Pension and Entrepreneurship: Evidence from Sweden's Transition from Defined Benefit to Defined Contribution*

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August 2026

Abstract

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Keywords: Entrepreneurship, Pension Reform, Defined Benefit, Defined Contribution, Downside Risk, Occupational Choice.
JEL Classification: L26, J26, J24, H55, D15.

*__Acknowledgments.__ We are greatly indebted for comments and constructive suggestions to Isaac Hacamo, Jing Zhang, Caihong Xu, and seminar participants at Deakin University, Stockholm University, Central University of Finance and Economics, and Shenzhen Technology University, for their helpful comments and discussions.

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1 Introduction

The importance of entrepreneurship in promoting innovation and economic growth has been recognized since at least Schumpeter (1942). Not surprisingly, governments in many countries seek to foster entrepreneurship through policies such as easier access to credit, tax incentives, and subsidized programs. However, entrepreneurship remains one of the riskiest career choices and often results in significant wealth loss (e.g., Hall and Woodward, 2010). In practice, very few people would give up stable employment to pursue risky ventures (Hou, Jonsson, Li, and Ouyang, 2025). This reluctance is further amplified by the fact that a steady and uninterrupted career would normally yield substantial pension benefits upon retirement.

A popular perception is that young people are the primary undertakers of entrepreneurship, reinforced by well-known examples such as Bill Gates, Steve Jobs, and Mark Zuckerberg, who founded highly successful companies in their early 20s. Debunking this conventional wisdom, Azoulay, Jones, Kim, and Miranda (2020) show that successful entrepreneurs are typically middle-aged rather than young; conditional on firm entry in the United States, a 50-year-old entrepreneur is twice as likely to achieve high-growth outcomes as a 30-year-old. A similar pattern is observed in Sweden, where the median age of first-time entrepreneurs increased from 46 in 1990 to 52 in 2020, indicating a shift toward later-life entrepreneurial entry. These patterns suggest that, for middle-aged individuals, institutional factors—particularly pension incentives—may play an important role in shaping the decision to transition to entrepreneurship. This is especially relevant given that over the past few decades many countries have undertaken substantial reforms to their pension systems, profoundly altering employees' occupational and retirement choices. Yet, the role of pension systems in influencing entrepreneurial entry remains largely overlooked.

This paper fills this gap by examining the extent to which pension designs and pension reforms affect employees' decisions to become entrepreneurs. In particular, we focus on a sweeping pension reform in Sweden, a famous welfare state. In 1999, the Swedish parliament began reforming the public old-age pension system. The reform replaced the old Defined Benefit (DB) plan with a pay-as-you-go (PAYG) Notional Defined Contribution (DC) scheme. Under the DB formula, an employee's pension amount depends primarily on i) the average earnings of the 15 highest-earning years of her career and ii) whether she has contributed to the pension system for at least 30 years. Under the DC formula, pension rights accrue in proportion to annual pensionable earnings at a total contribution rate of 18.5%, with 16% to a notional PAYG account and 2.5% to an individually funded account. In essence, the old DB regime generates ratchet effects that incentivize employees to remain with their employers to accumulate 30 years of employment and reach the "best 15 years" before retirement. In contrast, under the new DC regime, pension rights accrue in proportion to lifetime contributions, so career breaks and late-career occupational changes affect pension benefits primarily through their effects on total pensionable earnings rather than through best-years or contribution-duration requirements (Palmer, 2000; Banks, Blundell, and Emmerson, 2005). This contrast is especially relevant for entrepreneurship, which entails significant downside risks.

We motivate our analysis by developing a stylized model that illustrates how pension design affects occupational choice—namely, whether individuals remain salaried employees or become entrepreneurs—to derive testable predictions. The model predicts that the reform has larger effects for individuals whose career paths expose them to greater downside income risk and for those with lower baseline earnings. Entrepreneurship generates volatile income realizations, and under the DB system, such income interruptions translate into disproportionately large pension losses. The

new DC system reduces this penalty by compressing downside pension risk while preserving a strong link between employment earnings and retirement wealth. Consistent with this mechanism, the increase in entrepreneurship is concentrated among individuals facing greater income volatility and labor market uncertainty, particularly among the unemployed and workers who have experienced job transitions. The response is also stronger among low-income individuals, for whom the reform's downside protection represents a large improvement in retirement security. By contrast, individuals in stable employment, whose income paths are already predictable and whose financial buffers are larger, exhibit smaller responses.

We use Swedish administrative data to study the impact of this reform on employees' entrepreneurial decisions. Using administrative data from Statistics Sweden, we track the career trajectory from 1996 to 2002 of all individuals born between 1936 and 1955. Our identification strategy is to exploit the quasi-experimental variation in exposure to the new DC pension system across birth cohorts. Cohorts born in 1937 or earlier remain entirely under the old system, cohorts born between 1938 and 1953 are partially covered, and cohorts born in 1954 or later are fully covered. The reform was phased in across birth cohorts to mitigate its impact on individuals close to retirement (Palmer, 2000; Palme and Laun, 2021). In particular, individuals born in 1938 were the first to partially transition to the new system, with 20% of their pension benefits determined under the DC scheme and 80% under the DB scheme. For each subsequent birth cohort, the DC share increased by five percentage points, reaching full coverage for cohorts born in 1954.[1]

Figure 1 provides descriptive evidence on the relationship between age and entrepreneurial entry before and after the reform. The figure plots regression coefficients from a parsimonious model that includes a full set of age dummies (ages 25–65), estimated separately for the pre-

[1] See Section 2 for a detailed description of the pension reform and the construction of the affected cohorts.

reform and post-reform periods. We can see from the figure that the age profile of entrepreneurial entry is largely similar across periods at younger ages, but a clear divergence emerges after age 50, with individuals aged 50 and above significantly more likely to enter entrepreneurship in the post-reform period. These patterns suggest that the reform had heterogeneous effects on entrepreneurial entry across cohorts and age groups.

[Insert Figure 1 about here]

We proceed to examine the effect of the reform using a difference-in-differences approach. We find that the reform leads to a statistically and economically significant increase in entrepreneurship. Cohorts with greater exposure to the DC system experience significantly larger post-1999 increases in entrepreneurial entry than less-exposed cohorts. In our baseline estimates, moving from zero to full exposure raises the probability of entering entrepreneurship between 0.6 and 1.1 percentage points, corresponding to roughly an 8 to 15 percent increase relative to the sample mean. These results are robust to a variety of demographic and household controls, alternative cohort windows, and specifications with individual fixed effects, and are further corroborated by validation exercises using narrow-cohort comparisons. A dynamic analysis based on these cohort comparisons reveals no differential pre-trends and a clear divergence only after the reform, reinforcing a causal interpretation.

We further show that the reform does not merely generate transitory or low-quality entry. Firms founded by more-exposed cohorts exhibit higher survival rates and stronger operating performance, indicating that the reform affects both the quality and the quantity of entrepreneurial activity. Moreover, individuals with entrepreneurial experience do not suffer pension penalties at retirement. We find that greater exposure to the new system is associated with higher pension income later in

life, particularly for individuals with prior entrepreneurial experience. These findings suggest that the reformed pension system accommodates, rather than discourages, risky career paths and highlight how pension institutions influence occupational choice by reshaping the long-term risk-return trade-off of entrepreneurship. Overall, our study reveals that a flexible pay-as-you-go DC pension system can promote entrepreneurship.

Our paper makes several contributions to the literature on entrepreneurship, social insurance, and life-cycle risk. First, we identify public pension design as a novel and economically meaningful determinant of entrepreneurial activity. A large literature examines the drivers of entrepreneurship, emphasizing capital constraints and collateral channels (Evans and Jovanovic, 1989; Hurst and Lusardi, 2004; Adelino, Schoar, and Severino, 2015; Schmalz, Sraer, and Thesmar, 2017), entry regulation and institutional barriers (Klapper, Laeven, and Rajan, 2006; Bruhn, 2011), labor market shocks and unemployment insurance (Hombert, Schoar, and Sraer, 2020; Catherine, 2022; Hou et al., 2025), and the roles of knowledge, networks, and prior experience (Giannetti and Simonov, 2009; Kerr, Nanda, and Rhodes-Kropf, 2014; Chatterji, 2009). While these studies focus on contemporaneous financial frictions, regulatory barriers, or short-run labor market conditions, we instead highlight a long-horizon institutional mechanism: the mapping from lifetime earnings to retirement wealth embedded in the public pension system. We show that pension design affects entrepreneurship not through credit access or taxation but by altering how income volatility and career interruptions translate into retirement wealth. To our knowledge, this is the first study to provide robust evidence that public pension design—through its life-cycle earnings-to-retirement mapping—affects entrepreneurial entry decisions.

Second, we contribute to the literature on entrepreneurial risk-taking by uncovering a long-term risk-allocation channel. Existing work shows that unemployment insurance and related programs

can stimulate entrepreneurship by mitigating short-run income risk (Hombert et al., 2020; Catherine, 2022). Using Swedish administrative data, Hou et al. (2025) provide causal evidence that an exogenous increase in unemployment risk following a reform of employment protection law increases employees' transition into entrepreneurship. We complement this literature by showing that pension systems operate as a form of long-horizon income insurance. Under the pre-reform DB regime, pension entitlements were disproportionately sensitive to late-career earnings, amplifying the long-term cost of entrepreneurial income volatility. The reform compresses downside pension risk and strengthens the link between cumulative lifetime earnings and retirement wealth. As a result, the reform increases the risk-adjusted lifetime payoff to entrepreneurship by reducing downside risk in retirement. Our heterogeneous results are consistent with this mechanism: the reform effect is stronger among individuals facing higher income volatility, unemployment risk, and tighter household constraints, and weaker among those in more stable employment. These findings demonstrate that pension design influences entrepreneurial risk-taking by altering the long-term mapping from income to retirement wealth.

Third, we contribute to the literature on the consequences of entrepreneurship. Prior work studies firm performance, survival, and growth (e.g., Kerr et al., 2014; Azoulay et al., 2020), as well as the long-term earnings and wealth consequences of entrepreneurial careers (e.g., Hall and Woodward, 2010). We extend this literature by tracing a single institutional change through the full arc of an entrepreneurial career, from entry to firm outcomes to retirement. Among newly established sole proprietorships, firms founded by more exposed cohorts survive longer and are more likely to reach the two-, four-, and six-year horizons; they also employ more workers and generate higher net sales, operating profits, and owners' equity over their first three years. The reform therefore induces durable business formation rather than marginal or short-lived entry—an important dis-

tinction, since policies that lower the barrier to entry need not raise the quality of the firms created. We further document that greater reform exposure is associated with higher pension income at age 65, and that this association is more favorable for individuals with entrepreneurial experience before retirement, consistent with the reformed system translating volatile entrepreneurial earnings into retirement wealth more faithfully than the DB formula it replaced.

The remainder of the paper is organized as follows. Section 2 describes the 1999 reform and the cohort phase-in schedule that generates our identifying variation. Section 3 develops the occupational-choice framework and derives the testable predictions. Section 4 describes the administrative data and sample construction. Section 5 presents the empirical strategy and results, covering entrepreneurial entry, firm outcomes, and retirement income. Section 6 concludes.

2 The Swedish Pension System Reform

The Swedish pension system rests on three pillars: public pensions, occupational pensions, and private savings. Faced with largely the same demographic challenges as other OECD countries—most notably population ageing and rising life expectancy—Sweden began a sweeping reform of its national public pension system.

The reform was carried out in stages. In 1994, Parliament adopted the guiding principles of the new system, following an extended period of policy development and political negotiation. The detailed legislation governing the new system was passed in 1998, and it became effective in 1999, with pension entitlements thereafter accruing under the new rules, subject to cohort-specific transition arrangements.[2] It replaced a traditional pay-as-you-go defined-benefit system

[2]The process of pension reform was consistently supported by approximately 85 percent of the members of Parliament (Settergren, 2001).

with a contribution-based framework designed to ensure long-run financial sustainability while strengthening the link between lifetime earnings and pension benefits.

Beyond addressing fiscal sustainability, the reform fundamentally altered how pension rights are accumulated, how risks are allocated over the life cycle, and how pension entitlements evolve with heterogeneous lifetime earnings profiles.

2.1 The Pre-Reform Public Pension System

Prior to the reform, Sweden's public old-age pension system was organized as a DB scheme consisting primarily of a flat-rate basic pension (Folkpension) and an earnings-related supplementary pension (Allmän tilläggspension, ATP). Under the ATP system, pension benefits were calculated based on an individual's best 15 years of earnings, subject to an earnings ceiling, and required up to 30 years of contributions for a full pension. Pension benefits were therefore only imperfectly linked to lifetime earnings and total contributions, and pension wealth accrued unevenly over the career, with a strong emphasis on earnings late in working life.

Public pension benefits could be claimed from age 60, with actuarial adjustments relative to the normal retirement age of 65. Early claim resulted in permanent benefit reductions, while delayed claim increased benefits. Despite these actuarial adjustments, the system remained fundamentally DB in nature. Demographic and economic risks were absorbed collectively and addressed through future policy changes, and pension entitlements depended disproportionately on a limited segment of the earnings history.

2.2 The Reformed Public Pension System

Under the reformed system, pension rights are accrued based on lifetime earnings and contributions rather than on late-career income. The system combines a DC component with a smaller fully funded component and is financed by a fixed contribution rate of 18.5% of pension-qualifying income.

The core of the reformed system is the income-based DC pension, to which 16% of contributions are credited to individual notional accounts. These accounts record annual pension contributions and are indexed to aggregate wage growth, as measured by an official income index. Although the system continues to operate on a pay-as-you-go basis, the notional accounts create a transparent and portable measure of accumulated pension wealth that evolves proportionally with lifetime income, independent of the timing, continuity, or structure of earnings.

At retirement, accumulated notional pension wealth is converted into a life-long annuity using a cohort-specific annuity divisor that reflects remaining life expectancy at the chosen retirement age. As life expectancy increases, the annuity divisor rises, mechanically lowering annual pension benefits for a given retirement age. Pension accrual continues as long as individuals earn pension-qualifying income, and there is no formal upper retirement age.

In addition to the notional pension, 2.5% of contributions are allocated to a fully funded individual account, while a guaranteed minimum pension provides a basic income floor for individuals with low lifetime earnings.

Transition across Birth Cohorts. The reform was gradually implemented across birth cohorts in order to protect previously accrued pension rights. Individuals born in 1938 were the first to be partially covered by the reformed system, with 20% of their pension rights determined under the

new rules. The share of pension rights accruing under the reformed system increased by five percentage points per birth cohort. Individuals born in 1954 or later are fully covered by the reformed system, whereas those born before 1938 remain entirely under the pre-reform rules.

[Insert Figure 2 about here]

Figure 2 illustrates the cohort-based phase-in of the Swedish pension reform. The share of pension rights accrued under the reformed system increases in discrete 5-percentage-point steps across successive birth cohorts, starting with the 1938 cohort and reaching full coverage for cohorts born in 1954 or later. As a consequence, adjacent birth cohorts differ systematically in their exposure to the reformed pension system, while pension rights accrued under the previous system are preserved. This cohort-based transition generates substantial variation in pension accrual rules and in the exposure to life-cycle risk across otherwise comparable individuals within a stable institutional and macroeconomic environment.

Implications of the Pension Reform. To illustrate how the reform translates into differences in retirement outcomes, we present cohort patterns in entrepreneurial activity and the distribution of pension income under the pre-reform and post-reform systems. The transition from a best-years defined-benefit rule to a lifetime contribution-based design implies not only changes in average pension levels but also differences in how earnings histories map into retirement income.

[Insert Figure 3 and Figure 4 about here]

Figure 3 plots the growth rate in the proportion of entrepreneurs across birth cohorts from 1997 to 2001. The cohorts shown correspond to those affected by the pension reform, for whom exposure varies systematically with birth year. Prior to 1999, differences in entrepreneurial growth

across cohorts are relatively modest. After 1999, cohort-specific patterns become more pronounced: cohorts with higher exposure to the new system exhibit stronger growth in entrepreneurial participation, while less-exposed cohorts show weaker or negative growth. This divergence leads to a widening gap across cohorts over time, with the separation becoming increasingly visible in the post-reform period.

Figure 4 compares the distribution of pension income at age 65 under the DB system and DC system. Panel (a) presents the distribution for the full sample. Under the DC system, the distribution is shifted toward higher pension levels, with the peak of the density moving from approximately 0.075 to 0.125 million SEK, while the DB system exhibits a longer upper tail.

Panels (b) and (c) split the sample by income level, where low- and high-income individuals are defined based on pre-retirement earnings (corresponding to the bottom and top 50% of the earnings distribution). For lower-income individuals, the DC distribution is markedly shifted toward higher pension levels and has less mass at very low outcomes. For higher-income individuals, the main differences arise in the upper-middle part of the distribution: under the DC system, mass shifts toward higher pension levels, particularly between approximately 0.1 and 0.2 million SEK, while the DB distribution retains a thin but longer upper tail.

Panels (d) and (e) distinguish individuals by entrepreneurial experience. Among individuals with prior entrepreneurial experience, the DC distribution is shifted toward higher pension levels and exhibits less mass at very low outcomes relative to the DB system. For non-entrepreneurs, differences between the two systems are more limited, although the DB system continues to display a longer upper tail.

Taken together, the figure illustrates how the reform altered the distribution of retirement outcomes across workers with different earnings histories and occupational backgrounds. These pat-

terns highlight that pension design influences how working-life income trajectories translate into retirement resources, a feature central to the occupational-choice mechanism developed in this study.

3 Conceptual Framework and Testable Predictions

The institutional discussion in Section 2 shows that the Swedish pension reform changed how working-life earnings histories map into retirement income. To guide the empirical analysis, we develop a parsimonious occupational-choice framework. Following Hombert et al. (2020), we treat entrepreneurship as a risky entry decision with state-contingent payoffs and an endogenous entry margin. We adapt this logic to our setting by allowing occupational earnings histories to affect retirement wealth through the public pension formula.

3.1 Conceptual Framework

Individuals live for two periods. The first period corresponds to the working period, during which the occupational choice is made, and the second period corresponds to retirement. Lifetime utility is given by:

$$U = u(c_0) + \beta u(c_1),$$

where c_0 is working-period consumption, c_1 is retirement consumption, and $\beta \in (0,1)$ is the weight placed on retirement-period utility. The utility function is increasing and concave, $u'(c) > 0$ *and* $u''(c) < 0$.

Concavity captures an important part of the mechanism: a given increase in pension income is

more valuable when retirement resources are low. For tractability, working-period consumption is set equal to income from the chosen occupation, and working-period saving is omitted. We leave the pension schedules and the formal derivation in Appendix 2.

Let $e > 0$ denote the annual earnings an individual would receive by remaining in salaried employment. Thus, e is the individual's salaried outside option and also serves as the baseline against which entrepreneurial earnings are measured. Let T denote the length of a full pensionable career. Remaining in salaried employment generates stable earnings e over T contribution years.

Entrepreneurship generates two possible outcomes. With probability $\pi \in (0,1)$, the business succeeds and generates earnings $\rho_H e$, where $\rho_H > 1$. The parameter ρ_H therefore measures the earnings upside of successful entrepreneurship relative to salaried employment. With probability $1-\pi$, the business fails and generates earnings $\rho_L e$, where $0 < \rho_L < 1$. The parameter ρ_L measures the severity of the earnings loss following failure: a lower ρ_L corresponds to a worse failure outcome. Failure may also shorten the effective contribution history to $T_L \leq T$, reflecting years of low or missing pensionable earnings. Thus, ρ_L captures the level of earnings in the failure outcome, while T_L captures the duration of the associated career interruption.

We use $j \in \{S,H,L\}$ to index the three career paths, where S denotes the stable salaried path, H the successful entrepreneurial path, and L the failed entrepreneurial path. Let $Y_j(e)$ denote the pensionable earnings history associated with path j. The salaried history $Y_S(e)$ records earnings e over all T contribution years. The success history $Y_H(e)$ records earnings $\rho_H e$ over the same T years. The failure history $Y_L(e)$ records earnings $\rho_L e$ over T_L effective contribution years, with low or zero pensionable earnings in the remaining $T - T_L$ years. The object $Y_j(e)$ should therefore be understood as an earnings history, rather than simply current income: it contains both the earnings level and the continuity of pension contributions.

Let $P^{DB}(Y,N)$ denote annual public pension income under the pre-reform defined-benefit system, where Y is the pensionable earnings history and N is the number of qualifying contribution years, and let $P^{DC}(Y)$ denote pension income under the post-reform contribution-based system. For a generic reform exposure $\omega \in [0,1]$, the applicable pension rule is:

$$P_{\omega}(Y,N) = (1-\omega)P^{DB}(Y,N) + \omega P^{DC}(Y).$$

Hence $\omega = 0$ corresponds to the old DB system, $\omega = 1$ to the new DC system, and intermediate values place positive weight on both. At this stage ω is a generic model parameter; its cohort-specific empirical counterpart ω_c is introduced when we state the testable predictions.

Define $\Delta P(Y) \equiv P^{DC}(Y) - P^{DB}(Y)$. This term is the change in annual pension income obtained by evaluating the same earnings history under the new rather than the old pension formula. The framework does not assume that $\Delta P(Y)$ is positive for every earnings history. The reform can improve pension income along some career paths while reducing it along others. What matters for occupational choice is whether the reform improves the entrepreneurial paths relative to the salaried path.

In addition to public pension income, individuals have $A \geq 0$ units of non-public-pension retirement resources, which we hold fixed to isolate the public-pension channel. For career path $j \in \{S,H,L\}$, retirement consumption is therefore $R_j^{\omega}(e) \equiv A + P_{\omega}(Y_j(e))$, the pension generated by that path's earnings history under exposure ω, plus private resources.

Let $\Phi_{\omega}(e)$ denote the expected lifetime utility gain from entrepreneurship relative to salaried employment, taking into account both working-period income and retirement consumption. Individual i enters entrepreneurship if $\Phi_{\omega}(e) \geq \kappa_i$, where κ_i is an idiosyncratic fixed or nonpecuniary

cost of entry. Individuals near this threshold constitute the relevant entry margin.

Because the reform affects occupational choice only through retirement income, its effect on entry can be summarized by how $\Phi_\omega(e)$ changes with reform exposure. Proposition 1 states this result.

Proposition 1 (Pension reform and entrepreneurial entry)**.** *Suppose that the entry-cost distribution has positive density at the occupational-choice margin. Define*

$$\begin{aligned} D_\omega(e) \equiv \frac{\partial \Phi_\omega(e)}{\partial \omega} = \beta \Big[& \pi u'(R_H^\omega(e))\, \Delta P(Y_H(e)) \\ & + (1-\pi) u'(R_L^\omega(e))\, \Delta P(Y_L(e)) \\ & - u'(R_S^\omega(e))\, \Delta P(Y_S(e)) \Big]. \end{aligned} \tag{3.1}$$

where $\beta \in (0,1)$ is the weight placed on retirement-period utility and $u'(\cdot) > 0$ is the marginal utility of retirement consumption. Each of the three terms in (3.1) is a pension gain $\Delta P(Y_j(e))$ weighted by the marginal utility $u'(R_j^\omega(e))$ of the state in which it accrues: the first two are the probability-weighted gains along the entrepreneurial success and failure paths, and the third is the gain from remaining salaried. Because utility is concave, gains accruing in low-resource states—in particular the failure state—receive the greatest weight. If $D_\omega(e) > 0$, then a marginal increase in exposure to the post-reform pension system increases the probability of entrepreneurial entry for individuals with baseline earnings e.

Proposition 1 compares how the pension reform changes retirement payoffs under entrepreneurial success, entrepreneurial failure, and salaried employment. The reform encourages entrepreneurship when the probability-weighted improvement along the entrepreneurial paths exceeds the corresponding improvement from remaining in salaried employment. Because utility is concave, pen-

sion gains receive greater weight in states with lower retirement resources, making the failure state particularly relevant.

Proposition 1 is therefore a relative-payoff result: the reform need not increase overall pension income, but must improve the retirement consequences of entrepreneurship relative to salaried employment. In the Swedish setting, this condition is more likely to hold when entrepreneurial failure generates low earnings or contribution interruptions, which were particularly costly under the pre-reform DB rules. Appendix 2 provides the formal pension schedules, proof of Proposition 1, and associated comparative statics.

3.2 Testable Predictions

The Swedish reform was phased in across birth cohorts. Let ω_c denote the share of cohort c's public pension rights determined by the post-reform formula. Proposition 1 and the comparative statics in Appendix 2 yield the following empirical predictions.

Prediction 1: Entrepreneurial entry. After the reform, cohorts with greater exposure ω_c should experience greater increases in entrepreneurial entry.

Prediction 2: Earnings instability and career interruptions. The entry response should be stronger among individuals whose adverse labor market outcomes involve volatile earnings or interruptions in pensionable employment. Empirically, this implies larger effects among unemployed individuals, workers changing jobs, and individuals with high income volatility, and smaller effects among workers in stable employment arrangements.

Prediction 3: Income heterogeneity. The entry response should be larger in the lower part of the earnings distribution than among high-income individuals. Lower earnings imply lower failure-state retirement consumption and therefore a higher marginal value of pension-based downside protection. The model does not require a globally monotone relationship at the extreme bottom of the distribution, where minimum-pension guarantees may bind under both systems.

To assess whether the mechanism can generate effects of an empirically relevant size, we calibrate the model to the Swedish pension formulas—the contribution-years and best-years rules of the pre-reform system, the proportional accrual and guarantee structure of the post-reform system—and simulate entry responses across the statutory cohort phase-in schedule. The calibration targets the level of the entry response but not its shape: the simulated response is strictly increasing in reform exposure, rises monotonically with the length of the career interruption, and is hump-shaped across the earnings distribution, peaking somewhat below median earnings. These untargeted patterns are consistent with the predictions stated above. Appendix 3 reports the calibration, parameter values, and simulated entry responses in full.

4 Data and Variables

This section describes the data sources, sample construction, and variable definitions used in the analysis.

4.1 Data and Sample

To examine the impact of the pension reform on entrepreneurial activity, we assemble a comprehensive individual-level panel dataset from multiple administrative sources provided by Statis-

tics Sweden (SCB). Our primary data source is the LISA (Longitudinell Integrationsdatabas för Sjukförsäkrings- och Arbetsmarknadsstudier) database, which contains detailed information on individuals' demographics, employment, and income. We supplement LISA with several additional registries. The Födelseuppgifter (Birth Information) database provides information on individuals' birthplaces and birth years, the RTB (Registret över Totalbefolkningen) database supplies household affiliation records, and the Företagsdatabasen (Firm Database) provides firm-level data, including registration details, industry classification, location, employment, and financial outcomes.

By merging these datasets, we construct an unbalanced panel of all individuals born between 1936 and 1955, observed annually from 1996 to 2002, covering the period surrounding the implementation of the pension reform in 1999. While the individual-level panel used for the entrepreneurial entry analysis spans 1996–2002, the firm-level data from the Företagsdatabasen extend beyond this period, allowing us to track post-entry firm outcomes over longer horizons, including firm survival and operating performance. We apply a sequence of standard sample restrictions to ensure data quality and consistency across individuals. Specifically, we exclude individuals with total annual income below 1,000 SEK or in the top 0.01% of the income distribution, individuals who retired prior to the reform year, and observations with missing information on entrepreneurial status.

LISA reports individuals' primary sources of income annually, allowing us to identify entrepreneurial activity using administrative classifications. We classify an individual as an entrepreneur if they are either self-employed or registered as an individual business owner.[3] Table A2 details the sample selection procedure and reports the number of observations remaining after each

[3] Hou et al. (2025) use a similar definition. Gottlieb, Townsend, and Xu (2022) categorize individuals as entrepreneurs if they derive at least 50% of total income from self-employment.

filtering step. The final sample consists of 12,997,345 individual-year observations, corresponding to 1,939,666 unique individuals.

[Insert Table 1 about here]

Table 1 reports the distribution of the sample across calendar years and birth cohorts for the period 1996–2002. Panel A presents the annual distribution of individuals by entrepreneurial status. Over the sample period, the share of entrepreneurs remains remarkably stable, fluctuating narrowly around 7–8%. Panel B reports the distribution by birth cohort and reveals a clear cohort gradient in entrepreneurial activity. The proportion of entrepreneurs increases from early to late birth cohorts, from about 5.4% among individuals born in 1936 to approximately 7.3–8.0% for cohorts born in the mid-1940s and early 1950s.

Figure A1 and Figure A2 describe the newly established firms in our sample. Entrepreneurial activity is dominated by very small firms: more than 60% of new establishments are single-person enterprises, and new firm formation is concentrated in service-oriented industries. These patterns are stable over the sample period, indicating that the entrepreneurial activity captured in our data primarily reflects individual-level or small-scale business formation. Full size and industry distributions are reported in Appendix 1.2.

4.2 Variable Definitions

Our main dependent variable, $Entre_{i,c,t+2}$, is a binary indicator that equals 1 if individual i, born in cohort c, is observed in an entrepreneurial state in period $t+2$, and 0 otherwise. Following prior studies that measure entrepreneurial transitions prospectively, we use a two-year gap between the explanatory variables and the entrepreneurial outcome (Hou et al., 2025; Levine and Rubinstein,

2017). This forward-looking definition allows occupational decisions made after period t to be reflected in the administrative records and ensures that the explanatory variables are measured before entrepreneurial entry.

Following the literature on the determinants of entrepreneurship (Giannetti and Simonov, 2004, 2009; Azoulay et al., 2020), we include a comprehensive set of individual- and household-level controls. The first set captures demographic characteristics and human capital: gender, native background, age and its square, educational attainment, field of study, marital status, total personal income, years of employment since 1990, and household size. The second set captures household composition and financial resources, both of which may shape entrepreneurial entry (Hurst and Lusardi, 2004; da Fonseca and Bérubé, 2023): the number of children under 17, an indicator for being the highest-income earner in the household, and total household income. Finally, to account for persistence in entrepreneurial behavior and heterogeneity in entrepreneurial ability, we include *PriorEntre*, an indicator equal to one if the individual had entrepreneurial experience prior to the current year (Jovanovic, 1982; Holtz-Eakin, Joulfaian, and Rosen, 1994). Table A1 provides full definitions and construction details for all variables.

Table 2 reports summary statistics for the main variables used in the analysis, based on the sample of individuals observed between 1996 and 2002. The average age is 52.4 years, with a median of 52 and a range from 41 to 66. The average value of the education variable is 0.28, indicating that most individuals have finished high school. Approximately 65% of individuals are married.

On average, 7.5% of individual-year observations are classified as entrepreneurial, consistent with the proportions reported in Table 1. The sample is evenly split by gender, and approximately 81% of individuals were born in Sweden to Swedish-born parents. Economic characteristics vary

considerably across individuals. Average annual personal income is 0.23 million SEK, with a median of 0.20 million SEK and a pronounced right tail. Individuals have, on average, accumulated about 9 years of recorded employment since 1990, with work histories ranging from 1 to 13 years. Household characteristics also exhibit substantial variation. The average number of children under 17 is 0.42, with a median of zero, and average household size is 2.4 members. About two-thirds of individuals are the highest-income earners within their households.

[Insert Table 2 about here]

5 Empirical Analysis

This section presents the main empirical analysis. We first outline the identification strategy and report baseline estimates, then validate the design using discrete cohort comparisons and a battery of robustness tests. We then examine retirement outcomes, heterogeneity in the entry response, and the survival and performance of the resulting ventures.

5.1 Empirical Strategy

Our identification strategy leverages the cohort-specific implementation of the Swedish pension reform, which generates exogenous variation in individuals' exposure to the new system. Unlike a standard Difference-in-Differences (DiD) design with a binary treatment, the reform induces step variation in treatment intensity across birth cohorts, as individuals are gradually shifted from the pre-reform DB system to the post-reform DC system.

We capture this cohort-specific exposure using *Exposure*, a measure of treatment intensity defined as the fraction of an individual's pension contributions allocated to the DC system. Indi-

viduals born in 1937 or earlier are fully covered by the pre-reform system ($Exposure = 0$). The 1938 cohort is the first to be partially treated, with 20% of pension contributions covered by the DC system ($Exposure = 0.2$). For each subsequent birth cohort, the post-reform share increases in discrete 5-percentage-point increments, reaching full coverage ($Exposure = 1$) for individuals born in 1954 and later. Importantly, because this assignment rule depends solely on birth year, exposure is predetermined with respect to individual labor market behavior.

Specifically, we estimate the effects of the pension reform on entrepreneurship using the following continuous-treatment DiD model:

$$Entre_{i,c,t+2} = \alpha + \beta \left(Exposure_{i,c} \times Post_t\right) + f(Age_{i,t}) + X'_{i,c,t}\Gamma + \lambda_c + \theta_t + \eta + \kappa + \varepsilon_{i,c,t} \quad (5.1)$$

where $Entre_{i,c,t+2}$ is a dummy variable equal to one if individual i, born in year cohort c, is observed in an entrepreneurial state in year $t+2$, and zero otherwise; $Exposure_{i,c}$ is the cohort-specific exposure to the new pension system, ranging from 0 for those born before 1938 to 1 for those born in or after 1954; $Post_t$ equals 1 if year $t \geq 1999$, and 0 otherwise; The coefficient β captures the *DiD* estimate of how the pension reform affects entrepreneurial entry across cohorts with varying exposure to the new system. A positive β indicates that greater exposure to the new DC system increases the probability of entrepreneurial entry after the reform.

This step-wise DiD design parallels recent work that exploits policy-induced variation in treatment intensity rather than discrete treatment assignment (e.g., Hombert et al., 2020). By leveraging the mechanical and monotonic relationship between birth cohort and reform exposure, our approach isolates the impact of the pension reform from confounding age, cohort, and time effects, which are flexibly controlled for through fixed effects.

A key identification challenge is that reform exposure is a deterministic function of birth cohort, which is in turn mechanically related to age in any given year. Because age is the difference between year and birth cohort, the linear age term is absorbed once cohort and year fixed effects are included; the quadratic term in $f(Age_{i,t})$ remains separately identified and allows entrepreneurial activity to vary non-linearly over the life cycle. Identification of β rests on the differential change in entrepreneurial entry across cohorts with different exposure intensities around 1999, rather than on cross-sectional comparisons between older and younger individuals.

Furthermore, we include birth-cohort fixed effects λ_c to account for the unobservable differences across cohorts that may affect entrepreneurial behavior. Individuals born in different years face distinct macroeconomic conditions, education systems, labor market institutions, and social norms, which may shape entrepreneurial propensity. Because reform exposure is mechanically determined by birth year, cohort fixed effects absorb these confounding factors, ensuring that identification relies on within-cohort variation over time rather than cross-cohort differences.

$X_{i,c,t}$ includes a rich set of individual- and household-level control variables described in Section 4.2. The detailed variable definitions and constructions are provided in Table A1. θ_t are year fixed effects capturing aggregate shocks common to all individuals, including macroeconomic fluctuations and nationwide policy changes. Municipality fixed effects η and industry fixed effects κ absorb time-invariant geographic and sectoral determinants in entrepreneurial activity. Together, these controls separate age-related life-cycle effects, cohort-specific differences, and common time shocks. ε_{ict} is the idiosyncratic error term and is clustered at the individual level to account for serial correlation within individuals over time.

5.2 Baseline Results: DiD Estimates

The baseline results from the step-wise DiD specification in Equation (5.1) are reported in Table 3. Column (1) presents a parsimonious specification that includes the interaction between Exposure and the post-reform indicator, together with fixed effects. Column (2) augments this specification with a comprehensive set of individual- and household-level control variables.

Consistent with Prediction 1 of our conceptual framework, the coefficient estimate of β is positive and statistically significant at the 1% level across both specifications. The univariate coefficient estimate is 0.011, indicating that individual cohorts with greater exposure to the DC system are 1.1 percentage points more likely to become entrepreneurs after the pension reform. When we add demographic characteristics, labor market histories, income, and household conditions in Column (2), the coefficient remains positive and highly significant, although its magnitude declines to 0.006. The persistence of statistical significance and the consistent coefficient signs highlight the robustness of the baseline finding. In terms of economic magnitude, the estimate in Column (2) implies that, relative to the pre-reform period, the probability of entering entrepreneurship increased by approximately 0.6 percentage points more among fully exposed cohorts (Exposure = 1) than among unexposed cohorts (Exposure = 0). Relative to a mean entrepreneurship rate of about 7.5%, this corresponds to an increase of roughly 8%, indicating a meaningful effect of the pension reform on entrepreneurial activity.

[Insert Table 3 about here]

The estimated coefficients on the remaining control variables are broadly consistent with the established literature on entrepreneurial selection. Entrepreneurial entry is higher among males (Evans and Leighton, 1989; Giannetti and Simonov, 2009) and individuals with greater accumu-

lated employment experience (Lin, Picot, and Compton, 2000). Prior entrepreneurial experience is also strongly positively associated with subsequent entry, consistent with evidence on persistence and learning in serial entrepreneurship (Lafontaine and Shaw, 2016). In our estimates, higher personal income and proxies for household income are negatively associated with entry. This conditional pattern suggests that more financially secure individuals may have weaker incentives to transition into entrepreneurship. Household composition variables are also closely associated with entrepreneurial entry, indicating that spouses and children can shape occupational choices (da Fonseca and Bérubé, 2023). The linear age term is not reported because it is absorbed by the inclusion of birth-cohort and year fixed effects, as age is determined solely by birth cohort.

5.3 Validation Using Discrete Cohort Comparisons

To complement the DiD design in Table 3, we conduct a validation exercise based on discrete cohort comparisons. For each cohort comparison reported in Table 4, we estimate the following standard DiD specification, which follows the baseline model in Equation (5.1):

$$Entre_{i,c,t+2} = \alpha + \beta(Treat_{i,c} \times Post_t) + f(Age_{i,t}) + X'_{i,c,t}\Gamma + \lambda_c + \theta_t + \eta + \kappa + \varepsilon_{i,c,t}. \tag{5.2}$$

The key difference lies in how the treatment indicator is constructed. Specifically, $Treat_{i,c}$ is a dummy variable indicating whether individual i belongs to the treated birth-cohort group in a given comparison. The coefficient β captures the differential change in entrepreneurial entry after the reform for treated cohorts relative to control cohorts.

[Insert Table 4 about here]

To assess sensitivity to cohort selection, we construct treatment and control groups using alternative cohort windows. In Panel A (step size = 1), the control group consists of individuals born in 1937, while treated groups are defined as successive single-year cohorts from 1938 to 1954. In Panel B (step size = 2), the control group includes cohorts born in 1936–1937, and treated groups are defined as adjacent two-year cohorts (e.g., 1938–1939 to 1954–1955). In Panel C (step size = 3), the control group comprises cohorts born in 1935–1937, with treated groups defined as adjacent three-year cohorts (e.g., 1938–1940 to 1954–1956).

Across specifications, the estimated β coefficients are predominantly positive and statistically significant. Estimates based on the narrowest comparisons (Panel A) are smaller in magnitude and imprecisely estimated for the cohorts immediately adjacent to the cutoff, as expected given the limited cohort width and the small difference in reform exposure between neighboring birth years. As cohort windows widen and treated cohorts move further from the cutoff (Panels B and C), the estimates become more precise, consistently significant, and larger in magnitude. This pattern aligns with the institutional design of the reform, under which exposure increases in discrete increments with birth year.

To further assess the parallel-trends assumption underlying the discrete DiD specifications in Table 4, we implement a dynamic DiD design that replaces the single treatment-by-post interaction with a full set of treatment-by-year interactions. For each discrete cohort comparison, we estimate:

$$Entre_{i,c,t+2} = \alpha + \sum_{\substack{\tau \in \mathcal{T} \\ \tau \neq 1998}} \beta_\tau \left(Treat_{i,c} \times \mathbf{1}\{t = \tau\} \right) + f(Age_{i,t}) + X'_{i,c,t}\Gamma + \lambda_c + \theta_t + \eta + \kappa + \varepsilon_{i,c,t}. \tag{5.3}$$

where $\mathcal{T} = \{1996, \ldots, 2002\}$, $Treat_{i,c}$ indicates membership in the treated birth-cohort group, as defined in Equation (5.2), and $\mathbf{1}\{t = \tau\}$ is an indicator equal to one when the observation

year is τ and zero otherwise. Consistent with the baseline specifications, the dependent variable measures entrepreneurial entry in year $t+2$. We omit the interaction for the base year 1998, $Treat_{i,c} \times \mathbf{1}\{t = 1998\}$, so that each β_τ captures the treated–control difference in the probability of entrepreneurial entry at $t+2$ for observation year τ, relative to the corresponding difference for observation year 1998. The control variables and fixed effects match those in the corresponding discrete DiD specifications in Table 4, and standard errors are clustered at the individual level.

[Insert Figure 5 about here]

Figure 5 reports the β_τ coefficients and 95% confidence intervals for three representative cohort comparisons: (a) 1937 vs. 1938, (b) 1936–1937 vs. 1938–1939, and (c) 1935–1937 vs. 1938–1940. Across all three panels, the pre-policy coefficients (1996–1997 relative to the omitted year 1998) are small and not statistically different from zero, indicating no evidence of differential pre-trends between treated and control cohorts prior to the reform. In contrast, the post-policy coefficients become positive after 1999 and remain elevated in the early post-reform years, particularly in 2000 and 2001, consistent with the reform generating differential increases in entrepreneurial entry for cohorts with greater exposure. The three comparisons shown in Table 4 and Figure 5 are representative of the full set of cohort-pair specifications, which yield similarly insignificant pre-reform interaction coefficients and significant post-reform effects in the corresponding event-study analyses.[4]

[4]For brevity, only three representative comparisons are reported. The complete set of event-study estimates for all cohort-pair comparisons is available from the authors upon request.

5.4 Robustness Tests

In this section, we examine the robustness of the baseline results to alternative specifications, sample definitions, and placebo tests.

Table 5 reports a comprehensive set of robustness tests that assess the sensitivity of our baseline estimates to alternative sample constructions, alternative measures of entrepreneurship, and additional filters and placebo designs. For all panels, the coefficient on $Exposure_c \times Post_t$ remains positive and statistically significant, while the placebo coefficient is close to zero and statistically insignificant, supporting the stability of the baseline finding.

Panel A examines whether the baseline results are sensitive to the choice of birth-cohort range, the length of the estimation window, and the fixed-effects structure. In Columns (1) and (2), we expand the cohort range from the baseline 1936–1955 to 1935–1956 and 1934–1957, respectively. The estimated coefficients on $Exposure_c \times Post_t$ remain positive and highly significant. This exercise addresses the concern that the results could be driven by a particular choice of boundary cohorts. The persistence of the estimates suggests that the reform effect is not sensitive to marginal cohort inclusion or exclusion. Column (3) expands the time window to 1995–2003, thereby including four years on each side of the reform. The coefficient remains positive and significant. This test mitigates concerns that the baseline three-year window may overfit short-run fluctuations around the implementation year or be overly influenced by transitory shocks. Column (4) introduces individual fixed effects, absorbing all time-invariant individual heterogeneity, including unobserved entrepreneurial propensity, risk preferences, and stable family background. This specification addresses the possibility that cohort-level exposure is correlated with individual characteristics that are not fully captured by observed controls. The estimated coefficient remains positive and un-

changed. The finding indicates that the identification is not driven by cross-sectional compositional differences.

Our baseline definition of entrepreneurial entry focuses on whether an individual is observed in an entrepreneurial state two years after the initial decision period. This forward-looking measure is designed to capture realized entry into entrepreneurship while allowing some time for business formation. At the same time, it deliberately does not condition on short-term persistence or survival, as individuals who enter and exit entrepreneurship within a short window are not coded as entrants.

To assess the robustness of our findings to alternative timing horizons and conceptual definitions of entrepreneurship, Panel B evaluates whether the baseline results depend on the particular operationalization of entrepreneurial entry. Column (1) uses a longer horizon by defining entrepreneurship based on status in $t+3$ ($Entre1$). The estimated coefficient is 0.011, consistent with the idea that the transition from an occupational decision to formally recorded entrepreneurship can take time, and that part of the reform effect may materialize beyond two years. Column (2) broadens the definition to capture entrepreneurship observed in $t+1$, $t+2$, or $t+3$ ($Entre2$), which accommodates heterogeneous adjustment speeds and short lags in business formation. The coefficient remains positive and significant (0.010), showing that the estimated reform effect is not specific to the two-year horizon. Column (3) restricts entrepreneurship to self-employment only, excluding individual business owners ($Entre3$). The coefficient is larger (0.012), indicating that the estimated reform effect is not driven by the broader definition that includes individual business owners. Column (4) adopts a stricter "new entry" definition, defining $Entre4$ as one only if the individual is entrepreneurial at $t+2$ but not at t or $t+1$. This definition reduces the influence of persistence and focuses on transitions that occur after the decision window. The effect remains

positive and significant (0.003), suggesting that the baseline results are not driven by continued entrepreneurship among individuals who had already started earlier.

Panel C imposes additional sample restrictions and implements a placebo test. Column (1) excludes Agriculture, Forestry, and Fishing, an industry where self-employment may be structurally common and potentially less sensitive to pension incentives. The coefficient remains positive and significant (0.006), indicating that the baseline effect is not driven by agriculture-related self-employment patterns. Column (2) restricts the sample to individuals born in Sweden to Swedish-born parents. The coefficient remains positive and significant (0.008), suggesting that the results are not driven by differential migration or compositional changes in immigrant entrepreneurship across cohorts. Column (3) retains only individuals who are present throughout the sample period ("strong balanced" sample). The coefficient remains positive and significant (0.007), alleviating concerns that sample entry/exit or selective attrition drives the findings.

Finally, Column (4) conducts a placebo test by shifting the policy year to 1994 and restricting the sample to 1991–1997. The choice of 1994 is motivated by institutional considerations: as described in Section 2, Parliament adopted the guiding principles of the reform in 1994, five years before detailed legislation was enacted in 1998 and the new system took effect in 1999. The 1994 agreement made the broad direction of the reform public knowledge well in advance of implementation, raising the possibility that forward-looking individuals adjusted their behavior in anticipation of the reform following its legislative approval. By assigning 1994 as a placebo reform year and estimating an otherwise identical specification, we explicitly test for such anticipation effects. The estimated coefficient on the placebo interaction is economically small and statistically insignificant. This result indicates that entrepreneurial behavior did not respond to the legislative announcement of the reform in advance of its implementation. Together with the base-

line and validation results, this placebo test supports the interpretation that the observed increase in entrepreneurship is driven by the actual implementation of the pension reform rather than by spurious cohort-by-time trends or anticipatory behavioral responses.

[Insert Table 5 about here]

5.5 Retirement Outcomes and Long-Run Implications

In this subsection, we examine how exposure to the pension reform and entrepreneurial activity before retirement relate to individuals' pension income at age 65. We focus on pension income at age 65, the statutory retirement age in Sweden, to ensure comparability across individuals and to capture fully realized retirement outcomes that reflect lifetime earnings and pension accumulation.

We estimate the following cross-sectional specification at retirement:

$$\begin{aligned} Pension65_{i,c} = \alpha + \beta\, Exposure_{i,c} + \theta\, Entre_{i,<65} + \gamma Exposure_{i,c} \times Entre_{i,<65} \\ + X'_{i,c,64}\Gamma + \eta + \kappa + \varepsilon_{i,c}. \end{aligned} \tag{5.4}$$

where $Pension65_{i,c}$ is the natural logarithm of inflation-adjusted pension income received at age 65 (CPI-adjusted to the 2010 level). $Exposure_{i,c}$ measures the cohort-specific intensity of exposure to the post-reform pension system based on birth year. $Entre_{i,<65}$ is an indicator equal to one if the individual engaged in entrepreneurial activity before age 65. $X'_{i,c,64}$ is a vector of controls measured at age 64, and η and κ denote municipality and industry fixed effects, respectively. Standard errors are clustered at the individual level.

We present the results in Table 6. Across Columns (1)–(4), the coefficient on reform exposure is positive and highly significant, indicating that individuals with greater exposure to the post-reform

system receive higher inflation-adjusted pension benefits at retirement. This pattern accords with the mechanics of the notional defined contribution design, under which pension entitlements are more tightly linked to cumulative lifetime earnings and contributions.

Columns (2) and (4) further allow the effect of reform exposure to differ by whether individuals engaged in entrepreneurship before retirement. The interaction term $Exposure_{ic} \times Entre_{i,<65}$ is positive and statistically significant, implying that the association between reform exposure and pension income is stronger for individuals who were entrepreneurs before age 65. While the interaction becomes smaller after adding the age-64 control vector in Column (4), it remains positive and statistically meaningful, consistent with the idea that the post-reform system better translates entrepreneurial earnings into pension entitlements. Overall, Table 6 indicates that reform exposure is associated with higher pension income at age 65 and that this relationship is more favorable for individuals with entrepreneurial experience prior to retirement.

[Insert Table 6 about here]

5.6 Cross-sectional Analysis

This subsection examines how labor market conditions, labor income, and individual characteristics moderate the effect of exposure to pension reform on entrepreneurial entry. The results are presented in Table 7. In each specification, we interact the baseline reform term with the relevant heterogeneity indicator. For brevity, Table 7 reports only the coefficient on the triple interaction between reform exposure, the post-reform indicator, and the heterogeneity indicator. All specifications include the corresponding constituent terms and lower-order interactions, except for those absorbed by the fixed effects.

We first examine heterogeneity in career risk, earnings uncertainty, and income level, corresponding to Predictions 2 and 3. Consistent with these predictions, the reform effect is stronger among individuals facing greater employment or earnings instability and among lower-income individuals.

Panel A of Table 7 focuses on labor market conditions that capture variation in career risk and earnings uncertainty. Periods of unemployment or job reallocation are often associated with unstable income prospects and greater uncertainty about future earnings (Giannetti and Simonov, 2004; Hombert et al., 2020; Gottlieb et al., 2022). Consistent with Prediction 2, the reform effect is stronger among unemployed individuals (Column 1) and those experiencing job transitions (Column 2). These findings indicate that individuals facing greater employment instability respond more strongly to the reform.

In contrast, individuals with relatively stable employment arrangements exhibit a weaker response. Workers in bond-like industries—such as public administration, education, and health and social work—generally have more predictable earnings and face a lower risk of substantial income disruptions. The complete list of bond-like industries is provided in Table A3. Correspondingly, the reform effect is substantially weaker among individuals employed in bond-like industries (Column 3). This finding is consistent with the reform having a smaller effect when employment and earnings are relatively stable.

Panel B examines income-related heterogeneity. Consistent with Prediction 3, the reform effect is stronger among lower-income individuals and increases further down the distribution: the interaction is 0.006 for the bottom 25% and 0.008 for the bottom 5% (Columns 1 and 2). The reform effect is also stronger among individuals with high income volatility (Column 3), consistent with Prediction 2 regarding career risk and earnings uncertainty. Taken together, these results in-

dicate that lower-income individuals and those facing less stable earnings exhibit a larger increase in entrepreneurial entry in response to the pension reform.

Finally, Panel C examines demographic and family characteristics related to household constraints, risk-bearing capacity, and occupational mobility. The reform effect is stronger for males (Column 1), consistent with prior evidence documenting gender differences in entrepreneurial participation (Evans and Leighton, 1989; Kerr, Kerr, and Xu, 2018). Married individuals also respond more strongly (Column 2). This result may reflect the role of intra-household risk sharing: by smoothing income fluctuations, spouses may give individuals greater flexibility to adjust their occupational choices when pension incentives change (Hess, 2004; Hombert et al., 2020). By contrast, homeowners exhibit a weaker reform response (Column 3). One possible explanation is that housing-related consumption commitments make household expenditures less adjustable following income shocks, thereby limiting homeowners' willingness to undertake occupational risk (Chetty and Szeidl, 2007).

[Insert Table 7 about here]

5.7 Survival and Performance of New Ventures

In this section, we examine whether the pension reform affects not only individuals' decision to become entrepreneurs but also the survival and operating performance of the ventures they create. Individual entry into entrepreneurship does not necessarily translate to business success. To this end, we link entrepreneurs in the administrative data to firm-level records and study outcomes for newly established firms.

To examine the long-term implications of the reform for entrepreneurial quality and business

outcomes, we use extended firm-level data from the Företagsdatabasen that continue beyond the main 1996–2002 individual panel window. This extended coverage allows us to observe firm survival and operating performance over multi-year post-entry horizons, including survival up to six years after establishment and average operating performance over the first three post-entry years.

We restrict the sample to entrepreneurs born between 1936 and 1955 who had not retired prior to the reform implementation year, retaining only sole proprietorships so that the owner-founder can be uniquely identified and matched to firm outcomes. We then estimate the following firm-level regression:

$$G_{ij} = \alpha + \beta \left(Exposure_{i,c} \times Post_Establish_{ij} \right) + X'_{ij,t}\Gamma + \lambda_c + \theta_t + \eta + \kappa + \varepsilon_{ij,t} \qquad (5.5)$$

where $Exposure_{i,c}$ measures the cohort-specific exposure of founder i to the post-reform pension system based on birth year c, and $Post_Establish_{ij}$ is an indicator equal to one if firm j is established in or after 1999 and zero otherwise. G_{ij} denotes a survival or performance outcome for newly established firm j founded by individual i. Following the baseline specification, we control for birth-cohort, establishment-year, municipality, and industry fixed effects, denoted λ_c, θ_t, η, and κ. Standard errors are clustered at the individual (founder) level. The results are reported in Table 8.

[Insert Table 8 about here]

In Panel A, G_{ij} includes the log of survival duration, where $Duration_j$ is defined as the firm's exit year minus establishment year plus one, and indicator variables for surviving at least two, four,

and six years. In Panel B, G_{ij} represents operating performance measured over the first three years after establishment, including the three-year average number of employees, net sales, operating profit, and owners' equity; for each outcome, we compute the three-year average starting from the establishment year, add one, and take logs. The vector $X_{ij,t}$ includes the same set of individual- and household-level controls as in the baseline entrepreneurship regressions, measured at the time of firm establishment.

Panel A of Table 8 shows that new firms founded under greater post-reform exposure exhibit significantly stronger survival outcomes. Reform exposure is positively associated with longer survival duration when measured continuously (Col.1) and with higher probabilities of surviving beyond key horizons of two, four, and six years (Cols.2–4). These patterns indicate that the reform-induced increase in entrepreneurship is not driven solely by short-lived or transitory firm creation.

Panel B of Table 8 shows that new firms founded under greater post-reform exposure employ more workers (Col.1), generate higher net sales (Col.2), and achieve higher operating profits (Col.3). They also accumulate greater owners' equity (Col.4), suggesting stronger early capitalization and balance-sheet positions. Because these outcomes are measured over the initial years following entry, the results speak to the early scale and viability of the ventures created under higher reform exposure.

6 Conclusion

This paper studies how a large-scale reform of the public pension system affects entrepreneurial activity. Exploiting the cohort-based implementation of the Swedish pension reform, which gradually shifted individuals from a defined-benefit to a contribution-based pension system, we develop

a simple theoretical framework and test the predictions using rich administrative data to examine how changes in pension design influence occupational choice.

The theoretical model highlights a key mechanism through which pension institutions can shape entrepreneurship: by changing how income risk and career interruptions translate into retirement consumption. In the pre-reform system, pension entitlements were disproportionately sensitive to a long span of high-earning years, making pension outcomes particularly vulnerable to income volatility and interruptions. The reformed system, by contrast, ties pension wealth more closely to cumulative lifetime earnings and introduces automatic adjustment and downside protection. These features modify the expected retirement payoff associated with risky income paths and, in turn, the relative attractiveness of entrepreneurship.

Empirically, we exploit the step-wise cohort exposure to the reform in a DiD framework. We find that entrepreneurial entry increases more strongly after the reform among cohorts with greater exposure to the new DC system. The estimated effects are economically meaningful, robust to a wide range of alternative specifications, and supported by validation exercises based on discrete cohort comparisons and event-study designs. Importantly, we find no evidence of differential pre-trends, reinforcing the interpretation that the observed changes are driven by the reform rather than by age- or cohort-specific dynamics.

Consistent with the model, the effects of the reform are heterogeneous. The increase in entrepreneurial activity is stronger among individuals facing greater employment and earnings instability and among those with lower baseline earnings, and weaker among workers in stable, bond-like industries. These patterns suggest that pension design matters most where long-term downside risk is salient and private self-insurance is limited. Moreover, the reform does not merely induce short-lived entry: new firms founded with greater exposure to the reform exhibit higher survival

rates and stronger early operating performance, indicating that the increase in entrepreneurship reflects economically meaningful business formation rather than transitory responses.

Finally, we document that greater exposure to the reformed pension system is associated with higher pension income at retirement, particularly for individuals with entrepreneurial experience prior to retirement. This finding underscores that the reform not only affects occupational choice during working life but also shapes long-run retirement outcomes in ways that more fully reflect lifetime earnings.

Taken together, our results show that pension system design can have important effects on occupational choice by reshaping the long-term risk–return trade-offs individuals face. Beyond its implications for entrepreneurship, the analysis highlights a broader channel through which social insurance institutions influence economic behavior: by governing how uncertainty today maps into security tomorrow.

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Table 1: Sample Distribution

This table presents the sample distributions of the sample across calendar years and birth cohorts for the period 1996–2002. Panel A presents the breakdown by year and entrepreneurship status, while Panel B reports the distribution by birth year and entrepreneurship status. Both panels include counts of non-entrepreneurs, entrepreneurs, total observations, and the percentage of entrepreneurs within each subgroup.

Panel A. Distribution by Year and Entrepreneurship

Year	# of Non-entrepreneur	# of Entrepreneur	# of Total	% of Entrepreneur
1996	1,727,853	139,009	1,866,862	7.45%
1997	1,726,957	138,119	1,865,076	7.41%
1998	1,724,410	137,526	1,861,936	7.39%
1999	1,724,601	135,472	1,860,073	7.28%
2000	1,714,534	139,745	1,854,279	7.54%
2001	1,712,791	135,146	1,847,937	7.31%
2002	1,687,932	153,250	1,841,182	8.32%
Total	12,019,078	978,267	12,997,345	7.53%

Panel B. Distribution by Birth Year and Entrepreneurship

Birth Year	# of Non-entrepreneur	# of Entrepreneur	# of Total	% of Entrepreneur
1936	280,574	16,140	296,714	5.44%
1937	320,387	19,516	339,903	5.74%
1938	382,993	26,464	409,457	6.46%
1939	447,558	32,786	480,344	6.83%
1940	461,626	35,066	496,692	7.06%
1941	499,238	39,208	538,446	7.28%
1942	574,754	48,019	622,773	7.71%
1943	645,808	54,624	700,432	7.80%
1944	713,156	61,472	774,628	7.94%
1945	730,180	63,536	793,716	8.00%
1946	741,347	64,816	806,163	8.04%
1947	737,189	63,749	800,938	7.96%
1948	735,037	63,080	798,117	7.90%
1949	714,322	60,441	774,763	7.80%
1950	689,098	58,413	747,511	7.81%
1951	663,815	54,322	718,137	7.56%
1952	671,673	54,585	726,258	7.52%
1953	676,997	55,526	732,523	7.58%
1954	658,908	53,258	712,166	7.48%
1955	674,418	53,246	727,664	7.32%
Total	12,019,078	978,267	12,997,345	7.53%

Table 2: Summary Statistics

This table reports the descriptive statistics of the sample. The sample includes individuals born between 1936 and 1955, with data statistics covering the period 1996–2002. Exposure refers to the cohort-specific share of an individual's pension rights accrued under the post-reform public pension system, and Post is 1 if the year is 1999 or later, and 0 otherwise. Gender indicates whether the individual is male. Native is an indicator equal to one if the individual and both parents were born in Sweden. Age is measured as the difference between the current year and the individual's birth year. Educational attainment is captured by Edu (coded as 0 = high school or below, 1 = bachelor's or master's degree, and 2 = doctoral degree). Major classifies the individual's field of study into five categories. Married is an indicator for marital status. Income refers to individuals' total personal income and Workyear is the accumulated years of employment since 1990. Children is the logarithm of one plus the number of children under the age of 17. FamSize is the logarithm of one plus the number of individuals registered in the same household. FamIncHigh is equal to 1 if the individual is the highest-income earner in the household, and 0 otherwise; for single-person households, the variable is set to 1. FamIncome is the logarithm of one plus the total income of all members in the family. PriorEntre is coded as 1 if the individual had entrepreneurial experience prior to the current year, and 0 otherwise. Full variable definitions are listed in Table A1.

Variables	Obs	Mean	SD	Min	P50	Max
Entre	12,997,345	0.075	0.264	0.000	0.000	1.000
Exposure × *Post*	12,997,345	0.354	0.370	0.000	0.300	1.000
Exposure	12,997,345	0.621	0.272	0.000	0.650	1.000
Post	12,997,345	0.570	0.495	0.000	1.000	1.000
Gender	12,997,345	0.504	0.500	0.000	1.000	1.000
Native	12,997,345	0.811	0.391	0.000	1.000	1.000
Age	12,997,345	52.394	5.626	41.000	52.000	66.000
Edu	12,997,345	0.284	0.472	0.000	0.000	2.000
Major	12,997,345	1.235	1.523	0.000	1.000	4.000
Married	12,997,345	0.645	0.479	0.000	1.000	1.000
Income (million SEK)	12,997,345	0.227	0.191	0.001	0.199	15.126
Workyear	12,997,345	9.028	2.729	1.000	9.000	13.000
Children	12,997,345	0.417	0.807	0.000	0.000	13.000
FamSize	12,997,345	2.421	1.220	1.000	2.000	17.000
FamIncHigh	12,997,345	0.658	0.474	0.000	1.000	1.000
FamIncome(million SEK)	12,997,345	0.412	0.614	0.001	0.368	997.435
PriorEntre	12,997,345	0.126	0.332	0.000	0.000	1.000

Table 3: Baseline: Continuous DID of Full Sample

This table presents the baseline regression results of the continuous DiD for the full sample. The dependent variable is *Entre*, which equals 1 if the individual is an entrepreneur in $t+2$, and 0 otherwise. *Exposure* is cohort-specific exposure to the post-reform pension system, and *Post* indicates observations after the reform year (1999). Birth cohorts range from 1936 to 1955, and the panel spans 1996–2002. Standard errors are clustered at the individual level. Robust t-statistics are reported in parentheses below coefficients.

	(1) *Entre*	(2) *Entre*
Exposure × *Post*	0.011***	0.006***
	(26.80)	(11.07)
Gender		0.013***
		(46.60)
Native		0.001***
		(5.14)
Age^2		-0.000*
		(-1.75)
Edu		0.008***
		(19.41)
Major		0.001***
		(11.71)
Married		0.003***
		(10.93)
lnIncome		-0.005***
		(-13.22)
lnWorkyear		0.027***
		(53.67)
lnChildren		-0.003***
		(-7.86)
lnFamSize		0.012***
		(19.77)
FamIncHigh		-0.009***
		(-30.71)
lnFamInc		-0.004***
		(-9.46)
PriorEntre		0.475***
		(548.29)
Constant	0.071***	0.045***
	(339.48)	(12.37)
Year FE	Yes	Yes
City FE	Yes	Yes
Industry FE	Yes	Yes
Birth Cohort FE	Yes	Yes
Observations	12,997,345	12,997,345
R^2	0.143	0.454

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4: Standard DID of Specific Birth Groups

This table constructs the standard DiD model by selecting specific birth cohorts based on different step sizes (1, 2, and 3 years). The policy year is 1999. Each panel reports the coefficient and robust t-statistics of the $Treat \times Post$ interaction term for a given range of birth cohorts, where $Treat$ is an indicator equal to one if an individual belongs to a cohort exposed to the reform (i.e., born in 1938 or later), and $Post$ is a dummy equal to one if the observation year is 1999 or later. Panel A (step size = 1) uses individuals born in 1937 as the control cohort and sequentially defines treated cohorts using single birth years from 1938 to 1954. Panel B (step size = 2) uses individuals born in 1936–1937 as the control group and defines treated cohorts as overlapping two-year birth windows (1938–1939, 1939–1940, ..., 1954–1955). Panel C (step size = 3) uses individuals born in 1935–1937 as the control group and defines treated cohorts as overlapping three-year birth windows (1938–1940, 1939–1941, ..., 1954–1956). Controls and fixed effects follow Column (2) of Table 3. Standard errors are clustered at the individual level.

Panel A: Step Size = 1			**Panel B: Step Size = 2**			**Panel C: Step Size = 3**		
Groups	Coef.	Obs.	Groups	Coef.	Obs.	Groups	Coef.	Obs.
37, 38	0.001	749,359	36–37, 38–39	0.005***	1,526,418	35–37, 38–40	0.006***	2,261,254
37, 39	0.003	820,247	36–37, 39–40	0.006***	1,613,653	35–37, 39–41	0.007***	2,390,243
37, 40	0.003**	836,595	36–37, 40–41	0.006***	1,671,755	35–37, 40–42	0.008***	2,532,672
37, 41	0.004***	878,349	36–37, 41–42	0.007***	1,797,836	35–37, 41–43	0.009***	2,736,412
37, 42	0.005***	962,676	36–37, 42–43	0.008***	1,959,822	35–37, 42–44	0.010***	2,972,594
37, 43	0.005***	1,040,335	36–37, 43–44	0.008***	2,111,677	35–37, 43–45	0.010***	3,143,536
37, 44	0.005***	1,114,531	36–37, 44–45	0.008***	2,204,960	35–37, 44–46	0.010***	3,249,268
37, 45	0.005***	1,133,618	36–37, 45–46	0.008***	2,236,496	35–37, 45–47	0.009***	3,275,578
37, 46	0.004***	1,146,065	36–37, 46–47	0.007***	2,243,717	35–37, 46–48	0.009***	3,279,978
37, 47	0.005***	1,140,841	36–37, 47–48	0.008***	2,235,672	35–37, 47–49	0.010***	3,248,578
37, 48	0.005***	1,138,020	36–37, 48–49	0.008***	2,209,496	35–37, 48–50	0.010***	3,195,151
37, 49	0.005***	1,114,665	36–37, 49–50	0.008***	2,158,890	35–37, 49–51	0.010***	3,115,172
37, 50	0.005***	1,087,414	36–37, 50–51	0.008***	2,102,264	35–37, 50–52	0.010***	3,066,667
37, 51	0.005***	1,058,039	36–37, 51–52	0.008***	2,081,012	35–37, 51–53	0.010***	3,051,679
37, 52	0.004***	1,066,160	36–37, 52–53	0.007***	2,095,398	35–37, 52–54	0.010***	3,045,708
37, 53	0.005***	1,072,426	36–37, 53–54	0.008***	2,081,306	35–37, 53–55	0.010***	3,047,114
37, 54	0.004***	1,052,069	36–37, 54–55	0.008***	2,076,447	35–37, 54–56	0.010***	3,052,090

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5: Robustness Tests

This table reports robustness tests. In Panel A, Columns (1) and (2) replace the sample with individuals born between 1935–1956 and 1934–1957, respectively. Column (3) expands the sample window to 1995–2003. Column (4) incorporates individual fixed effects. In Panel B, *Entre*1 equals 1 if the individual is entrepreneurial in $t+3$; *Entre*2 equals 1 if entrepreneurial in $t+1$, $t+2$, or $t+3$; *Entre*3 equals 1 if entrepreneurial in $t+2$ considering only self-employment (excluding individual business owners); *Entre*4 equals 1 if entrepreneurial in $t+2$ but not in t or $t+1$. In Panel C, Column (1) excludes Agriculture, Forestry, and Fishing; Column (2) restricts to pure Swedish individuals (born in Sweden with both parents born in Sweden); Column (3) keeps individuals observed throughout the sample period; Column (4) is a placebo test shifting the policy year to 1994 and restricting the window to 1991–1997, with *Post*1994 = 1 for 1994 and later. Controls and fixed effects follow Column (2) of Table 3. Standard errors are clustered at the individual level. Robust t-statistics are in parentheses.

Panel A. Alternative Birth Groups, Windows and Fixed Effects

	(1) Group 35–56	(2) Group 34–57	(3) 1995–2003	(4) Individual FE
Exposure × *Post*	0.007***	0.008***	0.006***	0.006***
	(14.38)	(16.87)	(12.89)	(13.11)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Birth Cohort FE	Yes	Yes	Yes	No
Individual FE	No	No	No	Yes
Observations	13,972,989	14,890,697	17,954,053	12,980,951
R^2	0.448	0.444	0.414	0.796

Panel B. Alternative Definition of Entrepreneurship

	(1) *Entre*1	(2) *Entre*2	(3) *Entre*3	(4) *Entre*4
Exposure × *Post*	0.011***	0.010***	0.012***	0.003***
	(22.33)	(21.66)	(31.22)	(11.73)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Birth Cohort FE	Yes	Yes	Yes	Yes
Observations	13,129,974	13,129,974	12,997,345	13,129,974
R^2	0.388	0.481	0.312	0.011

Panel C. Additional Filters and Placebo Test

	(1) Ind Constraint	(2) Native Swedish	(3) Strong Balanced	(4) Placebo Test
Exposure × *Post*	0.006***	0.008***	0.007***	
	(12.56)	(15.15)	(15.67)	
Exposure × *Post*1994				-0.000
				(-0.88)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Birth Cohort FE	Yes	Yes	Yes	Yes
Observations	12,728,533	10,541,607	12,433,609	14,109,830
R^2	0.401	0.457	0.459	0.468

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6: Pension Income at Age 65

This table reports the effects of pension policy intensity and entrepreneurial behavior on individuals' pension income. The dependent variable is *Pension*65, the natural logarithm of pension income received at age 65 (CPI-adjusted to the 2010 level). *Exposure* is the cohort-specific exposure to the post-reform pension system. $Entre_{<65}$ equals 1 if the individual engaged in entrepreneurial activities before age 65, and 0 otherwise. Controls, city fixed effects, and industry fixed effects are defined based on the individual's status at age 64. Standard errors are clustered at the individual level. Robust t-statistics are in parentheses.

	(1) *Pension*65	(2) *Pension*65	(3) *Pension*65	(4) *Pension*65
Exposure	0.293***	0.285***	0.238***	0.232***
	(115.97)	(105.24)	(86.23)	(80.00)
$Exposure \times Entre_{<65}$		0.045***		0.010*
		(7.43)		(1.69)
$Entre_{<65}$		-0.014***		0.068***
		(-3.22)		(12.95)
Controls	No	No	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	1,548,968	1,548,968	1,548,968	1,548,968
R^2	0.032	0.032	0.097	0.098

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 7: Heterogeneous Analysis

This table presents the heterogeneous analysis. Each variable (M) is constructed as a dummy variable. In Panel A, M equals 1 for: being unemployed in Column (1), having a job change in the current year in Column (2), and belonging to a bond-like industry in Column (3). Bond-like industries are those with stable, regulated, or publicly funded revenue streams and correspondingly low earnings volatility, such as public administration, education, and health and social work; the full classification is listed in Table A3. In Panel B, M equals 1 for: bottom 5% income in Column (1), bottom 25% income in Column (2), and high income volatility in Column (3). In Panel C, M equals 1 for: male in Column (1), being married in Column (2), and owning residential property in Column (3).For brevity, the table reports only the coefficient on the triple interaction between reform exposure, the post-reform indicator, and the heterogeneity indicator. All specifications include the corresponding constituent terms and lower-order interactions, except for those absorbed by the fixed effects, as well as the full set of baseline controls and fixed effects. Standard errors are clustered at the individual level. Robust t-statistics are reported in parentheses.

Panel A: Job Characteristics			
	(1)	(2)	(3)
	Unemployed	*JobSwitch*	*BondLikeInd*
$Exposure \times Post \times M$	0.002^{***}	0.006^{***}	-0.002^{***}
	(3.02)	(11.07)	(−5.28)
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
City FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Birth Cohort FE	Yes	Yes	Yes
Observations	12,997,345	12,997,345	12,997,345
R^2	0.453	0.453	0.453
Panel B: Income Related Characteristics			
	(1)	(2)	(3)
	Bottom5%	*Bottom25%*	*HighVol*
$Exposure \times Post \times M$	0.008^{***}	0.006^{***}	0.001^{***}
	(6.04)	(12.22)	(3.20)
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
City FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Birth Cohort FE	Yes	Yes	Yes
Observations	12,997,345	12,997,345	12,997,345
R^2	0.453	0.454	0.454

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 7: Heterogeneous Analysis (continued)

Panel C: Individual Characteristics			
	(1) *Male*	(2) *Married*	(3) *HouseOwner*
$Exposure \times Post \times M$	0.002^{***}	0.002^{***}	-0.005^{***}
	(6.64)	(5.68)	(-10.01)
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
City FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Birth Cohort FE	Yes	Yes	Yes
Observations	12,997,345	12,997,345	12,997,345
R^2	0.453	0.453	0.454

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 8: Newly Established Firms

This table examines the performance of newly established firms founded by individuals in the sample. The sample is restricted to entrepreneurs born between 1936 and 1955 who had not retired prior to the policy year. We retain only sole proprietorship for which the identity of the owner-founder can be uniquely identified. *Exposure* is the cohort-specific exposure to the post-reform pension system based on the founder's birth year, and *PostEstablish* equals 1 if the firm was established in or after 1999, and 0 otherwise. Panel A reports survival outcomes. *Duration* is defined as exit year minus establishment year plus one. The dependent variable in Column (1) is logarithm of *Duration*, ln(*Duration*). The dependent variables in Columns (2)–(4) are indicators equal to one if the firm survives at least 2, 4, and 6 years, respectively. Panel B reports operating performance over the first three years after establishment. Outcomes include the average number of employees, net sales, operating profit, and owners' equity. For each outcome, we compute the three-year average starting from the establishment year, add one, and take logs. All regressions include the same individual- and household-level controls as in the baseline entrepreneurship regressions, measured at establishment. Municipality (city) FE, industry FE, birth-cohort FE, and establishment-year FE are included. Standard errors are clustered at the founder level. Robust t-statistics are in parentheses.

Panel A: Survival Duration

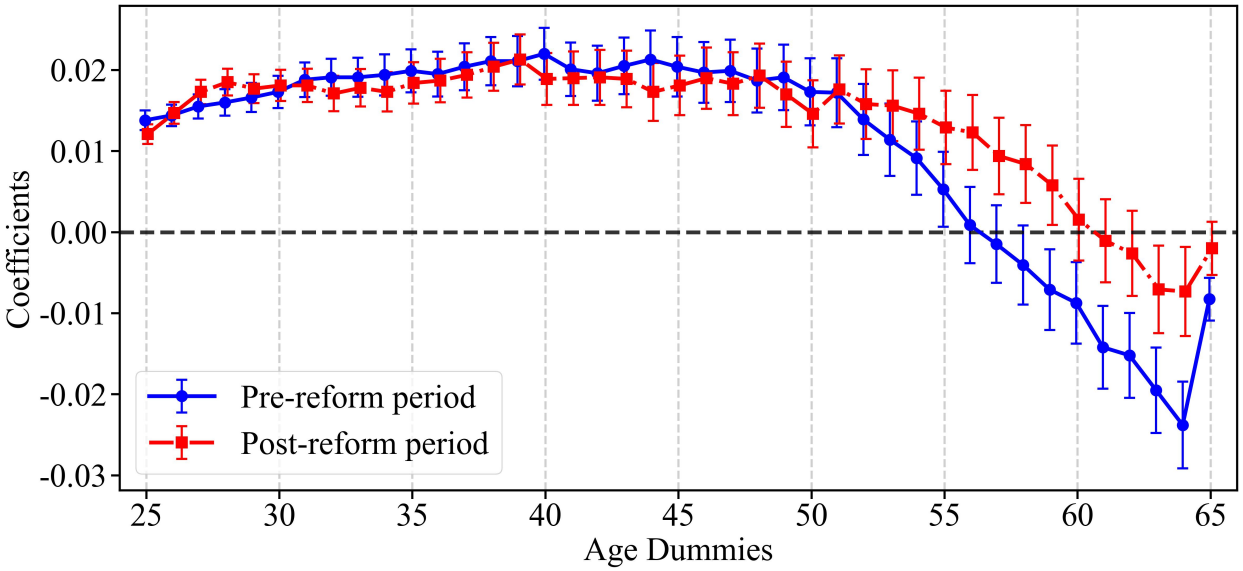
	(1) ln(*Duration*)	(2) *Duration* ≥ 2	(3) *Duration* ≥ 4	(4) *Duration* ≥ 6
Exposure × *PostEstablish*	0.137***	0.067***	0.066***	0.053***
	(3.63)	(4.93)	(4.09)	(3.13)
Controls	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Birth Cohort FE	Yes	Yes	Yes	Yes
Establishment-year FE	Yes	Yes	Yes	Yes
Observations	55,103	55,103	55,103	55,103
R^2	0.074	0.031	0.047	0.060

Panel B: Financial Performance

	(1) ln(*Employee*)	(2) ln(*Sales*)	(3) ln(*Profit*)	(4) ln(*Equity*)
Exposure × *PostEstablish*	0.048***	0.433***	0.191***	0.432***
	(2.88)	(5.67)	(2.72)	(3.31)
Controls	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Birth Cohort FE	Yes	Yes	Yes	Yes
Establishment-year FE	Yes	Yes	Yes	Yes
Observations	29,580	29,580	26,024	25,905
R^2	0.053	0.077	0.059	0.054

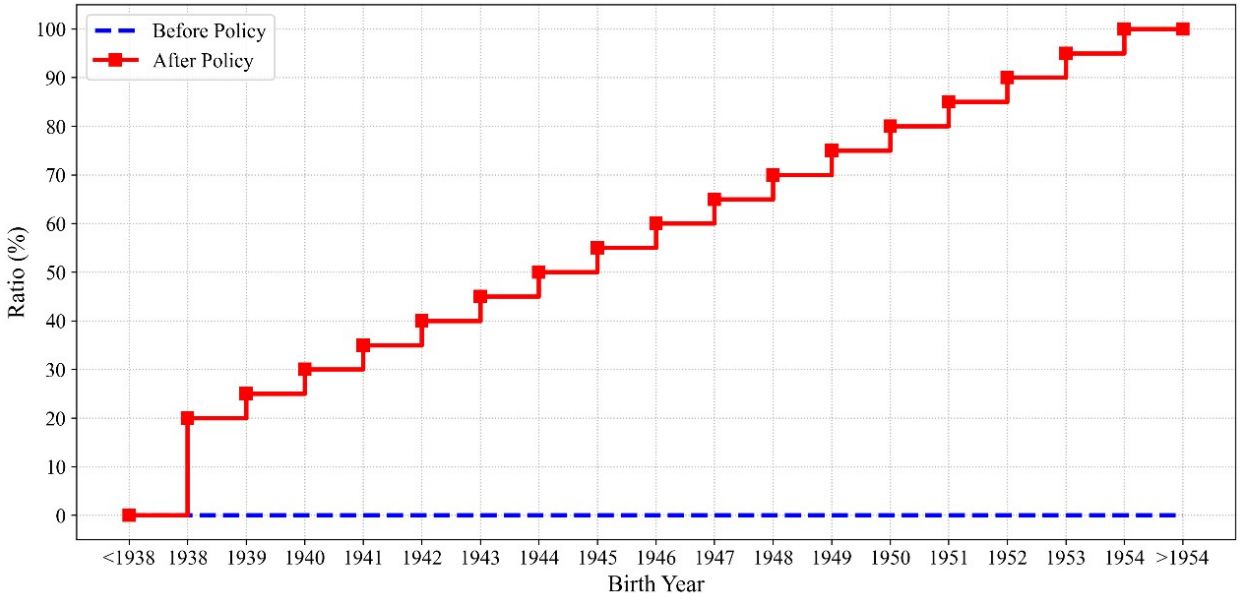
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Figure 1: Entrepreneurship by Age



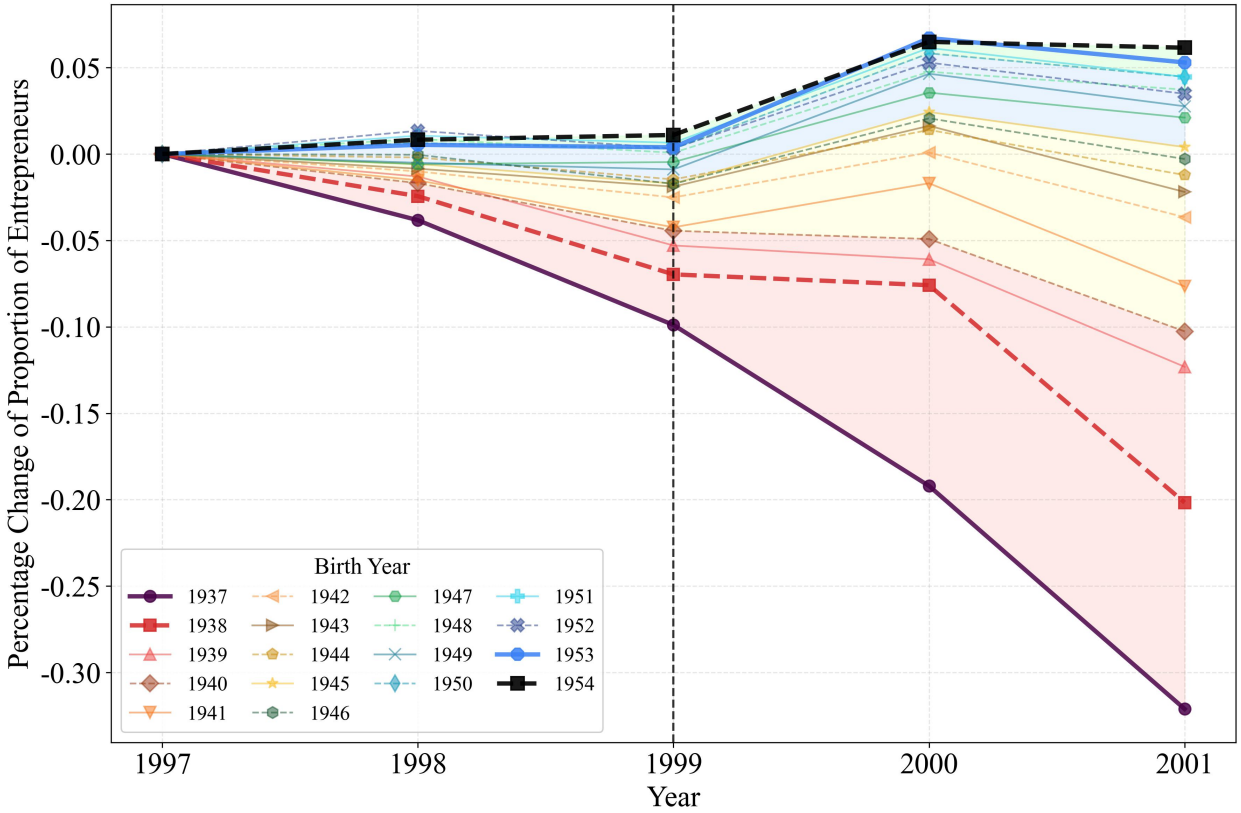
This figure reports regression coefficient estimates from models estimated separately for the pre-reform and post-reform samples. The dependent variable is an indicator for entrepreneurial entry. Each regression includes a full set of age dummies (ages 25 to 65), where each dummy equals one if an individual is of a given age in a given year, and zero otherwise. The reported coefficients capture the relationship between age and entrepreneurial entry relative to an omitted age group. Error bars represent 95% confidence intervals based on standard errors.

Figure 2: The Implementation Plan of the Pension Reform



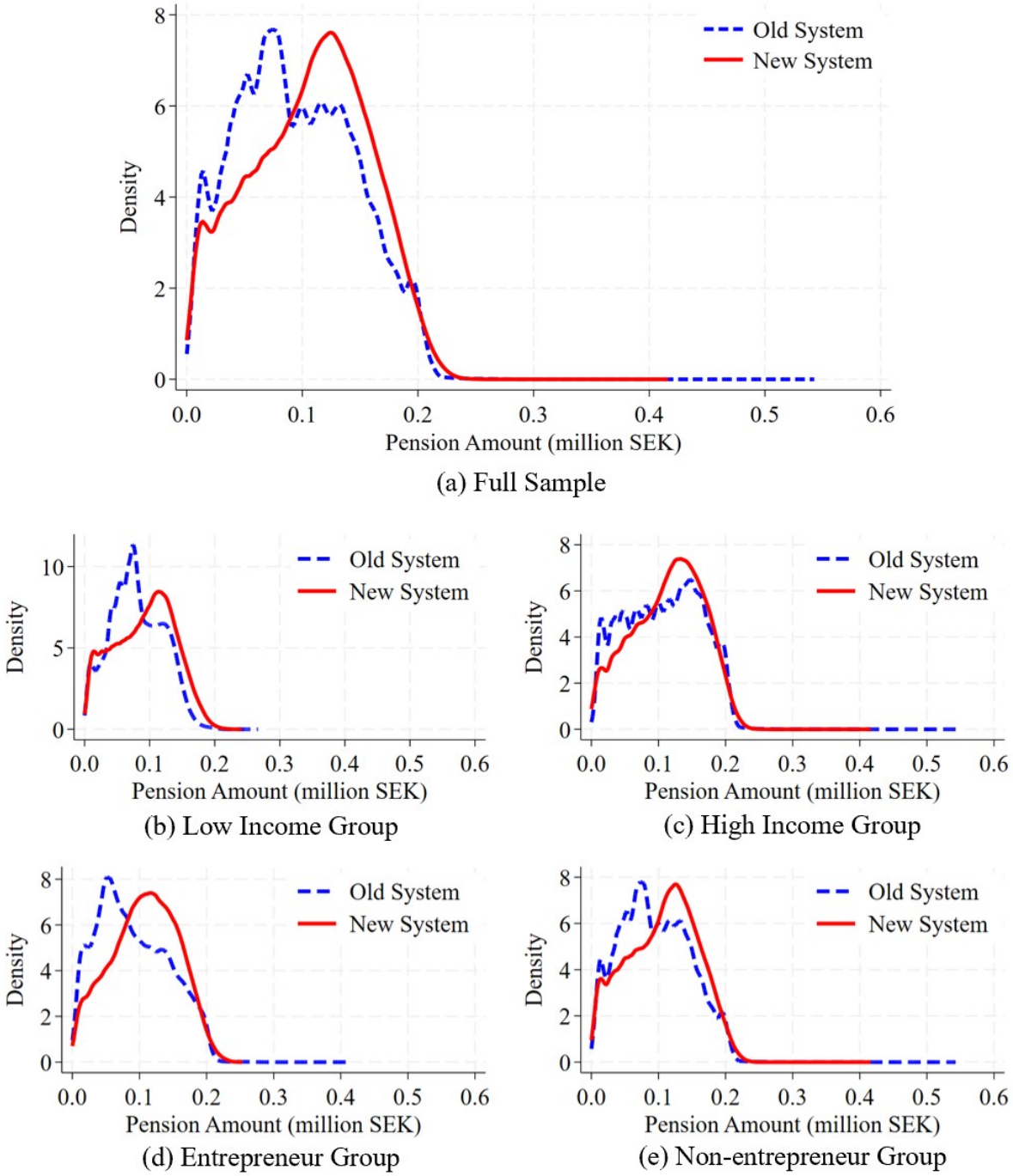
This figure shows the share of pension rights accrued under the post-reform public pension system by birth cohort; the vertical axis reports this share in percent. Individuals born in 1938 were the first cohort partially covered by the reform: 20 percent of their pension rights were determined under the new rules, while the remaining 80 percent were determined under the pre-reform rules. For each subsequent cohort, the share accruing under the post-reform system increased by 5 percentage points. Cohorts born in 1954 or later accrue all pension rights under the post-reform system. The blue dashed line ("Before Policy") indicates zero post-reform exposure prior to the reform, while the red step line ("After Policy") reflects the gradual increase in post-reform exposure across birth cohorts.

Figure 3: Growth of Entrepreneurs across Cohorts



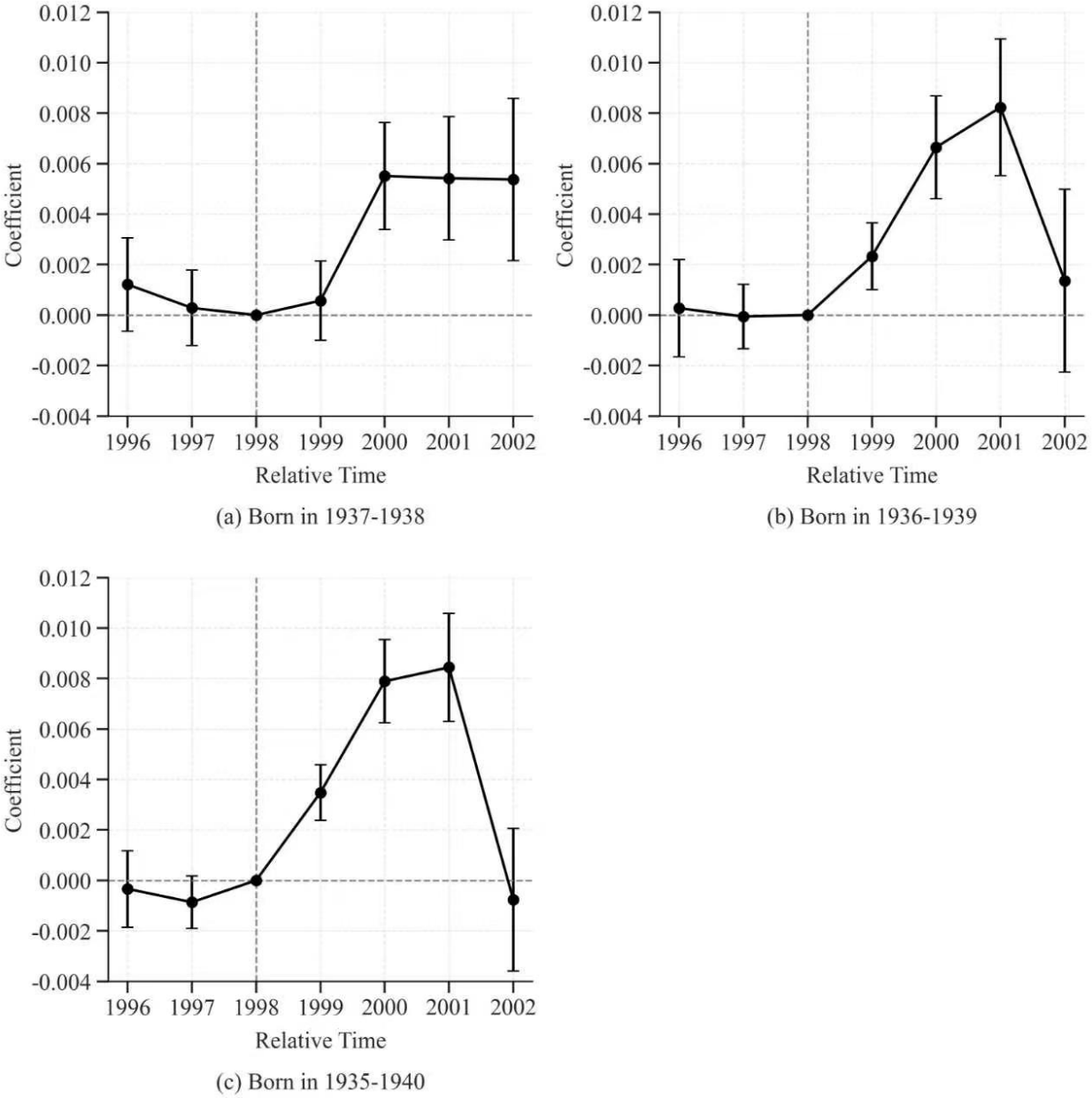
This figure plots the growth rate in the proportion of entrepreneurs from 1997 to 2001. Each line represents a birth cohort (1937–1954), and markers indicate cohort-year observations. The shaded areas indicate four ranges of cohorts, corresponding to differences in exposure to the pension reform as determined by the reform rules based on birth year—1937–1941 (purple), 1942–1946 (red/pink), 1947–1950 (yellow/beige), and 1951–1954 (light blue). The growth rate is calculated as the percentage change in the annual entrepreneurial share for each birth cohort relative to its 1997 level. The vertical dashed line marks the implementation of the pension reform in 1999.

Figure 4: Pension Distribution



This figure displays the density distribution of 65-year-old individuals' pension amounts, based on data from 1990 to 2023. The blue line corresponds to the Old System (those born in 1937 or earlier), and the red line corresponds to the New System (those born in 1954 or later). The horizontal axis represents pension amount (in million SEK, adjusted to 2010 CPI). Panel (a) uses the full sample. Panel (b) corresponds to the Low Income Group, which includes individuals sorted by earnings at age 64 and falling in the bottom 50% of earners. Panel (c) is the High Income Group, consisting of the top 50% of earners when sorted by earnings at age 64. Panel (d) represents the Entrepreneur Group, composed of individuals with at least one entrepreneurial experience before age 65, while Panel (e) is the Non-entrepreneur Group, covering those with no entrepreneurial history before age 65.

Figure 5: Parallel Trend of Standard DID



This figure shows parallel-trends test results for three representative cohort comparisons: (a) 1937 vs. 1938, (b) 1936–1937 vs. 1938–1939, and (c) 1935–1937 vs. 1938–1940. The policy year is 1999. In each panel, the later-born cohort or cohort group constitutes the treatment group, while the earlier-born cohort or cohort group constitutes the control group. Error bars denote 95% confidence intervals.

Online Appendix to "Pension and Entrepreneurship: Evidence from Sweden's Transition from Defined Benefit to Defined Contribution"

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1 Variable Definitions and Sample Construction

1.1 Variable Definitions and Sample Selection

This subsection reports the construction of the variables used in the analysis and the sample selection procedure. Table A1 defines each dependent variable, explanatory variable, and control, grouped by the table in which it appears. Table A2 reports the number of observations remaining after each filtering step, and Table A3 lists the industry divisions classified as bond-like.

Table A1: Variable Descriptions

Variables	Descriptions
Panel A: Dependent Variable	
Entre	The dummy variable equals 1 if the individual is in an entrepreneurial state (i.e., either self-employed or an individual business owner) in the subsequent period $t+2$, and 0 otherwise (Hou et al., 2025).
Panel B: Explanatory Variables	
Exposure × *Post*	Applicable to the continuous DiD model. *Exposure* is cohort-specific share of an individual's pension rights accrued under the post-reform pension system, and *Post* is coded as 1 if the year is 1999 or later, and 0 otherwise.
Treat × *Post*	Applicable to the standard DiD model (Table 4). *Treat* is coded as 1 if the individual was born in 1938 or later (partially covered by the post-reform pension system), and 0 otherwise. *Post* is coded as 1 if the year is 1999 or later, and 0 otherwise.
Panel C: Control Variables	
Gender	Equals 1 if the individual is male, otherwise 0.
Native	Equals 1 if the individual is of purely Swedish origin, i.e., both the individual and their parents were born in Sweden; otherwise 0.
Age	An individual's age, calculated as the current year minus birth year.
Age^2	Age squared.
Edu	Coded as 0 if educational attainment is senior high school or below; 1 if bachelor's or master's degree; and 2 if doctoral degree.
Major	Coded as 0 if educational attainment is senior high school or below; 1 if the major is in natural sciences, mathematics, computer science, technology and manufacturing; 2 if the major is in economics, business, or public administration; 3 if the major is in law and legal science; and 4 for other majors.
Married	Coded as 1 if the individual is married in the current year, and 0 otherwise.
lnIncome	The logarithm of one plus the total personal income, including labor income and capital income.
lnWorkyear	The logarithm of one plus the years of employment, where years of employment are calculated starting from 1990.
lnChildren	The logarithm of one plus the number of children under the age of 17.
lnFamSize	The logarithm of one plus the number of individuals registered in the same household.

Continued on next page

Table A1. Variable Descriptions (continued)

Variables	Descriptions
FamIncHigh	Coded as 1 if the individual is the highest-income earner in the household, and 0 otherwise. If the individual is the sole member of the household, it is coded as 1.
lnFamInc	The logarithm of one plus the total income of all members in the family.
PriorEntre	Coded as 1 if the individual had entrepreneurial experience prior to the current year, and 0 otherwise.
Panel D: Other Variables	
D.1. Table 5	
*Entre*1	Equals 1 if the individual is in an entrepreneurial state in the future period $t+3$, and 0 otherwise.
*Entre*2	Equals 1 if the individual is in an entrepreneurial state in $t+1$, $t+2$ or $t+3$, and 0 otherwise.
*Entre*3	Equals 1 if the individual is in an entrepreneurial state in the future period $t+2$ (only self-employment; excluding individual business owners), and 0 otherwise.
*Entre*4	Equals 1 if the individual is in an entrepreneurial state in the future period $t+2$ but not in t or $t+1$, and 0 otherwise.
*Post*1994	Coded as 1 for observations in 1994 and later, and 0 otherwise.
D.2. Table 6	
*lnPension*65	The natural logarithm of pension income received at age 65 (CPI-adjusted to the 2010 level).
$Entre_{<65}$	Equals 1 if the individual engaged in entrepreneurial activities before age 65, and 0 otherwise.
D.3. Table 7	
Male	Equals 1 if the individual is male, and 0 otherwise.
HouseOwner	Equals 1 if the individual owns residential property, and 0 otherwise.
Unemployed	Equals 1 if the individual is unemployed, and 0 otherwise.
JobSwitch	Equals 1 if the individual experienced a job change in the current year, and 0 otherwise.
BondLikeIndustry	Equals 1 if the individual's industry belongs to the bond-like industry, and 0 otherwise. More information on bond like industry classification can be found in Table A3
*Bottom*5%	Equals 1 if the individual's annual income ranks in the bottom 5% or below, and 0 otherwise.
*Bottom*25%	Equals 1 if the individual's annual income ranks in the bottom 25% or below, and 0 otherwise.
HighVolatility	The standard deviation of total income growth from year $t-4$ to year t (Bonaparte, Korniotis, and Kumar, 2014), further split into high/low groups by the within-year median.
D.4. Table 8	
PostEstablish	Equals 1 if a firm was established in or after 1999, and 0 otherwise.
$\ln(Duration)$	The natural logarithm of survival duration *Duration*, defined as exit year minus establishment year plus one.
$\mathbb{1}\{Duration \geq 2\}$	Equals 1 if $Duration \geq 2$, and 0 otherwise.
$\mathbb{1}\{Duration \geq 4\}$	Equals 1 if $Duration \geq 4$, and 0 otherwise.
$\mathbb{1}\{Duration \geq 6\}$	Equals 1 if $Duration \geq 6$, and 0 otherwise.
LnEmployee	The natural logarithm of the future three-year average number of employees.
LnSales	The natural logarithm of the future three-year average net sales.
LnProfit	The natural logarithm of the future three-year average operating profit.

Continued on next page

Table A1. Variable Descriptions (continued)

Variables	Descriptions
LnEquity	The natural logarithm of the future three-year average owners' equity.

Table A2: Sample Selection

This table outlines the sample selection process for the analysis, starting with the initial LISA dataset spanning 1996–2002. A series of sequential filters are applied to refine the sample. The final sample consists of 12,997,345 observations, corresponding to 1,939,666 distinct individuals.

Procedures	Loss	Remain
LISA data (1996–2002)		41,350,322
Filters:		
Keep individuals born between 1936 and 1955	(26,310,839)	15,039,483
Exclude total income less than 1,000 SEK or top 0.01%	(201,118)	14,838,365
Exclude individuals who retired before the policy year (1999)	(1,708,391)	13,129,974
Exclude observations with unknown entrepreneurial status in year $t+2$	(132,629)	12,997,345
Final sample		12,997,345

Table A3: Bond-Like Industries

This table lists the two-digit SNI 2002 industry divisions classified as bond-like, used to construct the indicator *BondLikeIndustry* in the heterogeneity analysis. Bond-like industries are those with stable, regulated, or publicly funded revenue streams and correspondingly low earnings volatility. All remaining industries are coded zero.

SNI	Description
11	Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction excluding surveying
40	Electricity, gas, steam and hot water supply
41	Collection, purification and distribution of water
64	Post and telecommunications
65	Financial intermediation, except insurance and pension funding
66	Insurance and pension funding, except compulsory social security
70	Real estate activities
75	Public administration and defence; compulsory social security
80	Education
85	Health and social work
90	Sewage and refuse disposal, sanitation and similar activities

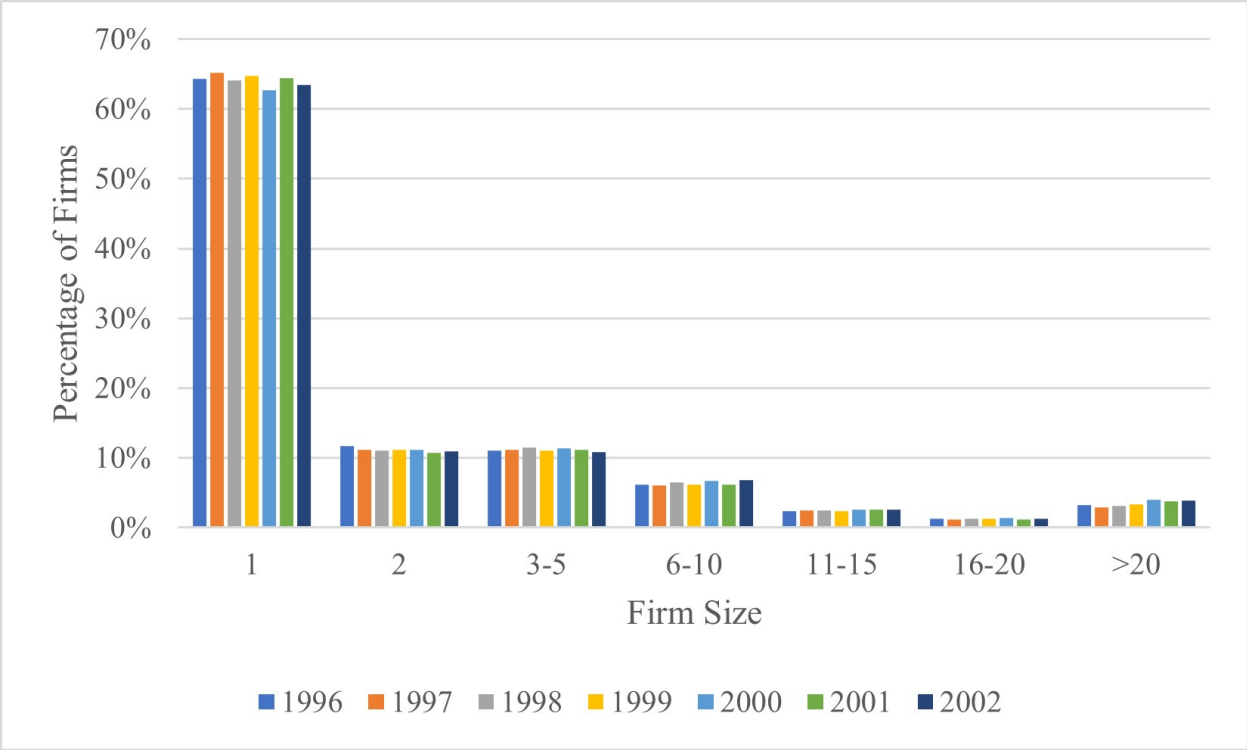
1.2 Characteristics of Newly Established Firms

This subsection describes the size and industry composition of the firms founded by entrepreneurs in our sample. These characteristics indicate what kind of entrepreneurial activity the reform induces.

Figure A1 illustrates the distribution of newly established companies in different size categories during the period 1996–2002. Firm size is measured by the total number of employees, and the bars report the percentage of firms in each size group for each year. The figure shows that the entrepreneurial activity in our sample is dominated by very small firms. More than 60% of newly established firms are single-person enterprises, approximately 10% employ two workers, and around 10% have between three and five employees. Firms with six or more employees account for only a small fraction of new establishments. These patterns are stable over time, indicating that the entrepreneurial activity captured in our data primarily reflects individual-level or small-scale business formation.

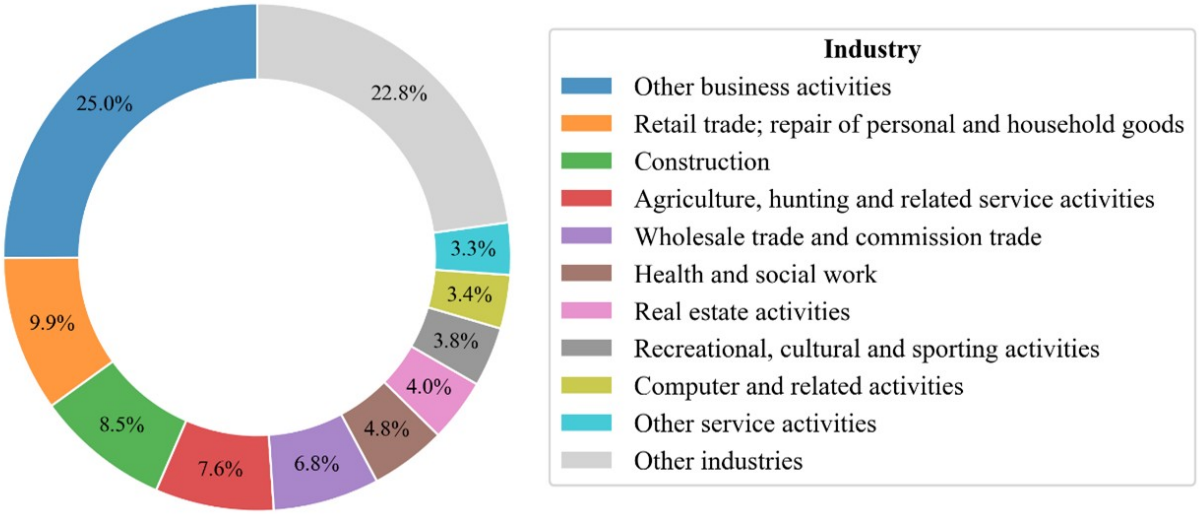
Figure A2 presents the industry distribution of newly established firms, classified at the two-digit level of the Swedish industry classification system. The distribution indicates that new firm formation is concentrated in service-oriented industries. *Other business activities* account for the largest share of new establishments (25%), reflecting professional and business service activities such as consulting, legal, accounting, and technical services. Retail trade and the repair of personal and household goods represent 9.9% of new firms, followed by construction (8.5%) and agriculture, hunting, and related service activities (7.6%). Wholesale trade and commission trade account for 6.8% of new establishments, while health and social work (4.8%), real estate activities (4.0%), and recreational, cultural, and sporting activities (3.8%) each constitute smaller shares. Computer and related activities (3.4%) and other service activities (3.3%) account for relatively modest proportions. All remaining industries are aggregated into Other industries, which together represent 22.8% of newly established firms.

Figure A1: Size Distribution of Newly Established Firms



This figure illustrates the distribution of the newly established firms across different size categories over the period 1996–2002. Firm size refers to the total number of employees in a firm. The bars reflect the relative percentage of firms in each size group for each year.

Figure A2: Industry Distribution of Newly Established Firms



This figure presents the industry distribution of newly established firms, classified at the two-digit level of the Swedish industry classification system. The visualization focuses on the top 10 industries with the highest proportion of new establishments, and all remaining industries are consolidated into the aggregated "Other industries". The founders are individuals born between 1936 and 1955 who have not retired, and whose firms were established between 1996 and 2002.

2 Pension Mapping and Model Derivations

This appendix provides the full setup, the institutional pension mappings, and the derivations underlying the conceptual framework in Section 3. The main text retains only the elements needed to state Proposition 1 and the empirical predictions. Here we present the complete occupational-choice problem and the comparative statics.

2.1 Full Occupational-Choice Setup

Individuals live for two periods. In the first period, they choose between salaried employment and entrepreneurship. In the second period, they retire. Preferences are given by

$$U = u(c_0) + \beta u(c_1), \tag{2.1}$$

where $u'(\cdot) > 0$, $u''(\cdot) < 0$, and $\beta \in (0,1)$ is the weight placed on retirement-period utility. We abstract from working-period saving so that working-period consumption equals income from the chosen occupation. This assumption isolates the effect of the public-pension formula on occupational choice.

Let $e > 0$ denote annual earnings under salaried employment and let $T \geq 15$ denote the length of a full pensionable career. Remaining in salaried employment generates earnings e over T years.

Entrepreneurship generates two possible outcomes. With probability $\pi \in (0,1)$, the venture succeeds and generates annual earnings $\rho_H e$, where $\rho_H > 1$. With probability $1-\pi$, the venture fails and generates annual earnings $\rho_L e$, where $\rho_L \in (0,1)$. The restriction $\rho_L > 0$ ensures positive working-period consumption under standard CRRA or logarithmic preferences. The limiting case

$\rho_L = 0$ can instead be accommodated by introducing a positive consumption floor.

Failure may also shorten the effective pensionable contribution history. Let $T_L \in \{1,\ldots,T\}$ denote the number of years with qualifying pensionable earnings in the failure state. Thus, ρ_L captures the severity of the earnings loss during active years, whereas T_L captures the duration of the contribution interruption.

Let $j \in \{S,H,L\}$ index the three career paths: S denotes salaried employment, H denotes entrepreneurial success, and L denotes entrepreneurial failure. Let $Y_j(e)$ denote the pensionable earnings history generated by path j. The three histories are

$$Y_S(e) = \big(e,\ldots,e\big), \tag{2.2}$$

$$Y_H(e) = \big(\rho_H e,\ldots,\rho_H e\big), \tag{2.3}$$

$$Y_L(e,T_L) = \big(\underbrace{\rho_L e,\ldots,\rho_L e}_{T_L \text{ years}},\ \underbrace{0,\ldots,0}_{T-T_L \text{ years}}\big). \tag{2.4}$$

The associated numbers of qualifying contribution years are

$$N_S = N_H = T, \qquad N_L = T_L. \tag{2.5}$$

Let $P^{DB}(Y,N)$ denote annual public-pension income under the pre-reform defined-benefit system, and let $P^{DC}(Y)$ denote annual public-pension income under the post-reform contribution-based system. Define the path-specific pension amounts as

$$P_j^{DB}(e) \equiv P^{DB}\big(Y_j(e),N_j\big), \tag{2.6}$$

$$P_j^{DC}(e) \equiv P^{DC}\big(Y_j(e)\big). \tag{2.7}$$

For the failure path, the dependence on T_L is suppressed when no confusion can arise.

For a generic reform exposure $\omega \in [0,1]$, the applicable pension amount along path j is

$$P_j^{\omega}(e) = (1-\omega)P_j^{DB}(e) + \omega P_j^{DC}(e). \tag{2.8}$$

The reform-induced pension gain associated with path j is

$$\Delta P_j(e) \equiv P_j^{DC}(e) - P_j^{DB}(e). \tag{2.9}$$

Hence,

$$\frac{\partial P_j^{\omega}(e)}{\partial \omega} = \Delta P_j(e). \tag{2.10}$$

To match the notation in the main text, we write $\Delta P(Y_j(e))$ for $\Delta P_j(e)$ when the associated contribution history N_j is implied by the career path.

Individuals also have $A \geq 0$ units of annualized non-public-pension retirement resources, including occupational pension income, private savings, and other retirement wealth. We treat A as fixed across occupational choices in order to isolate the public-pension channel. Retirement consumption under career path j is therefore

$$R_j^{\omega}(e) \equiv A + P_j^{\omega}(e). \tag{2.11}$$

Lifetime utility from remaining in salaried employment is

$$U_S^{\omega}(e) = u(e) + \beta u\big(R_S^{\omega}(e)\big). \tag{2.12}$$

Expected lifetime utility from entrepreneurship is

$$U_E^{\omega}(e) = \pi \left[u(\rho_H e) + \beta u\big(R_H^{\omega}(e)\big) \right] + (1-\pi) \left[u(\rho_L e) + \beta u\big(R_L^{\omega}(e)\big) \right]. \tag{2.13}$$

Define the gross utility advantage of entrepreneurship relative to salaried employment as

$$\Phi_{\omega}(e) \equiv U_E^{\omega}(e) - U_S^{\omega}(e). \tag{2.14}$$

Individual i enters entrepreneurship if

$$\Phi_{\omega}(e) \geq \kappa_i, \tag{2.15}$$

where κ_i is an idiosyncratic fixed or nonpecuniary cost of entry, measured in utility units.

Let F_{κ} and f_{κ} denote the cumulative distribution function and density of entry costs. Conditional on baseline earnings e, the probability of entrepreneurial entry is

$$\Pr(\text{Entry} \mid \omega, e) = F_{\kappa}\big(\Phi_{\omega}(e)\big). \tag{2.16}$$

Differentiating with respect to reform exposure gives

$$\frac{\partial \Pr(\text{Entry} \mid \omega, e)}{\partial \omega} = f_{\kappa}\big(\Phi_{\omega}(e)\big) \frac{\partial \Phi_{\omega}(e)}{\partial \omega}. \tag{2.17}$$

The reform is assumed to affect occupational choice only through the public-pension mapping. In particular, it does not directly change working-period earnings, entrepreneurial success

probabilities, taxes, or business opportunities.

2.2 Pension Schedules

This subsection provides stylized representations of the two pension systems that capture the institutional features relevant for the model.

Let $Y = (y_1, \ldots, y_T)$ denote a pensionable earnings history. Let $y_{(1)} \geq y_{(2)} \geq \cdots \geq y_{(T)}$ denote the ordered annual pension bases. Define the average pension base over the 15 highest-earning years as

$$AP_{15}(Y) \equiv \frac{1}{15} \sum_{m=1}^{15} y_{(m)}. \tag{2.18}$$

If the individual has fewer than 15 years with positive pensionable earnings, the remaining entries among the 15 highest years are zero.

The pre-reform DB system consists of a flat component, an earnings-related ATP component, and a supplement for individuals with low earnings-related pensions. A stylized representation is

$$P^{DB}(Y,N) = FP + ATP(Y,N) + \max\left\{K^{DB} - ATP(Y,N), 0\right\}, \tag{2.19}$$

where FP denotes the flat-rate component and K^{DB} is the supplement threshold net of the flat-rate component.

The earnings-related ATP component is

$$ATP(Y,N) = \alpha AP_{15}(Y) \min\left\{\frac{N}{30}, 1\right\}, \tag{2.20}$$

where $\alpha > 0$ converts the pension base into annual benefits.

The DB system can amplify adverse earnings histories through two channels. First, low earnings may reduce $AP_{15}(Y)$, particularly when the individual has accumulated fewer than 15 positive or high-earning years. Second, when the contribution history falls below 30 years, the ATP entitlement is scaled down by $N/30$, unless the low-pension supplement fully offsets the reduction.

Under the post-reform contribution-based system, pension rights depend more closely on cumulative lifetime pensionable earnings. Let

$$I(Y) = \delta_P \sum_{t=1}^{T} \min\{y_t, \bar{y}\}, \tag{2.21}$$

where $\bar{y}$ is the pensionable-earnings ceiling and $\delta_P > 0$ summarizes the contribution rate, account indexation, and annuity conversion.

The post-reform pension schedule is

$$P^{DC}(Y) = I(Y) + \max\left\{K^{DC} - \eta I(Y), 0\right\}, \qquad 0 \leq \eta < 1, \tag{2.22}$$

where K^{DC} denotes the guarantee-pension threshold and η is the clawback rate.

When the guarantee binds,

$$\frac{\partial P^{DC}(Y)}{\partial I(Y)} = 1 - \eta > 0. \tag{2.23}$$

This differs from the DB supplement region, where an increase in the earnings-related ATP component is offset one-for-one by a reduction in the supplement.

For the entrepreneurial failure path, the reform-induced pension gain is

$$\Delta P_L(e, T_L) = P^{DC}\big(Y_L(e, T_L)\big) - P^{DB}\big(Y_L(e, T_L), T_L\big). \tag{2.24}$$

This object captures both the change in the earnings-to-pension mapping and the absence, under the DC system, of a separate contribution-years scaling factor beyond the pension consequences of foregone contributions themselves.

2.3 Proof of Proposition 1

From equations (2.12)–(2.14), working-period utility does not depend directly on ω. Using (2.10), define

$$D_\omega(e) \equiv \frac{\partial \Phi_\omega(e)}{\partial \omega} = \beta \Big[\pi u'\big(R_H^\omega(e)\big)\Delta P_H(e) + (1-\pi)u'\big(R_L^\omega(e)\big)\Delta P_L(e) - u'\big(R_S^\omega(e)\big)\Delta P_S(e) \Big]. \tag{2.25}$$

Equation (2.17) therefore becomes

$$\frac{\partial \Pr(\text{Entry} \mid \omega, e)}{\partial \omega} = f_\kappa\big(\Phi_\omega(e)\big) D_\omega(e). \tag{2.26}$$

If the entry-cost distribution has positive density at the occupational-choice margin, then

$$f_\kappa\big(\Phi_\omega(e)\big) > 0.$$

Consequently,

$$D_\omega(e) > 0 \quad \Longrightarrow \quad \frac{\partial \Pr(\text{Entry} \mid \omega, e)}{\partial \omega} > 0. \tag{2.27}$$

This proves Proposition 1.

The condition $D_\omega(e) > 0$ can equivalently be written as

$$\begin{aligned}\pi u'\big(R_H^\omega(e)\big)\Delta P_H(e) + (1-\pi)u'\big(R_L^\omega(e)\big)\Delta P_L(e) \\ > u'\big(R_S^\omega(e)\big)\Delta P_S(e).\end{aligned} \tag{2.28}$$

Thus, the reform encourages entrepreneurship when the marginal-utility-weighted pension gain associated with the entrepreneurial paths exceeds the corresponding gain from remaining in salaried employment.

Proposition 1 is a marginal result evaluated at a given exposure level ω. For a finite increase from ω_0 to ω_1, where $\omega_1 > \omega_0$,

$$\begin{aligned}&\Pr(\text{Entry} \mid \omega_1, e) - \Pr(\text{Entry} \mid \omega_0, e) \\ &\quad = \int_{\omega_0}^{\omega_1} f_\kappa\big(\Phi_s(e)\big) D_s(e)\, ds.\end{aligned} \tag{2.29}$$

A sufficient condition for the finite exposure increase to raise entry is therefore $D_s(e) > 0$ for every $s \in [\omega_0, \omega_1]$.

2.4 Comparative Statics: Downside Risk

The comparative statics below characterize how the utility-side reform incentive $D_\omega(e)$ varies with downside risk. Translating these results into heterogeneity in entry probabilities requires accounting for the density of entry costs at the occupational-choice margin.

For any continuous characteristic x, differentiation of (2.26) gives

$$\frac{\partial}{\partial x}\left[\frac{\partial \Pr(\text{Entry} \mid \omega, e)}{\partial \omega}\right] = f'_{\kappa}\big(\Phi_{\omega}(e)\big)\frac{\partial \Phi_{\omega}(e)}{\partial x}D_{\omega}(e) + f_{\kappa}\big(\Phi_{\omega}(e)\big)\frac{\partial D_{\omega}(e)}{\partial x}. \tag{2.30}$$

Accordingly, the comparative statics of $D_{\omega}(e)$ translate directly into comparative statics of the entry response when the density of entry costs is locally constant across the compared groups, or more generally when the first term in (2.30) does not overturn the second. This local-density condition is maintained when interpreting the comparative statics below.

Because the pension schedules contain guarantee thresholds, an earnings ceiling, the 30-year contribution rule, and the best-15-years rule, the continuous derivatives below are local. They are evaluated away from the corresponding kinks. At a kink, the expressions should be interpreted as one-sided derivatives.

2.4.1 Failure Probability

Define the marginal-utility-weighted pension gain in state j as

$$G_j^{\omega}(e) \equiv u'\big(R_j^{\omega}(e)\big)\Delta P_j(e). \tag{2.31}$$

Equation (2.25) can then be written as

$$D_{\omega}(e) = \beta\left[\pi G_H^{\omega}(e) + (1-\pi)G_L^{\omega}(e) - G_S^{\omega}(e)\right]. \tag{2.32}$$

Holding the state-contingent earnings histories fixed, differentiation with respect to the success probability gives

$$\frac{1}{\beta}\frac{\partial D_\omega(e)}{\partial \pi} = G_H^\omega(e) - G_L^\omega(e). \tag{2.33}$$

Equivalently, letting $q \equiv 1-\pi$ denote the failure probability,

$$\frac{1}{\beta}\frac{\partial D_\omega(e)}{\partial q} = G_L^\omega(e) - G_H^\omega(e). \tag{2.34}$$

Thus, a higher failure probability increases the reform-induced utility gain from entrepreneurship if and only if

$$u'\big(R_L^\omega(e)\big)\Delta P_L(e) > u'\big(R_H^\omega(e)\big)\Delta P_H(e). \tag{2.35}$$

One convenient set of primitive sufficient conditions is

$$R_L^\omega(e) \le R_H^\omega(e), \qquad \Delta P_L(e) \ge \Delta P_H(e) \ge 0, \tag{2.36}$$

together with either $\Delta P_L(e) > \Delta P_H(e)$, or $R_L^\omega(e) < R_H^\omega(e)$ and $\Delta P_H(e) > 0$. Under these conditions, concavity implies

$$G_L^\omega(e) > G_H^\omega(e),$$

and hence

$$\frac{\partial D_\omega(e)}{\partial q} > 0.$$

Equation (2.34) holds when the state-contingent earnings histories are held fixed. If, for example, ρ_H is adjusted when π changes in order to hold expected entrepreneurial earnings constant,

additional payoff effects arise. The model therefore does not imply a globally monotone response to the failure probability under all such joint parameter changes.

2.4.2 Failure-State Earnings

Consider a change in ρ_L, holding T_L fixed. Define the path derivatives

$$P^{DB}_{L,\rho} \equiv \frac{\partial}{\partial \rho_L} P^{DB}\big(Y_L(e,T_L),T_L\big), \tag{2.37}$$

$$P^{DC}_{L,\rho} \equiv \frac{\partial}{\partial \rho_L} P^{DC}\big(Y_L(e,T_L)\big), \tag{2.38}$$

$$P^{\omega}_{L,\rho} \equiv (1-\omega)P^{DB}_{L,\rho} + \omega P^{DC}_{L,\rho}, \tag{2.39}$$

$$\Delta P_{L,\rho} \equiv P^{DC}_{L,\rho} - P^{DB}_{L,\rho}. \tag{2.40}$$

Only the failure-state component of $D_\omega(e)$ depends on ρ_L. Differentiating that component gives

$$\begin{aligned}\frac{1}{\beta(1-\pi)}\frac{\partial D_\omega(e)}{\partial \rho_L} &= u''\big(R^{\omega}_L(e)\big)P^{\omega}_{L,\rho}\Delta P_L(e,T_L) \\ &\quad + u'\big(R^{\omega}_L(e)\big)\Delta P_{L,\rho}.\end{aligned} \tag{2.41}$$

Let

$$a(c) \equiv -\frac{u''(c)}{u'(c)} \tag{2.42}$$

denote absolute risk aversion. Dividing (2.41) by $\beta(1-\pi)u'(R_L^{\omega}(e)) > 0$ gives

$$\frac{1}{\beta(1-\pi)u'(R_L^{\omega}(e))}\frac{\partial D_{\omega}(e)}{\partial \rho_L} = \Delta P_{L,\rho} - a\big(R_L^{\omega}(e)\big)P_{L,\rho}^{\omega}\Delta P_L(e,T_L). \tag{2.43}$$

Suppose that pension income is locally nondecreasing in failure-state earnings and that the reform improves the failure-state pension:

$$P_{L,\rho}^{\omega} \geq 0, \qquad \Delta P_L(e,T_L) > 0.$$

The second term on the right-hand side of (2.43) is then the concavity channel: lower failure-state earnings reduce retirement resources and increase the marginal value of the reform-induced pension gain.

A reduction in ρ_L, corresponding to a more severe failure-state earnings loss, increases $D_{\omega}(e)$ whenever

$$a\big(R_L^{\omega}(e)\big)P_{L,\rho}^{\omega}\Delta P_L(e,T_L) > \Delta P_{L,\rho}. \tag{2.44}$$

This condition allows the local slope of the pension gain to offset part of the marginal-utility channel. Consequently, the response to failure-state earnings need not be globally monotone, particularly when minimum-pension provisions bind.

2.4.3 Contribution Interruptions

The contribution length T_L is discrete. We therefore analyze the effect of an additional qualifying contribution year using finite differences rather than treating T_L as a continuously differentiable

variable.

Let $n \in \{1, \ldots, T-1\}$ denote the number of qualifying contribution years in the failure state. Define

$$P_L^r(n) \equiv P^r\big(Y_L(e,n), n\big), \qquad r \in \{DB, DC, \omega\}, \tag{2.45}$$

$$\Delta P_L(n) \equiv P_L^{DC}(n) - P_L^{DB}(n), \tag{2.46}$$

$$R_L^{\omega}(n) \equiv A + P_L^{\omega}(n). \tag{2.47}$$

For the DC schedule, the second argument n is redundant and is included only to keep the notation symmetric.

Define the incremental pension generated by one additional qualifying contribution year as

$$\mathcal{I}_n^r \equiv P_L^r(n+1) - P_L^r(n), \qquad r \in \{DB, DC, \omega\}. \tag{2.48}$$

It follows that

$$\Delta P_L(n+1) - \Delta P_L(n) = \mathcal{I}_n^{DC} - \mathcal{I}_n^{DB}. \tag{2.49}$$

Because only the failure-state component of D_ω depends on n,

$$\begin{aligned} &D_\omega(e,n+1) - D_\omega(e,n) \\ &= \beta(1-\pi)\Big[u'\big(R_L^{\omega}(n+1)\big)\Delta P_L(n+1) - u'\big(R_L^{\omega}(n)\big)\Delta P_L(n)\Big]. \end{aligned} \tag{2.50}$$

An exact decomposition is

$$\begin{aligned}
&\frac{D_\omega(e,n+1)-D_\omega(e,n)}{\beta(1-\pi)} \\
&= \left[u'\left(R_L^\omega(n+1)\right)-u'\left(R_L^\omega(n)\right)\right]\Delta P_L(n) \\
&\quad + u'\left(R_L^\omega(n+1)\right)\left[\mathcal{I}_n^{DC}-\mathcal{I}_n^{DB}\right]. \qquad (2.51)
\end{aligned}$$

Suppose that

$$P_L^\omega(n+1) \geq P_L^\omega(n), \qquad (2.52)$$

$$\Delta P_L(n) \geq 0, \qquad (2.53)$$

$$\mathcal{I}_n^{DB} \geq \mathcal{I}_n^{DC}. \qquad (2.54)$$

Concavity implies that the first term in (2.51) is weakly negative, while (2.54) implies that the second term is weakly negative. If at least one of these two terms is strictly negative, then

$$D_\omega(e,n+1) < D_\omega(e,n). \qquad (2.55)$$

Hence, under these conditions, a shorter contribution history increases the reform-induced relative gain from entrepreneurship.

Condition (2.54) is particularly plausible when the DB 30-year rule is binding, because an additional contribution year directly raises the DB entitlement through the $N/30$ adjustment. The condition need not hold when the DB supplement fully offsets the additional ATP benefit or when the DC guarantee generates a sufficiently large incremental benefit. The contribution-history pre-

diction is therefore local to the relevant region of the pension schedules rather than globally unconditional.

2.5 Local Pension Derivatives

This subsection characterizes the local pension derivatives used above and in the income comparative statics below.

Let x be a continuous parameter that changes the earnings history along career path j while leaving the number of qualifying contribution years N_j fixed. Examples include $x = e$ and $x = \rho_L$. Let $y_{jt}(x)$ denote pensionable earnings in year t along path j.

Define the guarantee and supplement indicators

$$g_j^{DC} \equiv \mathbf{1}\left\{K^{DC} - \eta I(Y_j) > 0\right\}, \tag{2.56}$$

$$g_j^{DB} \equiv \mathbf{1}\left\{K^{DB} - ATP(Y_j, N_j) > 0\right\}. \tag{2.57}$$

Away from the pensionable-earnings ceiling,

$$I_{j,x} \equiv \frac{\partial I(Y_j)}{\partial x} = \delta_P \sum_{t=1}^{T} \mathbf{1}\{y_{jt} < \bar{y}\} \frac{\partial y_{jt}}{\partial x}. \tag{2.58}$$

At $y_{jt} = \bar{y}$, the expression is interpreted as the appropriate one-sided derivative.

The corresponding DC pension derivative is

$$P_{j,x}^{DC} \equiv \frac{\partial P^{DC}(Y_j)}{\partial x} = \left(1 - \eta g_j^{DC}\right) I_{j,x}. \tag{2.59}$$

Holding N_j fixed, define

$$AP_{15,j,x} \equiv \frac{\partial AP_{15}(Y_j)}{\partial x}. \tag{2.60}$$

Away from changes in the identity of the 15 highest-earning years,

$$ATP_{j,x} = \alpha \min\left\{\frac{N_j}{30}, 1\right\} AP_{15,j,x}. \tag{2.61}$$

The corresponding DB pension derivative is

$$P^{DB}_{j,x} \equiv \frac{\partial P^{DB}(Y_j, N_j)}{\partial x} = \left(1 - g^{DB}_j\right) ATP_{j,x}. \tag{2.62}$$

When the DB supplement binds, a marginal increase in ATP is offset by a reduction in the supplement and the total DB pension is locally flat in ATP.

The mixed-system derivative and the local slope of the reform gain are therefore

$$P^{\omega}_{j,x} = (1-\omega)P^{DB}_{j,x} + \omega P^{DC}_{j,x}, \tag{2.63}$$

$$\Delta P_{j,x} \equiv \frac{\partial \Delta P_j}{\partial x} = P^{DC}_{j,x} - P^{DB}_{j,x}. \tag{2.64}$$

For the earnings histories in (2.2)–(2.4), the DC lifetime-earnings derivatives with respect to baseline earnings are

$$I_{S,e} = \delta_P T \mathbf{1}\{e < \bar{y}\}, \tag{2.65}$$

$$I_{H,e} = \delta_P T \rho_H \mathbf{1}\{\rho_H e < \bar{y}\}, \tag{2.66}$$

$$I_{L,e} = \delta_P T_L \rho_L \mathbf{1}\{\rho_L e < \bar{y}\}. \tag{2.67}$$

Holding T_L fixed, the derivative with respect to failure-state earnings is

$$I_{L,\rho} = \delta_P T_L e \mathbf{1}\{\rho_L e < \bar{y}\}. \tag{2.68}$$

These expressions explicitly account for the fact that earnings above the pensionable-earnings ceiling do not generate additional DC pension accrual.

The finite-difference analysis in the preceding subsection automatically captures both the best-15-years effect and the direct 30-year contribution adjustment when T_L changes. No continuous derivative with respect to the integer-valued contribution count is required.

2.6 Comparative Statics: Baseline Earnings

All three career paths scale with baseline salaried earnings e. The effect of baseline earnings on $D_\omega(e)$ therefore depends on both marginal utility and the local slopes of the pension schedules.

Using the path derivatives defined above, differentiation of (2.25) gives

$$\begin{aligned}\frac{1}{\beta}\frac{\partial D_\omega(e)}{\partial e} = \pi &\Big[u''\big(R_H^\omega(e)\big)P_{H,e}^\omega \Delta P_H(e) + u'\big(R_H^\omega(e)\big)\Delta P_{H,e}\Big] \\ &+ (1-\pi)\Big[u''\big(R_L^\omega(e)\big)P_{L,e}^\omega \Delta P_L(e) + u'\big(R_L^\omega(e)\big)\Delta P_{L,e}\Big] \\ &- \Big[u''\big(R_S^\omega(e)\big)P_{S,e}^\omega \Delta P_S(e) + u'\big(R_S^\omega(e)\big)\Delta P_{S,e}\Big].\end{aligned} \tag{2.69}$$

Equivalently, using absolute risk aversion,

$$\begin{aligned}\frac{1}{\beta}\frac{\partial D_\omega(e)}{\partial e} &= \pi u'\big(R_H^\omega(e)\big)\left[\Delta P_{H,e} - a\big(R_H^\omega(e)\big)P_{H,e}^\omega \Delta P_H(e)\right] \\ &\quad + (1-\pi)u'\big(R_L^\omega(e)\big)\left[\Delta P_{L,e} - a\big(R_L^\omega(e)\big)P_{L,e}^\omega \Delta P_L(e)\right] \\ &\quad - u'\big(R_S^\omega(e)\big)\left[\Delta P_{S,e} - a\big(R_S^\omega(e)\big)P_{S,e}^\omega \Delta P_S(e)\right]. \end{aligned} \tag{2.70}$$

The derivative in (2.69) does not have a global sign. The model instead yields a local income prediction.

At lower-to-middle earnings, entrepreneurial failure generates relatively low retirement consumption, so the marginal utility of retirement resources is high. When the reform also improves the failure-state pension relative to the DB system, the term

$$-a\big(R_L^\omega(e)\big)P_{L,e}^\omega \Delta P_L(e)$$

makes the reform-induced utility gain especially valuable for individuals with lower baseline earnings. If this failure-state marginal-utility channel dominates the corresponding success-state and salaried-path terms, then

$$\frac{\partial D_\omega(e)}{\partial e} < 0$$

over the relevant interior region.

At very low earnings, however, minimum-pension provisions may dominate both pension schedules, compressing variation in the reform gain and attenuating the income gradient. At high earnings, marginal utility is lower, the pensionable-earnings ceiling limits additional DC accrual,

and the DB best-years component may attenuate or reverse the reform gain. The model therefore predicts a stronger reform response over the lower-to-middle part of the earnings distribution than among high-income individuals, without requiring a globally monotone relationship at the extreme bottom.

Under the local-density condition stated in (2.30), these utility-side comparative statics carry over to the corresponding heterogeneity in entrepreneurial entry probabilities.

3 Quantitative Illustration

This appendix presents a calibrated quantitative illustration of the mechanism developed in Section 3. The goal is to assess whether the reform-induced change in the failure-state pension payoff is large enough, under plausible parameter values, to shift occupational choices by an empirically meaningful amount. The exercise takes the pension formulas from Section 2 and the model from Section 3 at face value and asks whether the implied entry responses are consistent with the data. It is a calibrated illustration rather than a structural estimation.

3.1 Setup and Calibration

The simulation assigns each individual one of three earnings histories, corresponding to the three occupational outcomes in the model. The salaried path generates constant annual earnings e over a full T-year career. The entrepreneurial success path generates proportionally higher earnings $\rho_H e$ over the same horizon. The entrepreneurial failure path generates lower earnings $\rho_L e$ over a shortened effective contribution history $T_L < T$. The failure path is the central object of the exercise. Under the pre-reform DB formula it incurs a compounded penalty, falling on both the level and the

duration of pensionable earnings: the best-15-years rule averages only the few low-earning years of the failed career, while the 30-year contribution rule discounts pension rights for each year short of the threshold. Under the post-reform DC formula, rights accumulate in proportion to lifetime pensionable earnings regardless of career continuity, with a minimum-income guarantee providing a floor in the worst outcomes, so an interrupted career incurs no penalty beyond the earnings shortfall itself.

We normalize median salaried annual earnings to $e = 1$ and evaluate baseline earnings on a grid $e \in [0.25, 2.50]$, with a pensionable earnings ceiling $\bar{y} = 2$. Career length is set to $T = 30$, matching the contribution-years requirement in the pre-reform DB system. The three earnings histories are:

$$
\begin{aligned}
y_{S,t} &= e, \quad t = 1, \ldots, 30, \\
y_{H,t} &= \rho_H e, \quad t = 1, \ldots, 30, \\
y_{L,t} &= \begin{cases} \rho_L e, & t = 1, \ldots, T_L, \\ 0, & t = T_L + 1, \ldots, 30. \end{cases}
\end{aligned}
\tag{3.1}
$$

We adopt CRRA preferences, $u(c) = (c^{1-\gamma} - 1)/(1-\gamma)$ for $\gamma \neq 1$ and $u(c) = \log(c)$ for $\gamma = 1$. The DB and DC pension schedules follow the formulas in Appendix 2. Under the DC system, lifetime pensionable earnings $Y = \sum_t \min(y_t, \bar{y})$ are converted into an annualized income-based pension via $I(Y) = \delta_P Y$, where δ_P summarizes the contribution rate, notional account indexation, and annuity conversion factor. The full DC pension is then $P^{DC}(Y) = I(Y) + \max\{K^{DC} - \eta I(Y), 0\}$, where the second term is a minimum-income guarantee with clawback rate η.

Two normalizations discipline the exercise. First, we calibrate δ_P so that a median full-career

salaried worker receives approximately the same pension under both regimes:

$$P^{DC}(Y_S(1)) \approx P^{DB}(Y_S(1), 30). \tag{3.2}$$

Under the baseline parameters this yields $\delta_P \approx 0.023$, implying that each unit of lifetime pensionable earnings generates about 2.3 cents of annual DC pension income before the guarantee. This ensures that the simulation isolates a redistribution of pension outcomes across earnings histories rather than a general increase in generosity. Second, entrepreneurial payoffs satisfy $\pi\rho_H + (1-\pi)\rho_L \approx 1$, so that expected working-period entrepreneurial income is close to salaried income and the exercise isolates the pension-risk channel from any mechanical income advantage of entrepreneurship. The reform exposure grid follows the Swedish cohort phase-in schedule: $\omega \in \{0, 0.20, 0.25, \ldots, 1\}$.

To translate the utility gain $\Phi_\omega(e)$ into an entry probability, we assume that the idiosyncratic entry cost follows a logistic distribution, $\kappa_i \sim \text{Logistic}(\mu_\kappa, s_\kappa)$, giving

$$\Pr(\text{Entry})_i(\omega, e_i) = \Lambda\left(\frac{\Phi_\omega(e_i) - \mu_\kappa}{s_\kappa}\right), \tag{3.3}$$

where $\Lambda(\cdot)$ is the logistic CDF. We calibrate μ_κ so that the simulated average entry rate at $\omega = 0$ matches the sample average of approximately 7.5 percent, and select s_κ so that moving from zero to full exposure increases the average entry probability by approximately 0.6 percentage points, consistent with the baseline estimate in Column (2) of Table 3. The level of the full-exposure response is therefore a calibration target rather than a test of the model; what the exercise delivers is the *shape* of the response across intermediate exposure values and the heterogeneity patterns

reported below, none of which are targeted. The average entry response across the exposure grid is:

$$\Delta \Pr(\text{Entry})(\omega) = \frac{1}{N} \sum_i \left[\Pr(\text{Entry})_i(\omega, e_i) - \Pr(\text{Entry})_i(0, e_i) \right]. \tag{3.4}$$

Table C1 reports all baseline parameter values.

Table C1: Simulation: Baseline Parameter Values

This table reports the baseline parameter values used in the quantitative illustration. The pension schedules P^{DB} and P^{DC} follow the formulas in Appendix 2. The parameter δ_P is calibrated so that a median full-career salaried worker ($e = 1$, $T = 30$) receives approximately the same pension under the DB and DC systems. The logistic entry-cost parameters μ_κ and s_κ are calibrated so that the average simulated entry rate at $\omega = 0$ is approximately 7.5 percent and the full-exposure entry response is approximately 0.6 percentage points, consistent with the baseline DiD estimate in Table 3.

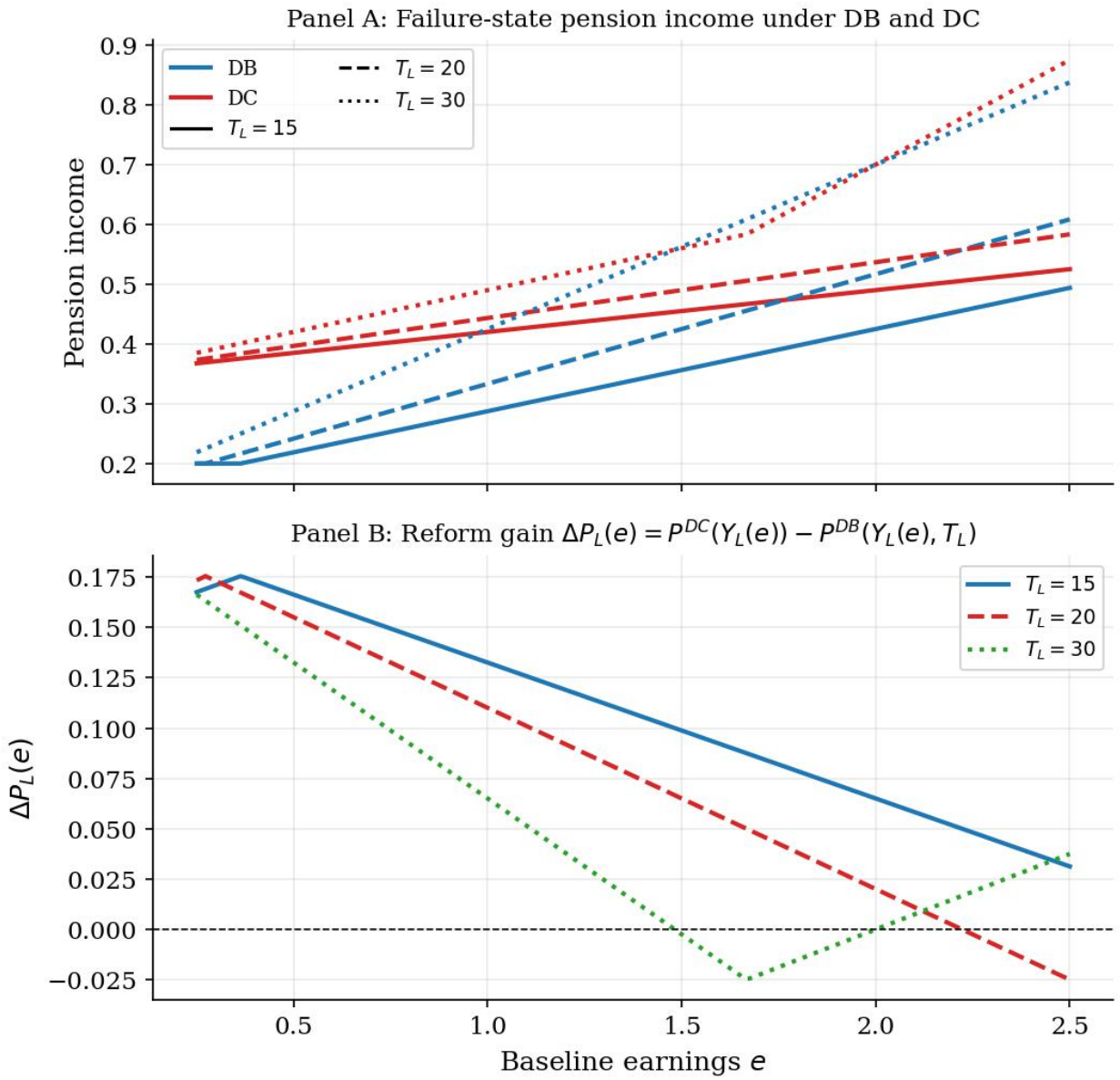
Parameter	Baseline value	Interpretation
Panel A: Earnings and Career		
T	30	Full contribution length in the DB schedule.
B	15	Number of best earnings years entering the DB earnings-related pension.
e	1	Median salaried annual earnings, normalized.
$\bar{y}$	2	Normalized pensionable earnings ceiling.
ρ_H	1.6	Earnings multiplier in the entrepreneurial success state.
ρ_L	0.5	Earnings multiplier in the entrepreneurial failure state.
T_L	20	Effective contribution years in the entrepreneurial failure state.
π	0.45	Probability of entrepreneurial success.
Panel B: Preferences and Retirement Resources		
γ	2	CRRA risk-aversion coefficient.
β	0.65	Weight on retirement-period utility.
A	0.25	Non-public-pension retirement resources, normalized by median earnings.
Panel C: Pension Parameters		
FP	0.15	Flat component of the DB pension.
K_{DB}	0.05	DB supplement threshold, net of the flat component.
α	0.55	DB earnings-related accrual intensity.
K_{DC}	0.35	DC guarantee threshold.
η	0.60	DC guarantee clawback parameter.
δ_P	Calibrated	Chosen so that $P^{DC}(Y_S(1)) \approx P^{DB}(Y_S(1), 30)$.
Panel D: Reform Exposure		
ω	$0, 0.20, 0.25, \ldots, 1$	Reform exposure grid, following the Swedish cohort phase-in schedule.

3.2 Pension Mapping and the Failure-State Reform Gain

Figure C1 plots pension income as a function of baseline earnings e under the DB and DC systems, evaluated at the entrepreneurial failure-state earnings history $(Y_L(e), T_L)$, together with the reform-induced gain $\Delta P_L(e) = P^{DC}(Y_L(e)) - P^{DB}(Y_L(e), T_L)$. Separate lines correspond to contribution lengths $T_L \in \{15, 20, 30\}$. The figure illustrates the core pension mechanism. Under the DB system, shorter effective contribution histories generate larger pension penalties through both the best-15-years rule and the 30-year contribution requirement, so the penalty is especially severe for interrupted entrepreneurial careers. Under the DC system, pension rights accumulate proportionally to total lifetime earnings regardless of career continuity. The reform gain is therefore most pronounced for low-earnings or interrupted histories—precisely the outcomes associated with entrepreneurial failure.

The figure also makes the mechanism in Proposition 1 concrete. Under the baseline calibration, the success-state and salaried terms in the sufficient condition for $D_\omega(e) > 0$ are both close to zero—success-state entrepreneurs complete a full career and are treated similarly by the two formulas, while the salaried pension gain is small by construction of the normalization in equation (3.2)—so the condition reduces to whether the failure-state term dominates. It does, for two reinforcing reasons: the reform gain $\Delta P_L(e)$ is largest at low earnings and short contribution histories, precisely where the DB best-years and contribution-years rules bite hardest, and the marginal utility of retirement consumption in the failure state is simultaneously elevated. The sufficient condition is therefore satisfied across the earnings grid under baseline parameters.

Figure C1: Pension Mapping and Failure-State Reform Gain

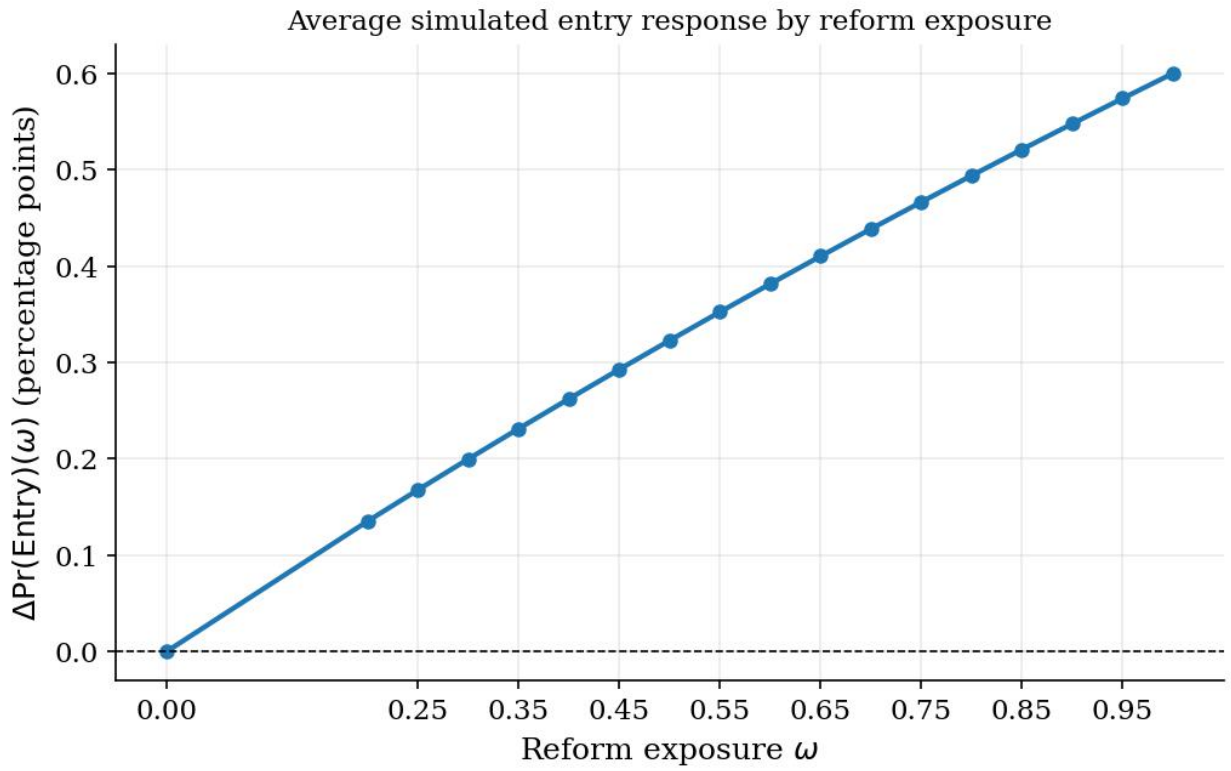


This figure plots pension income under the pre-reform DB system and the post-reform DC system as a function of baseline earnings e, evaluated at the entrepreneurial failure-state earnings history $(Y_L(e), T_L)$. The lower panel shows the failure-state reform gain $\Delta P_L(e) = P^{DC}(Y_L(e)) - P^{DB}(Y_L(e), T_L)$. Separate lines correspond to effective contribution lengths $T_L \in \{15, 20, 30\}$. Parameter values follow Table C1.

3.3 Entry Response by Reform Exposure

Figure C2 plots the average simulated entry response as reform exposure ω increases across the Swedish phase-in grid. Consistent with Prediction 1, the response is strictly increasing in ω: as each successive cohort absorbs a larger DC weight, the failure-state pension payoff rises, and more individuals at the entry margin find entrepreneurship utility-improving. Under the baseline calibration the full-exposure response reaches approximately 0.6 percentage points. As noted in Appendix 3.1, this level is a calibration target; the shape of the response across intermediate exposure values is not, and its monotonicity is a genuine prediction of the model.

Figure C2: Simulated Entry Response by Reform Exposure



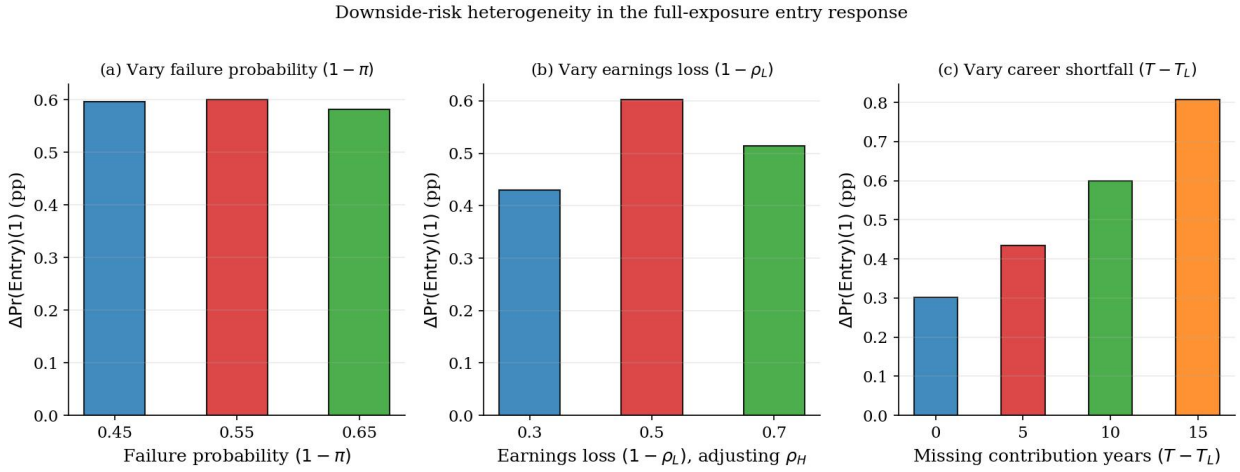
This figure plots the average simulated entry response $\Delta\Pr(\text{Entry})(\omega) = N^{-1}\sum_i[\Pr(\text{Entry})_i(\omega, e_i) - \Pr(\text{Entry})_i(0, e_i)]$ across the reform exposure grid $\omega \in \{0, 0.20, 0.25, \ldots, 1\}$, following the Swedish cohort phase-in schedule. Baseline earnings e_i are drawn from a lognormal distribution with $\log e_i \sim \mathcal{N}(0, 0.4^2)$. The entry-cost parameters μ_κ and s_κ are calibrated so that the simulated entry rate at $\omega = 0$ is approximately 7.5 percent and the full-exposure response is approximately 0.6 percentage points. All other parameter values follow Table C1.

3.4 Downside-Risk Heterogeneity

Two forces drive the cross-sectional heterogeneity in the entry response. A *marginal-utility channel* makes each unit of pension gain worth more to workers whose failure state implies lower retirement consumption; a *contribution-history channel* makes the gain itself larger for workers whose shorter contribution histories were penalized most heavily under the DB rules.

Figure C3 evaluates Prediction 2 along three dimensions of downside risk. The contribution-history channel operates most clearly: the response increases monotonically as the effective contribution history shortens (Panel c), rising from about 0.30 to 0.81 percentage points as missing contribution years increase from zero to fifteen, because the DB contribution-years penalty is precisely what the DC formula removes. The remaining two dimensions are non-monotone under the baseline calibration, and instructively so. In Panel (a) the response is nearly flat and slightly declining at high failure probabilities: raising $1-\pi$ increases the weight on the failure state but also lowers expected entrepreneurial income, and the two effects approximately offset. In Panel (b) the response is hump-shaped, peaking near $1-\rho_L = 0.5$ and declining thereafter, because at severe earnings losses the failure-state pension falls into the minimum-income guarantee region, where the guarantee rather than the DC accrual formula determines the pension and the incremental reform gain therefore shrinks. Prediction 2 is thus confirmed along the dimension the model identifies as primary, while the guarantee floor and the offsetting income effect bound the response along the other two—features of the pension schedules rather than of the preference specification.

Figure C3: Downside-Risk Heterogeneity in the Simulated Entry Response

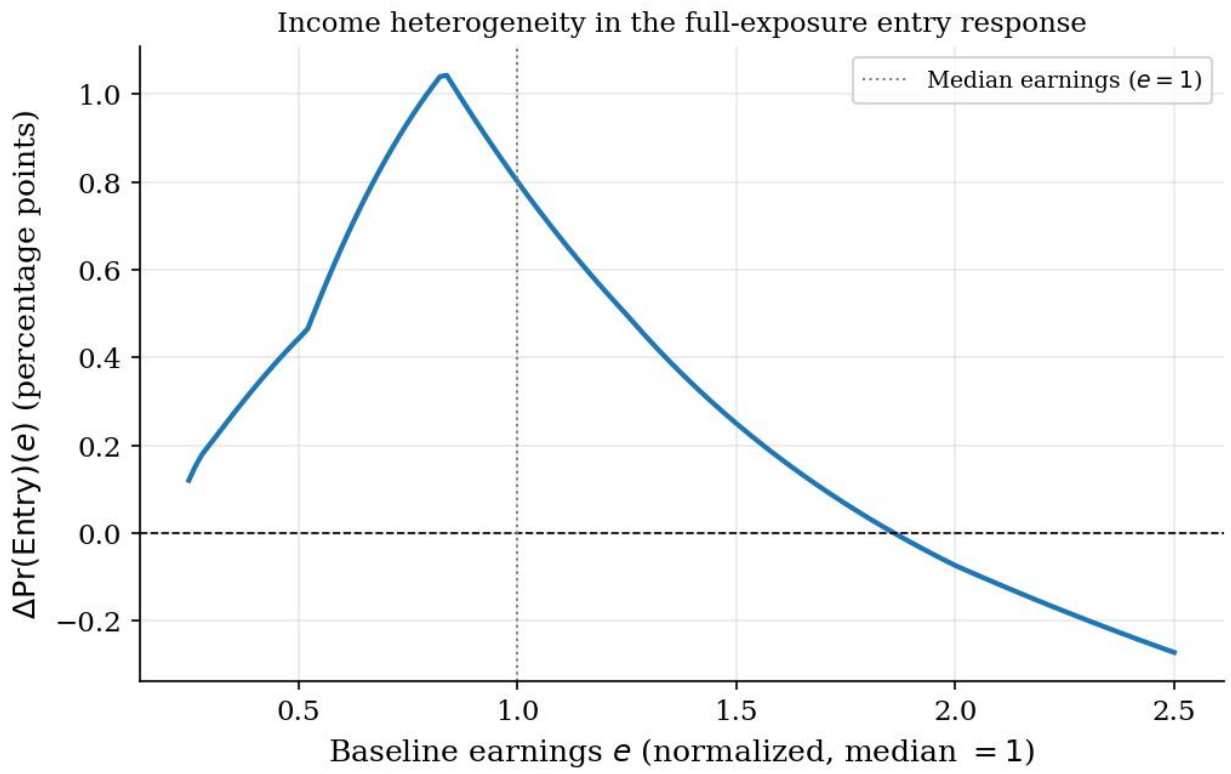


This figure plots the full-exposure entry response $\Delta\Pr(\text{Entry})(1) = N^{-1}\sum_i[\Pr(\text{Entry})_i(1,e_i) - \Pr(\text{Entry})_i(0,e_i)]$ as a function of three dimensions of downside risk. In each panel the x-axis is ordered so that downside risk increases from left to right. Panel (a) varies the failure probability $(1-\pi) \in \{0.45, 0.55, 0.65\}$. Panel (b) varies the earnings loss $(1-\rho_L) \in \{0.30, 0.50, 0.70\}$, adjusting ρ_H to maintain $\pi\rho_H + (1-\pi)\rho_L = 1$. Panel (c) varies the career shortfall $(T-T_L) \in \{0, 5, 10, 15\}$ missing contribution years. All other parameter values follow Table C1.

3.5 Income Heterogeneity

Figure C4 evaluates Prediction 3 across the earnings distribution, reproducing the income gradient predicted by the comparative statics in Appendix 2. The response is hump-shaped, peaking at approximately 1.0 percentage point somewhat below median earnings and falling thereafter, turning negative for the highest earners in the grid. The decline above the peak is the content of Prediction 3: as earnings rise, failure-state pensionable income is less likely to reach the guarantee region, the marginal utility of retirement consumption falls, and the pensionable earnings ceiling $\bar{y}$ truncates the DC accrual advantage, so the reform gain attenuates and eventually reverses. Below the peak the response also falls, for the opposite reason—for the lowest earners the guarantee floor binds under both the DB and DC schedules, leaving little scope for the reform to alter failure-state pension income. The guarantee floor and the earnings ceiling therefore compress the response at both tails, so the gradient is monotone over the interior of the distribution rather than globally.

Figure C4: Income Heterogeneity in the Simulated Entry Response



This figure plots the full-exposure entry response $\Delta\Pr(\text{Entry})(e) = \Pr(\text{Entry})(1,e) - \Pr(\text{Entry})(0,e)$ against baseline earnings $e \in [0.25, 2.50]$. The horizontal axis is in units of normalized median salaried earnings ($e = 1$). All parameter values follow Table C1.

3.6 Robustness and Scope

The main simulation patterns are robust to variation in the preference and pension parameters around the baseline calibration. We consider $\gamma \in \{1,3,5\}$, $\beta \in \{0.40,0.80,0.95\}$, $A \in \{0,0.50\}$, $K_{DC} \in \{0.30,0.40\}$, $\eta \in \{0.40,0.80\}$, and $\bar{y} \in \{1.5,2.5\}$. Across these variations, $D_{\omega}(e) > 0$ continues to hold, the simulated entry response rises with reform exposure, the response continues to increase with the career shortfall $T - T_L$, and the income gradient remains downward-sloping over the interior of the earnings distribution. This confirms that the mechanism operates through the structure of the pension formulas rather than any particular configuration of preference parameters. The normalization in equation (3.2) ensures that a stable salaried worker is no better or worse off under DC than under DB on average, so the simulation isolates a redistribution of pension outcomes across different earnings histories—not a general increase in pension generosity—as the driver of entrepreneurial entry.