post_m * group_x$ , and  $KPA_c * group_x$ , where  $group_x$  is an indicator for a sub-group of interest.

difference in treatment effects for the relevant sub-group vis-à-vis the reference group.<sup>33</sup>

Panel B and D in Table 2 report the results of the heterogeneity analysis for the 2008 and 2011 modification, respectively.

We find that women are more responsive than men to the modifications in the application form. Relative to men, women were 6.3 percentage points more likely to choose the 5-year payout following the 2008 modification (Panel B, column 1). Similarly, women were 6.0 percentage points more likely than men to choose the 10-year payout following the 2011 modification (Panel D, column 2).

Table 2 also reveals significant differences with respect to education level. The estimates in Panel B show that while the highly educated were as likely as the less educated to move away from the life annuity following the 2008 modification, the highly educated were more likely than the less educated to opt for the fixed-term payout that was not highlighted in the modified application form, i.e., the 10-year payout. A similar pattern is seen in the 2011 modification in Panel D. While there was no difference between the highly educated and the less educated in the likelihood of choosing the 10-year payout, the highly educated were more likely than the less-educated to choose the 5-year payout.

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<sup>33</sup> The reference group is defined as married men whose DC KAP-KL pension capital is between the 25<sup>th</sup> and the 75<sup>th</sup> percentile, and who has no college degree. Note that we need a reference group to exploit the triple differences framework, and that the choice of a specific reference group is arbitrary. We also estimated heterogeneous effects for marital status and amount of DC KAP-KL pension capital; these estimates did not contribute much to the overall picture and are not included in the heterogeneity analysis.

Table 2: Effects on Payout Decisions

	5 yrs. (y/n)	10 yrs. (y/n)	Lifelong (y/n)
<i>Panel A: 2008 modification</i>			
Average effect, no controls	0.277***	-0.027**	-0.225***
Average effect, controls	0.274***	-0.028**	-0.220***
Baseline (pre KPA)	0.259	0.116	0.582
<i>Panel B: 2008 modification, heterogeneous effects</i>			
Reference group	0.303***	-0.022	-0.251***
<u>Added effects:</u>			
Women	0.063*	-0.023	-0.046
High education	-0.060*	0.048*	0.013
<i>Panel C: 2011 modification</i>			
Average effect, no controls	-0.287***	0.310***	-0.022
Average effect, controls	-0.286***	0.305***	-0.017
Baseline (pre KPA)	0.482	0.144	0.342
<i>Panel D: 2011 modification, heterogeneous effects</i>			
Reference group	-0.325***	0.340***	-0.016
<u>Added effects:</u>			
Women	-0.042	0.060*	-0.018
High education	0.073**	-0.018	-0.046

*Note: Robust standard errors: \* indicates  $p < 0.05$ ; \*\* indicates  $p < 0.01$ ; \*\*\* indicates  $p < 0.001$ . This table reports difference-in-difference estimates of the probability of choosing the payout option indicated in the column heading. Columns A and B report estimates from the 2008 modification nudging the 5-year payout, while columns C and D report estimates from the 2011 modification nudging the 10-year payout. The “reference group” estimate is a double difference estimate ( $KPA_c * Post_m = 1$ ). The “added effects” estimate on group  $x$  is a triple difference estimate ( $KPA_c * Post_m * group_x = 1$ ) that represents the difference in the modification effect vis-à-vis the reference group. The reference group is defined as married men whose DC KAP-KL pension capital is between the 25th and the 75th percentile, and who has no college degree. All levels and second-order interactions are included as controls. Controls include birth-month dummies, gender, marital status at age 64, education level, labour market sector, various measures of historical incomes such as sickness absence benefit income, and controls for pension capital (dummies for percentile*



*rank of less than p10, p10–p25, p75–p90, and greater than p90). There are 17,949 observations for the 2008 modification and 21,955 for the 2011 modification.*

We draw several tentative conclusions from these findings. First, our results provide further evidence that life expectancy did not play a key role in the payout decisions of these individuals. Women, who on average live longer than men, were more likely to choose the 5-year payout following the 2008 modification. Similarly, the highly educated, who should benefit more from payments over a longer period of time as they have longer life expectancies, were more likely than the less educated to choose the 5-year payout when the 10-year payout was nudged in 2011.

We also interpret these findings as suggestive evidence that the highlighted payout was interpreted as the recommended choice. Previous studies have shown that education level is positively related to both financial literacy (Almenberg and S  ve-S  derbergh, 2011) and knowledge about pensions (Gustman and Steinmeier, 2005), and that financial literacy is on average lower among women than men (Bucher-Koenen et al., 2017; Lusardi and Mitchell, 2008, 2011; Almenberg and S  ve-S  derbergh, 2011). Less informed individuals might be more likely to believe that the highlighted payout is the “best option,” and hence choose this option. More informed individuals may also be in a better position to evaluate the economic implications of different payout options on their own. In addition, women have been shown to be more receptive to informational interventions in other contexts (Bhargava and Manoli, 2015; Liebman and Luttmer, 2015).<sup>34</sup>

Another interpretation of the finding that the highly educated were more likely than the less educated to choose the fixed-term payout that was not highlighted in the

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<sup>34</sup> Agnew et al. (2008) and Bockweg et al. (2017) examine the effects of framing settings in annuity demand using a survey-based experiment. They find that both men and women respond to framing, but that they are responsive to different frames.

application forms is that the highly educated suffer less from the WYSIATI bias.

Although the overall awareness of fixed-term payouts seemed to have been low even among the highly educated (they were equally affected by the nudges in terms of opting out of the annuity), they may have paid more attention to details beyond what was most salient, i.e., the checkbox on the front page of the application.

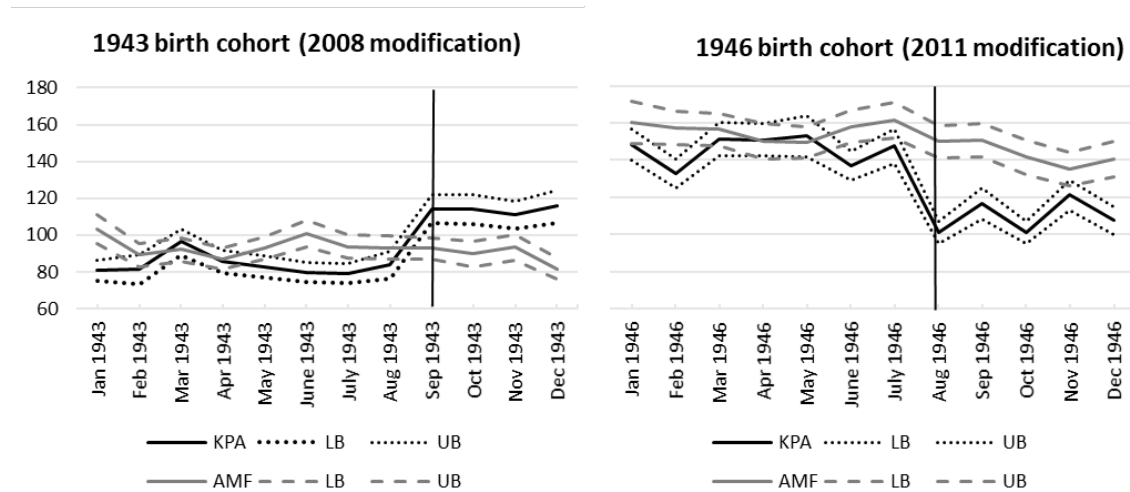
The observed differences with respect to education level might also be explained by a relatively larger reduction in information costs for individuals with low education. Mastrobuoni (2011) argues that the less educated have weaker incentives to gather information and might therefore be more susceptible to information that is made salient. An alternative explanation is that a 5-year payout is associated with a higher marginal tax than a 10-year payout, and hence choosing a 5-year payout is economically less favourable. We can only speculate about the relative importance of each of these explanations. Irrespectively of the interpretation, we conclude that the highly educated were significantly less responsive to the nudges.

### **5.3 Effects on Pension Income**

We also study the effects on pension income. We have data on three pension components: DC KAP-KL, total occupational pension (the sum of DC KAP-KL, DB KAP-KL, and any other occupational pension not directly affected by the modifications in the application form), and public pension. KPA's modifications in their application form might have had spillover effects on their clients' payout decisions in other pension plans, particularly if the clients were unaware of, or had little knowledge about, fixed-term payouts. Recall that mandatory annuitization applies to the public pension, meaning

that any effect on public pension income should reflect changes in the timing or extent of the withdrawal of the public pension.<sup>35</sup>

*Figure 4: Average Pension Income from DC KAP-KL (in 100s of SEK) of the Treatment (KPA) and Control (AMF) Groups, Age 66–67*



*Note: Pension income is expressed in 100s of SEK (USD 1  $\approx$  SEK 9) on an annual basis. The vertical lines indicate the first cohorts that receive the modified application form. LB and UB, respectively, stands for the lower and upper bounds of a 95-percent confidence interval around the mean.*

Figure 4 plots the average pension income from DC KAP-KL of the treatment and control groups before and after the 2008 and 2011 modifications in the application form. The income variables are expressed in 100s of SEK (USD 1  $\approx$  SEK 9). Despite some monthly fluctuations, these figures suggest that the treatment and control groups received similar levels of pension income from DC KAP-KL, on average, prior to the modifications. Following the 2008 modification, the average pension income of the treatment group rose, reflecting the increased demand for a 5-year payout and decreased demand for a life annuity. On the other hand, following the 2011 modification, the

<sup>35</sup> Public pension can be drawn in full or in part as 75, 50, or 25 percent of the whole; however very few choose partial withdrawal.

average pension income of the treatment group fell, reflecting the increased demand for a 10-year payout and decreased demand for a 5-year payout. The results of our estimations are shown in Table 3, column 1. The average DC KAP-KL pension income of the treatment group increased by SEK 3,460 following the 2008 modification and decreased by SEK 3,061 following the 2011 modification.

*Table 3: Effects on Pension Income and Labour Supply, Age 66–67*

	DC KAP-KL (100s SEK)	Total occupational pension (100s SEK)	Public Pension>0 (y/n)	Public Pension (100s SEK)	Labour inc.>2BA (y/n)	Labour income (100s SEK)
<i>Panel A: 2008 modification</i>						
Average effect, no controls	34.340***	50.888**	0.012	17.510	-0.045**	-59.320
Average effect, controls	34.595***	36.562*	0.012	11.918	-0.051***	-79.627
Baseline (pre KPA)	83.843	473.856	0.930	1339.291	0.322	956.983
<i>Panel B: 2008 modification, heterogeneous effects</i>						
Reference group	20.299*	-15.497	-0.023	-24.518	-0.023	106.384
<i>Added effects:</i>						
Women	12.929	95.560	0.022	21.776	0.016	-68.077
High education	11.006	4.286	0.012	-33.015	-0.074*	-128.967
<i>Panel C: 2011 modification</i>						
Average effect, no controls	-24.550***	-49.064**	-0.027***	-46.546**	0.026*	139.185**
Average effect, controls	-30.609***	-81.647***	-0.022**	-60.386***	0.015	7.9

Baseline (pre KPA)	146.122	606.125	0.914	1301.359	0.365	1105.945
<i>Panel D: 2011 modification, heterogeneous effects</i>						
Reference group	-35.657***	59.012	-0.022	-37.893	0.031	180.639
<u>Added effects:</u>						
Women	-6.613	-116.550**	0.006	0.581	-0.006	-98.766
High education	18.288**	-46.614	-0.024	-101.884***	0.049	116.475

Note: Robust standard errors: \* indicates  $p < 0.05$ ; \*\* indicates  $p < 0.01$ ; \*\*\* indicates  $p < 0.001$ . This

table reports difference-in-difference estimates of the probability of choosing the payout option indicated in the column heading. Columns A and B report estimates from the 2008 modification nudging the 5-year payout, while columns C and D report estimates from the 2011 modification nudging the 10-year payout. The “reference group” estimate is a double difference estimate ( $KPA_c * Post_m = 1$ ). The “added effects” estimate on group  $x$  is a triple difference estimate ( $KPA_c * Post_m * group_x = 1$ ) that represents the difference in the modification effect vis-à-vis the reference group. The reference group is defined as married men whose DC KAP-KL pension capital is between the 25th and the 75th percentile, and who has no college degree. All levels and second-order interactions are included as controls. Controls include birth-month dummies, gender, marital status at age 64, education level, labour market sector, various measures of historical incomes such as sickness absence benefit income, and controls for pension capital (dummies for percentile rank of less than  $p_{10}$ ,  $p_{10}-p_{25}$ ,  $p_{75}-p_{90}$ , and greater than  $p_{90}$ ). There are 17,949 observations for the 2008 modification and 21,955 for the 2011 modification.

We next examine whether the modifications in the application form affected individuals’ decisions regarding their other occupational pension plans. We estimate the effects on *total* occupational pension, again using the difference-in-difference specification. The estimates are presented in Table 3, column 2. As seen in Panel A, the introduction of the 5-year nudge in 2008 raised the average total occupational pension by SEK 3,656, which is only slightly larger than the SEK 3,460 increase in the DC KAP-KL pension income. These estimates suggest that the DC KAP-KL modifications had little spillover effects on other occupational pension plans.

Meanwhile, the introduction of the 10-year nudge in 2011 lowered the average total occupational pension by SEK 8,165. The corresponding decrease in DC KAP-KL pension income is only SEK 3,061. Unfortunately, we have limited data to further examine the nature of this “residual effect.” Nevertheless, we re-estimated difference-in-difference models for various sources of occupational pension income using the LISA database. Our estimates (not reported) suggest that most of the residual effect is accounted for by income from other pensions managed by KPA, which we interpret as primarily DB KAP-KL.<sup>36</sup>

Figure 5 plots the proportion of individuals who have claimed their public pension by the ages of 66 and 67. The treatment and control groups exhibit similar trends before the modifications; AMF clients are more likely to have claimed their public pension than KPA clients. Following the 2008 modification, the gap in public pension take-up between the treatment and control groups shrinks. On the other hand, following the 2011 modification, the gap between the treatment and control groups widens.

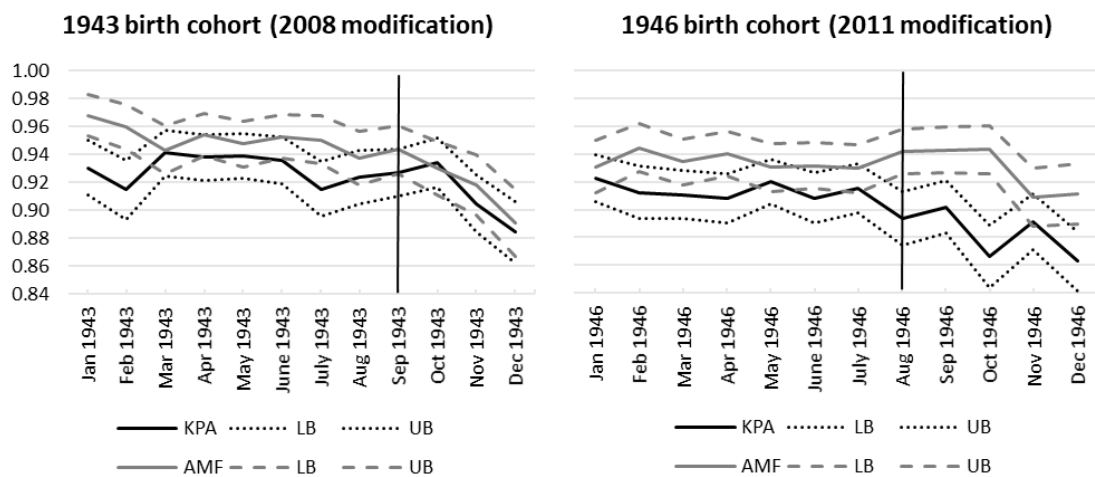
Figure 6 plots the public pension income of the treatment and control groups before and after the 2008 and 2011 modifications in the application form. Prior to the modifications, the treatment and control groups receive similar levels of public pension income and exhibit similar trends. While there is no discernible change following the 2008 modification, the gap between the treatment and control groups widens slightly following the 2011 modification.

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<sup>36</sup> Because LISA data only separates between pension payout from the largest pension companies, and not between components *within* a pension plan or different pension plans, we cannot truly evaluate whether the “residual” effect (on total occupational pension net of DC KAP-KL) is driven by an increase in the demand of longer payouts, partial withdrawals or later claiming in some other pension. However, since KAP-KL should be the main occupational pension for local government workers and the DB-part cannot be subject to longer or shorter payouts, we interpret the estimates as individuals delaying their DB pension as a result of the 2011 reform.

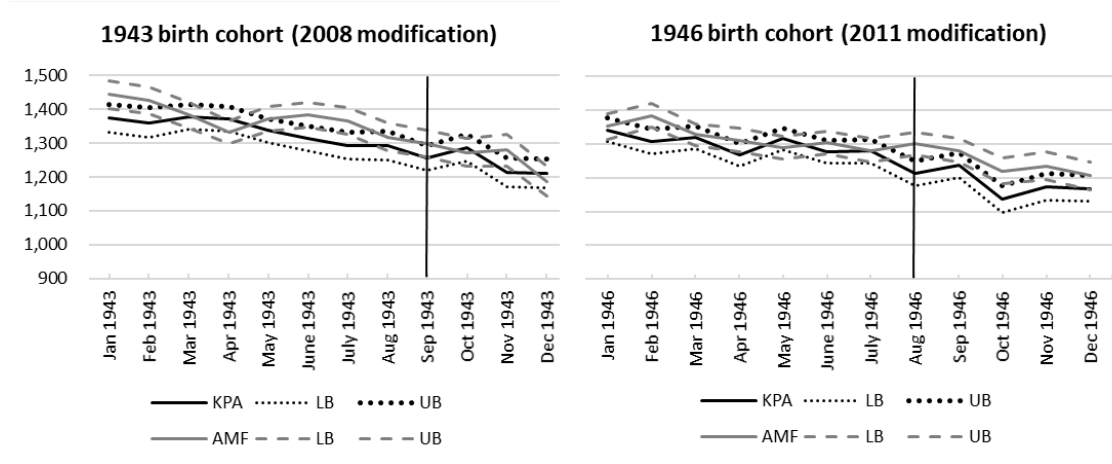
The difference-in-difference estimates of the extensive and intensive margins of public pension income are shown in columns 2 and 3 of Table 3, respectively. The public pension effects of the 2008 modification are statistically insignificant. As for the 2011 modification, the probability of having claimed the public pension by the ages of 66 and 67 decreased by 2.2 percentage points, from a baseline of 91 percent. The intensive margin result shows that, on average, public pension decreased by SEK 6,039.

*Figure 5: Share of the Treatment (KPA) and Control (AMF) Groups who have Claimed their Public Pension by Age 66–67*



*Note: The vertical lines indicate the first cohorts that receive the modified application form. LB and UB, respectively, stands for the lower and upper bounds of a 95-percent confidence interval around the mean.*

Figure 6: Average Public Pension Income (in 100s of SEK) of the Treatment (KPA) and Control (AMF) Groups, Age 66–67



Note: Public pension income is expressed in 100s of SEK (USD 1  $\approx$  SEK 9) on an annual basis. The vertical lines indicate the first cohorts that receive the modified application form. LB and UB, respectively, stands for the lower and upper bounds of a 95-percent confidence interval around the mean.

#### 5.4 Spillover Effects on Labour Supply

In this section, we examine the spillover effects of the modifications in the application form on labour supply. As discussed in Section 2.3, fixed-term payouts should be more attractive to individuals who discount future incomes at a higher rate. The higher the subjective discount rate, the higher is the perceived value of a fixed-term payout relative to a life annuity. Some individuals may therefore get the perception that, by choosing a fixed-term payout they can achieve a similar/higher level of consumption while having more/unchanged leisure hours. We therefore hypothesize that increasing the salience of a larger monthly payout over a shorter period may raise the perceived opportunity cost of working and induce some individuals to substitute labour income with pension income.

Although both application forms nudged a fixed-term payout, we expect the two modifications to have opposite effects on labour supply. The 2008 modification nudged



individuals from a life annuity to a 5-year payout, while the 2011 modification nudged individuals from a 5-year payout to a 10-year payout. Consequently, we expect the 2008 nudge to decrease labour supply, and the 2011 nudge to increase labour supply.

We model labour income both as a continuous variable and as a dummy variable that equals one if labour income is above a particular threshold. In our main specifications, we define an individual as “actively working” if his or her annual labour income exceeds 2 price base amounts (about SEK 90,000 or USD 10,000). The results are, however, robust for alternative income thresholds.<sup>37</sup> We refer to income as a continuous variable as the “intensive margin” and income exceeding a particular threshold as the “extensive margin.”

Figures 7 and 8 plot the average series for the extensive and intensive margin of labour supply, respectively, for the treatment and control groups before and after the 2008 and 2011 modifications. Across all birth-month cohorts, the treatment group (KPA) has higher labour income than the control group (AMF). We again observe that treatment and control groups exhibit similar trends prior to the modification, although there are some monthly variations.

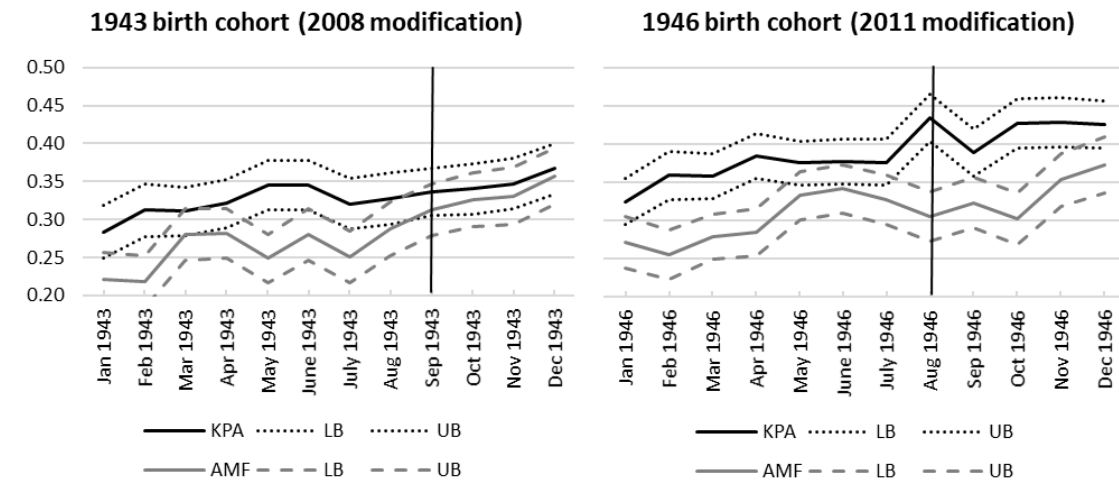
Following the 2008 modification, the gap between treatment and control groups shrinks. The decline in labour earnings for the treatment group, relative to the control group, suggests that the nudge from the life annuity towards the 5-year payout reduced labour supply at the ages of 66 and 67. Conversely, the gap between treatment and control groups widens following the 2011 modification. The increase in labour earnings for the treatment group, relative to the control group, suggests that the nudge from the 5-year

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<sup>37</sup> Instead of a threshold of 2 price base amounts, we also used 0.5, 1, and 3 price base amounts as alternative thresholds (approximately SEK 22,000, SEK 45,000, and SEK 135,000, respectively, or USD 2,500, USD 5,000, and USD 15,000, respectively). See Table A4 in the Appendix for estimation results.

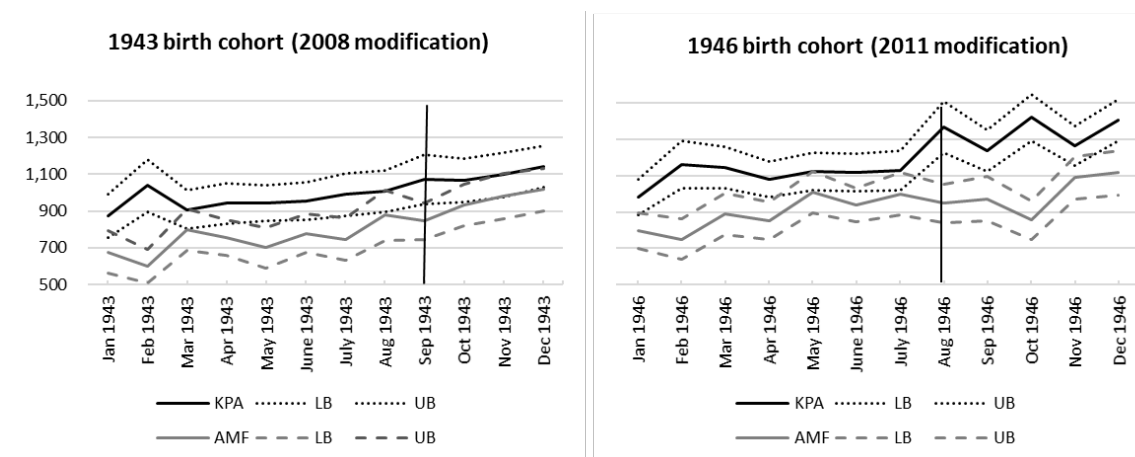
payout towards the 10-year payout induced individuals to continue working at the ages of 66 and 67.

*Figure 7: Share of the Treatment (KPA) and Control (AMF) Groups with Labour Earnings Greater than 2 Price Base Amounts, Age 66–67*



*Note: 1 price base amount (BA) is equal to SEK 44,800 (USD 1  $\approx$  SEK 9). The vertical lines indicate the first cohorts that receive the modified application form. LB and UB, respectively, stands for the lower and upper bounds of a 95-percent confidence interval around the mean.*

*Figure 8: Average Labour Earnings (in 100s of SEK) of the Treatment (KPA) and Control (AMF) Groups, Age 66–67*



*Note: Labour income is expressed in 100s of SEK (USD 1  $\approx$  SEK 9) on an annual basis. The vertical lines indicate the first cohorts that receive the modified application form. LB and UB, respectively, stands for the lower and upper bounds of a 95-percent confidence interval around the mean.*

Table 3 presents the results on labour supply. The results for the extensive margin (labour income > 2 BA) and intensive margin (100s of SEK) measures of labour supply at the ages of 66 and 67 are reported in columns 4 and 5, respectively. The increased demand for 5-year payouts induced by the 2008 modification decreased labour supply on the extensive margin. Given an average probability of having wage income above 2 price base amounts of 32 percent, the point estimate of -0.051 is sizable (15.8 percent).<sup>38</sup> The intensive margin estimate reflects an average decrease in annual labour income of SEK 7.963 (-8.3 percent); however this estimate is insignificant.

It is informative to express the labour supply estimates in terms of elasticities. Relating the percentage change in the extensive margin measure of labour supply (-15.8 percent) to the percentage change in total pension income (i.e., the sum of occupational and public pension income), we obtain an elasticity close to -6.<sup>39</sup> Using the intensive margin estimate instead, the percentage change in labour income is about three times as large as the percentage change in total pension income, i.e., people reduced their labour income by three dollars for every dollar increase in total pension income.

As for the 2011 modification, which increased the demand of 10-year payouts, we see an indication of increased labour supply, i.e. labour income above 2 BA and continuous labour income (although these estimates are not statistically significant when the full set of controls is included) and a negative effect on the take-up of public pensions (which is

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<sup>38</sup> As mentioned, the results are robust for alternative definitions of the extensive margin of labour supply; see Table A4 in the Appendix.

<sup>39</sup> This elasticity is calculated based on the estimates from the full set of controls in 2008, as shown in Table 3:  $[-0.051/0.322]/[(36.562 + 11.918)/(473.856 + 1339.291)] = -15.8\%/2.7\% = -5.9$ .

statistically significant). Thus, the empirical results of the analyses of the 2008 and 2011 modifications appear to support our hypothesis that increasing the salience of a larger monthly payout over a shorter period may induce some individuals to substitute labour income with pension income.

To further strengthen the validity of our empirical approach, in addition to the graphical analysis above, we perform several placebo tests for the 1944 and 1947 birth cohorts who experienced no changes in the application form. Reassuringly, as shown in Table A5 in the Appendix, the placebo difference-in-difference estimates are, in all cases but one, insignificant and close to zero. We also examine the direct relationship between payout decisions and labour supply. Specifically, Table A6 in the Appendix presents means of our extensive margin measure of labour supply and public pension variables by treatment status and payout decision. In short, these results confirm that labour supply is related to payout decisions, and that the modifications in KPA's application form affect the relative labour supply across these payouts.<sup>40</sup>

One possible concern is that the narrowing gap in 2008 may be due to the financial crisis differentially affecting the employment prospects of KPA and AMF workers. However, the financial crisis had a marginal impact on public sector employment, and statistics on layoffs suggest that the increase in layoffs in the public sector came later in 2009. Another concern is that the control group, who moved their pension capital to the default company for blue-collar workers (AMF), might have previously worked in the private sector, and might consequently be currently employed in jobs with greater ties to

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<sup>40</sup> Among AMF clients, labour supply is highest among those who choose 10-year payouts, followed by those who choose 5-year payouts, and then those who choose life annuities. Importantly, this relative ranking does not change across pre- and post-modification cohorts. Among KPA clients, the pre-modification pattern is slightly different. Labour supply is highest among those who choose 5-year payouts followed by the two other groups. After the 2008 modification, however, those who choose the 5-year payout work the least. And after the 2011 modification, those who choose the 10-year payouts work the least. Thus, labour supply at age 66–67 seems to be negatively related to the probability of responding to the nudge.

the private sector. However, we know from Table 1 that a very small percentage of these individuals work in the private sector (less than 10 percent at age 55 for both groups among the 1943 cohort). The financial crisis should therefore not have affected involuntary job loss differentially in the two groups due to differences in private sector exposure.

#### **5.4.1 Heterogeneous Effects**

Next, we perform a heterogeneity analysis for pension income and labour supply. Panel B and D in Table 3 report the results for the 2008 and 2011 modifications, respectively.

The results show that the extensive margin effect on labour supply of the increased demand of 5-year payouts is driven by the highly educated. The point estimate of the interaction term for high education in column 5 of Panel B reflects an increased probability of exiting the labour force of about 7 percentage points. We also see from column 4 in Panel D that the negative effect on public pension of the increased demand for 10-year payouts in 2011 is also entirely driven by the highly educated.<sup>41</sup>

This finding that the highly educated were most likely to adjust their labour supply seems at odds with the observation that the highly educated were less likely than the less educated to choose the nudged payout. We see three potential reasons that could reconcile these findings. First, highly educated workers may have jobs that allow for more flexibility in the timing of retirement. Second, the highly educated likely have more flexibility in income that enables them to afford a lower monthly pension and early retirement. Third, although the highly educated were less likely to choose the nudged payout, they were not significantly less affected than others in terms of pension income,

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<sup>41</sup> As a robustness check, Table A7 in the Appendix reports means of the extensive margin measure of labour supply by treatment status and education level. The raw difference-in-difference estimates for the highly educated and less educated amount to -0.08 and -0.02, respectively, indicating that the observed labour supply response is indeed driven by the highly educated.

and therefore had similar leeway, at least in absolute terms, to adjust their labour supply, as shown in the first two columns in Panel B, where both interaction terms for high education are insignificant and close to zero. One mitigating factor in this context was that the highly educated were more likely to choose the fixed-term payout that was not being highlighted in the first modification, i.e., the 10-year payout. In other words, they were thus equally affected by the modification in the application form in terms of *not* choosing the life annuity.

## **6 Conclusion**

We study the effects of two exogenous modifications in the Swedish pension system application form that nudged individuals towards a certain fixed-term payout. We examine both the effects on individuals' payout decisions and the spillover effects on other pensions and labour supply. We match administrative data on actual payout decisions from two large pension companies with rich demographic and financial history data from Statistics Sweden's longitudinal registers.

The 2008 modification in the application form nudged individuals from a life annuity to a 5-year payout, while the 2011 modification nudged individuals from a 5-year payout to a 10-year payout. We evaluate the effects of the two modifications using a difference-in-difference framework. The control group comprises local government workers of the same age who belong to the same pension plan but who had chosen a different pension company, and therefore experienced no change in their application form. The average accumulated capital stock at stake in the payout decision in the treatment group was close to USD 11,000.

The 2008 modification more than doubled the share choosing a 5-year payout, while the 2011 modification tripled the share choosing a 10-year payout. In both cases, women

and those with less education were more likely to respond to the nudge. Given the persistent appeal of the highlighted payout option, the response to these nudges may be driven by a combination of strong preferences for more money now and a tendency to gravitate towards salient and easy choices. The latter phenomenon may be driven by individuals interpreting the highlighted payout as the recommended choice. On the other hand, responding to the nudge may be the outcome of a less deliberative thought process. These payout decisions may have been made hastily with limited attention to details beyond what was most salient, i.e., the checkbox for the fixed-term payout on the front page of the application form. Both explanations likely have merit; however, we are unable to empirically distinguish between the two explanations in this analysis.

We then show that this substantial change in demand for 5-year payouts had negative and significant spillover effects on individuals' labour supply after the normal retirement age, i.e., at age 66–67. A higher pension benefit, although payable only for a limited number of years, may raise the perceived opportunity cost of working, and make the decision to leave the labour market more attractive. While 2011 modification nudging a 10-year payout did not significantly affect labour supply, it delayed the claiming of public pension and other occupational pensions.

Our study makes several important contributions to the existing literature. First, it provides quasi-experimental evidence of the effect of nudging on decisions on pension payouts. Second, it contributes directly to the strand of the nudge literature that focuses on retirement by studying decisions close to retirement. Third, it provides evidence of spillover effects of nudging interventions in the labour market domain for up to two years after the initial nudge. Fourth, this study contributes to the literature on the annuity market participation puzzle. We propose that individuals choose to withdraw their pensions over a short period of time instead of annuitizing, to be able to reduce their

labour supply and retire early. We also show that the annuitization rate falls when other payout options are made more salient.

This study also provides important lessons for policy. First, the study shows that easily implemented nudges in application forms have substantial, direct effects on annuitization decisions, as well as spillover effects on other retirement related decisions, including labour supply. Such application forms and choice platforms are, as in our study, in many cases designed by actors in the private pension managing industry with, perhaps, goals other than prolonging labour supply. Second, the study demonstrates that more liquid payout options could have negative effects on the actual retirement age. Although Sweden no longer has any official retirement age, several occupational pension systems set 65 as the typical age for claiming pension. How to increase labour supply among individuals who are older than 65 is a challenge for governments that wish to increase the overall retirement age. Our results are relevant for such policies as we examine labour market and pension choices of workers beyond the normal pension-claiming age of 65.

The spillover effects on labour supply is one aspect of the overall welfare effects of nudging individuals to shorter pension payment terms. Another relevant aspect of welfare is the issue of regret. Individuals who were nudged to take up the shorter payment term may have regretted their choice when they realize that their pension income will fall at the end of the term. Many individuals probably made decisions on pension payouts without much prior thought and with limited understanding of the long-term economic implications. Brown et al. (2016) find that individuals who were nudged into a program were more likely to regret their decision. Understanding the impact of less binding nudges, such as information nudges, on regret is an avenue for future research.



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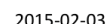
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Figure A1: An Example of KPA's Application Form after the Modification in August 2011



*Table A1: Descriptive Statistics for the 1943 Cohort (2008 Modification) (Panel A), and the 1946 Cohort (2011 Modification) (Panel B)*

	Treatment (KPA)		Control (AMF)	
	Pre	Post	Pre	Post
<i><u>Panel A: 2008 modification</u></i>				
5 yrs. (y/n)	0.26	0.54	0.17	0.18
10 yrs. (y/n)	0.12	0.09	0.11	0.11
Life annuity (y/n)	0.58	0.35	0.72	0.72
DC KAP-KL	83.84	113.73	93.87	89.43
Total occupational pension (100s SEK)	473.86	480.54	477.65	433.44
Public pension > 0 (y/n)	0.93	0.91	0.95	0.92
Public pension (100s SEK)	1,339.29	1,241.70	1,375.26	1,260.16
Labour income > 2BA (y/n)	0.32	0.35	0.26	0.33
Labour income (100s SEK)	956.98	1093.93	744.97	941.24
Number of Observations	6,357	3,454	5,380	2,758
<i><u>Panel B: 2011 modification</u></i>				
5 yrs. (y/n)	0.48	0.20	0.22	0.22
10 yrs. (y/n)	0.14	0.45	0.15	0.14
Life annuity (y/n)	0.34	0.32	0.63	0.64
DC KAP-KL	146.12	109.41	155.95	143.79
Total Occ.pens	606.13	495.88	547.73	486.54
Publ. Pens>0 (y/n)	0.91	0.88	0.93	0.93
Publ. Pens	1301.36	1186.56	1319.37	1251.12
Labour income>2BA (y/n)	0.37	0.42	0.30	0.33
Labour income	1105.95	1340.83	898.09	993.79
<b>Number of observations</b>	<b>7291</b>	<b>4947</b>	<b>5873</b>	<b>3844</b>

*Note: The sample comprises local government workers born in 1943 (Panel A) and in 1946 (Panel B) who claimed their occupational pension (DC KAP-KL) from either KPA (treatment group) or AMF (control group). The continuous income variables (e.g., labour income) are expressed in 100s of SEK (USD 1 ≈ SEK 9) on an annual basis. 1 price base amount (BA) is equal to SEK 44,800. All incomes are in 2016 price level. The outcomes are on an annual basis at age 66–67.*

Table A2: Money's Worth Ratios (MWR) of Different Payout Options

	MW Life/5 yrs.			MW Life/10 yrs.			MW 10 yrs./5 yrs.		
	All	Women	Men	All	Women	Men	All	Women	Men
r=0%	1.12	1.23	1.04	1.06	1.16	0.99	1.05	1.06	1.04
r=0.5%	1.07	1.17	1.00	1.03	1.12	0.97	1.04	1.05	1.03
r=1%	1.02	1.12	0.96	0.99	1.08	0.94	1.03	1.04	1.02
r=1.5%	0.98	1.07	0.92	0.96	1.04	0.92	1.02	1.02	1.01
r=2%	0.94	1.02	0.89	0.94	1.01	0.89	1.00	1.01	1.00
r=2.5%	0.90	0.97	0.86	0.91	0.97	0.87	0.99	1.00	0.99
r=3%	0.87	0.93	0.83	0.89	0.94	0.85	0.98	0.99	0.98
r=3.5%	0.84	0.90	0.80	0.86	0.92	0.83	0.97	0.98	0.97

*Note: This table reports calculations of the money's worth ratio (MWR) for the life annuity vs. the 5-year payout, the life annuity vs. the 10-year payout and the 10-year payout vs. the 5-year payout. The MWR is defined as the ratio of the expected present discounted value of the two payout options in question. A value larger than one implies that the payout in the numerator is worth more than the payout in the denominator. The MWR is calculated for different discount rates and for men and women, separately, using gender-specific mortality tables from Statistics Sweden (Statistics Sweden, 2013). The MWR is calculated for a customer at KPA who claims his/her pension at age 65 in 2008.*

Table A3: P-values from Separate F-tests of the Null Hypothesis that Cohort Trends are Parallel for the Pre-Modification Cohorts.

<u>Outcomes 66 –67 (annual):</u>	2008 pre-modification cohorts (born between January and August 1943)	2011 pre-modification cohorts (born between January and July 1946)
5 yrs. (y/n)	0.7944	0.5501
10 yrs. (y/n)	0.2417	0.0723
Life annuity (y/n)	0.3772	0.0833
DC KAP-KL	0.4088	0.8563
Total occupational pension (100s SEK)	0.3068	0.8492
Public pension > 0 (y/n)	0.3630	0.8245
Public pension (100s SEK)	0.8600	0.2597
Labour income > 2BA (y/n)	0.7898	0.0981
Labour income (100s SEK)	0.3157	0.0579

*Table A4: Average Effects of 2008 and 2011 Modifications on Labour Income and Public Pension at Age 66–67 using Alternative Definitions of Labour Supply.*

	Labour income > 2BA (y/n) (repeated from Table 3)	Labour income > 0.5BA (y/n)	Labour income > 1BA (y/n)	Labour income > 3BA (y/n)
<i>Panel A: 2008 modification</i>				
Average effect, no controls	-0.045**	-0.050**	-0.048**	-0.041**
Average effect, controls	-0.051***	-0.058***	-0.055***	-0.047***
<i>Averages by group:</i>				
KPA Post	0.347	0.478	0.423	0.300
KPA Pre	0.322	0.460	0.403	0.266
AMF Post	0.331	0.458	0.400	0.279
AMF Pre	0.261	0.390	0.332	0.204
<i>Panel B: 2011 modification</i>				
Average effect, no controls	0.026*	0.028*	0.026	0.037**
Average effect, controls	0.015	0.020	0.018	0.025*
<i>Averages by group:</i>				
KPA Post	0.421	0.554	0.497	0.362
KPA Pre	0.365	0.495	0.441	0.298
AMF Post	0.330	0.470	0.411	0.272
AMF Pre	0.301	0.439	0.381	0.245

*Note: Robust standard errors: \* indicates  $p < 0.05$ ; \*\* indicates  $p < 0.01$ ; \*\*\* indicates  $p < 0.001$ . 1 price*

*base amount (BA) is equal to SEK 44,800 (USD 1  $\approx$  SEK 9). There are 17,949 observations in 2008, and 21,955 observations in 2011. “Controls” include the same variables as in Table 3.*

*Table A5: Placebo Effects on Public Pension and Labour Supply*

	Public pension > 0 (y/n)	Public pension (100s SEK)	Labour income > 2BA (y/n)	Labour income (100s SEK)
<i>Panel A: 2009 placebo modification (1944 cohort)</i>				
No controls	0.00	12.588	-0.001	1.347
Controls	0.001	-12.073	-0.011	-46.865
<i>N</i>	19,728	19,728	19,728	19,728
<i>Panel B: 2012 placebo modification (1947 cohort)</i>				
No controls	-0.005	-22.113	0.004	0.775
Controls	-0.004	-31.271*	-0.001	-23.228
<i>N</i>	23,092	23,092	23,092	23,092

*Note: This table reports difference-in-difference estimates from estimating equation (1) using data from two years in which the application form was unchanged. The placebo treatment for 2009 is assumed to affect clients of KPA who turned 65 on or after September 2009, while the placebo treatment for 2012 is assumed to affect clients of KPA who turned 65 on or after August 2012. Robust standard errors: \* indicates  $p < 0.05$ ; \*\* indicates  $p < 0.01$ ; \*\*\* indicates  $p < 0.001$ . “Controls” include the same variables as in Table 3. The continuous income variables (e.g., labour income) are expressed in 100s of SEK (USD 1  $\approx$  SEK 9) at an annual basis. 1 price base amount (BA) is equal to SEK 44,800 SEK.*

*Table A6: Averages of Labour Income Exceeding 2 BA and Strictly Positive Public Pension by Payout Choice and Treatment Status*

<b>Variable: Labour income &gt; 2 BA</b>			
<i>Panel A: 2008 modification</i>			
	5 yrs.	10 yrs.	Life annuity
KPA pre	0.366	0.302	0.304
KPA post	0.325	0.397	0.367
AMF pre	0.307	0.348	0.236
AMF post	0.398	0.442	0.298
<i>Panel B: 2011 modification</i>			
	5 yrs.	10 yrs.	Life annuity
KPA pre	0.304	0.425	0.426
KPA post	0.451	0.374	0.459
AMF pre	0.342	0.383	0.267
AMF post	0.367	0.436	0.293
<b>Variable: Public pension &gt; 0</b>			
<i>Panel C: 2008 modification</i>			
	5 yrs.	10 yrs.	Life annuity
KPA pre	0.914	0.936	0.936
KPA post	0.925	0.843	0.911
AMF pre	0.950	0.913	0.957
AMF post	0.890	0.874	0.936
<i>Panel D: 2011 modification</i>			
	5 yrs.	10 yrs.	Life annuity
KPA pre	0.951	0.879	0.879
KPA post	0.900	0.906	0.841
AMF pre	0.934	0.910	0.940
AMF post	0.912	0.888	0.946



*Table A7: Proportion with Labour Income Exceeding 2 BA by Education Level and Treatment Status for the 2008 Modification*

	Treatment (KPA)		Control (AMF)		Raw DiD
	Pre	Post	Pre	Post	
High	0.414	0.418	0.336	0.426	-0.085
education					
Low	0.231	0.278	0.200	0.263	-0.016
education					

*Note: No controls. "Raw DiD" is (KPA Post – KPA Pre) – (AMF Post – AMF Pre).*