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Are People Systematically Inactive Across Financial Decisions? Linking Evidence from Mortgage and Retirement Saving Decisions

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Abstract

Many people forgo substantial economic gains by not responding to financial incentives, even in major decisions such as retirement savings and mortgage refinancing. But do the same people systematically fail to respond across financial contexts? We study this using a quasi-experimental setting that combines policy changes in pension incentives with shifts in mortgage refinancing incentives from interest rate fluctuations. Linking Danish administrative records, we uncover a striking independence between financial decisions: people who are inactive in one context are not systematically inactive in the other. One implication is that the costs of inaction are not concentrated among specific groups.

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1 Introduction

It is well documented that people often fail to respond to financial incentives, missing opportunities for substantial economic gains. For example, most individuals do not adjust their retirement savings in response to tax incentives, and most homeowners do not refinance their mortgages when interest rates fall (Chetty et al., 2014; Andersen et al., 2020). Studies documenting this inaction typically focus on a single financial domain (Gomes, Haliassos, & Ramadorai, 2021). As a result, we do not know whether inaction is systematic across individuals—that is, whether the same individuals repeatedly fail to respond to incentives in different contexts.

Understanding whether inaction is systematic is key to assessing its welfare costs and designing effective policy interventions. If inaction arises from stable personal traits, such as limited attention, low financial literacy, or impatience, then economic opportunities are disproportionately missed by certain individuals. This opens the door to targeted interventions focused on those most prone to inaction, for example, through tailored information, education, or assistance. Conversely, if inaction is not systematic—meaning individuals who miss one financial opportunity are just as likely as others to act on another opportunity—then variation in personal traits plays a minor role, and context-specific features of the decision environment are likely more important. In this case, the welfare costs of inaction are more evenly distributed, but targeted interventions are less effective in addressing them.

We examine whether inaction in retirement saving and mortgage refinancing reflects a common individual component using a multiple quasi-experimental design. Our analysis combines earlier evidence that separately documents inaction in response to incentives to adjust retirement savings (Chetty et al., 2014; Andersen, 2018) and to refinance mortgages (Andersen et al., 2020). Similarly to these studies, we use population-wide administrative records from Denmark, which provide detailed information on both retirement savings and mortgage loans. The period we study features large variation in mortgage interest rates, creating incentives to refinance fixed-rate mortgage loans, and at the same time major changes in pension saving incentives due to reforms that altered tax subsidies for retirement savings. Together, these changes allow us to identify individuals who had incentives to adjust both their mortgage and pension choices.

This rare combination of data and quasi-experimental variation across two dimensions allows us to test whether inaction is systematic among individuals. The mortgage data covers the period 2009-2016, during which the 30-year mortgage interest rate fluctuated between 5 and 2 percent, creating strong incentives to refinance fixed-rate mortgages. Individuals are defined as inactive if they do not refinance their mortgage when the difference between their current interest rate and their new potential rate exceeds an optimal refinancing threshold, calculated for each borrower using the rule in Agarwal, Driscoll, and Laibson (2013). During the same period, retirement savings incentives changed in 2010 with the introduction of a cap on deductible contributions to annuity accounts of DKK 100,000 (approximately USD 14,400). This cap was further reduced to DKK 50,000 in 2012. Individuals are classified as inactive in the pension context if they do not adjust annuity contributions in response to one of these policy changes.

We first reproduce the analyses of Andersen (2018) and Andersen et al. (2020), which demonstrate the high prevalence of inaction. Two out of three individuals affected by the pension policy changes did not adjust their contributions to remain below the cap, and four out of five mortgage holders with a clear incentive to refinance did not do so. A back-of-the-envelope calculation suggests that the first-year foregone gains amount to about 3 percent of annual disposable income for each inactive decision. As individuals often leave their financial choices unchanged for several years, the cumulative losses from inaction are likely substantially larger.

We show that observable factors—including age, gender, marital status, higher education, financial education, income, indicators of liquidity constraints, and the size of the economic incentive—are correlated with inaction in both the pension and mortgage contexts. For example, individuals with financial training are more likely to make active decisions in both contexts. These findings are consistent with previous studies and could suggest that inaction is systematic. However, the coefficients on the observable factors vary in size across decision contexts and, albeit statistically significant, they explain in total less than 5 percent of the variation in inaction. As a consequence, it is impossible to know from these results whether inactive decisions carry a strong individual component.

With information on inaction in both pension and mortgage contexts, we can directly test for a common individual component and estimate how much this explains of the decision variance. Our test accounts for the fact that inaction may depend on the size of the incentive. For example, individuals may face frictions that require overcoming costly hurdles to act. It also allows for the possibility that individuals may experience 'mental gaps', such as forgetfulness or behavioral norms, and thus fail to respond actively for reasons not related to the magnitude of the incentive. Thus, our approach encompasses two key classes of financial inaction models (Handel & Schwartzstein, 2018).

Our main results point to striking independence in people's decisions: individuals who are inactive in one context are not systematically inactive in the other. In our setting, the systematic component of the variation is estimated to be close to zero, with an upper bound of 3 percent at a 5-percent significance level.

This key finding is robust to a number of changes in the empirical design. As mentioned, we follow previous studies in our measurement of inaction in both the pension savings and mortgage refinancing contexts and use the same underlying data. We show that our results do not depend on the specific way in which inaction is measured. In our baseline analysis, we define inaction as the failure to respond to an incentive in the year it arises. However, individuals may respond with a delay. In an alternative specification, we therefore classify individuals as inactive if they do not respond to the incentive at any point during the entire observation period. Thus, individuals who respond with a delay are classified as active. Under this approach, we find that 48 percent of individuals fail to respond to pension incentives and 55 percent fail to respond to mortgage refinancing incentives. Nevertheless, we still find independence in the decisions. Importantly, the same conclusion emerges when we restrict the sample to cases where the incentives in the two contexts arise in close calendar proximity (2010–2012), thereby minimizing the scope for changes in personal circumstances between decisions, and when we limit the sample to individuals facing above-median incentives in both contexts, ensuring that the foregone gains from inaction are economically meaningful in each decision. Finally, since individuals may not refinance exactly at the optimal threshold for various reasons (Berger et al., 2024), we also confirm that the results apply when using alternative refinancing rules.

We also examine whether inaction is systematic within the context of pension saving by analyzing whether individuals who did not respond to the 2010 cap on pension contributions were also inactive following the further reduction of the cap in 2012. This case is interesting because the two changes in incentives occur within the same context, the policy changes are similar in nature, and they occurred within a short time frame. Therefore, it is natural to expect a more systematic pattern, with some individuals remaining active in both decisions, while others remain inactive in both. About 35 percent of the variation in inaction turns out to be systematic across the two pension reforms. While this points to significant individual differences in decision-making capabilities with respect to pension choices, most of the variation remains unsystematic—and the systematic component is not shared with the mortgage context.

Our work provides new insights into the nature of financial inaction, showing that it is largely unsystematic across different decision contexts. The findings have important implications for understanding who bears the costs of inaction. We show that inaction is associated with significant foregone financial gains. Because inaction is not systematic, the incidence of foregone gains is not concentrated among a particular subset of individuals, but instead more evenly distributed across the population facing financial decisions. Moreover, since observable individual characteristics have limited explanatory power and differences in inherent traits do not appear to drive inaction, our results indicate that designing targeted interventions for specific groups of financial decision makers is difficult.

Related literature. Our study relates to several strands of literature. Inaction is well established in the savings literature, often referred to as passive behavior. Many studies show that people passively accept default enrollment in employer pension plans and that this affects savings in retirement accounts, contrary to what should be expected of active savers (Madrian & Shea, 2001; Thaler & Benartzi, 2004; Blumenstock, Callen, & Ghani, 2018; Butt et al., 2018; Goda et al., 2020; de Bresser & Knoef, 2024). Carroll et al. (2009) find that compelling people to make active decisions about pension savings significantly increases enrollment in the pension scheme, which cannot be explained by the standard neoclassical model. Chetty et al. (2014) find that 85 percent of those affected by pension mandates do not adjust other types of savings to avoid an overall increase in savings. Similar findings by Andersen (2018) indicate that about

77 percent of those affected by a change in tax incentives to save in retirement accounts do not rebalance their financial portfolio, i.e., the majority remain inactive.

Our study also links to the literature on mortgage refinancing. Andersen et al. (2020), Keys, Pope, and Pope (2016), and Agarwal, Ben-David, and Yao (2017) show that few people refinance optimally, that is, they refinance too late or not at all. More broadly, our study links to literature on how people make financial mistakes, e.g., in relation to consumer credit products (e.g., Carvalho, Olafsson, and Silverman, 2024; Agarwal and Mazumder, 2013) and investment decisions (Calvet, Campbell, and Sodini, 2007).

The studies mentioned above document financial inaction, but measure responses to single policy events or one-time experiments. In other words, they do not examine whether an inactive response in one context is systematically linked to an inactive response in another context. There are a few exceptions. Bilias, Georgarakos, and Haliassos (2010) examine inertia in stock market participation and trading within brokerage and retirement accounts. They find that inertia in both decisions is associated with observable factors, but their data do not permit a direct test of whether inertia is consistent across different accounts at the individual level. Brot-Goldberg et al. (2023) study sequential active choices over time within the context of default rules in Medicare pay for prescription drugs. They find evidence of some systematic inaction over time in this context, but also that the variation in individual choices is predominantly driven by random transitory shocks. This is consistent with our finding of some systematic inaction across time within the pension context.

Organization. The next section presents the data and describes how the indicators of inactive responses to incentives are measured. Section 3 shows the prevalence of inaction in each decision context and examines how much of the variation can be explained by observable factors. Section 4 presents a framework that allows us to quantify the relative importance of inherent behavioral traits of the individual in driving inaction in financial decision making. Sections 5 and 6 present the results, including several robustness checks. Section 7 concludes.

2 Institutional Setting and Measurement of Inaction

We use population-wide administrative register data from Denmark. The data are collected from different administrative sources and compiled by Statistics Denmark. We combine two key registers that document pension contributions and information about mortgage loans. The pension register documents total annual pension contributions for all types of retirement saving instruments that exist, and the register is available with full coverage from 1995. This register has been used in previous research documenting responses to pension policy (Chetty et al., 2014; Andersen, 2018; Christensen & Ellegaard, 2023). The mortgage data are collected from Danish mortgage banks, and the register covers the period 2009-2016. It includes detailed information on all mortgage loans, such as the starting date of the loan, the type of loan, interest rate, balance, maturity, etc. This data set has been used in previous research on household mortgage behavior (Andersen et al., 2020; Andersen & Leth-Petersen, 2021). These two key registers are combined at the individual level with other registers that include demographic information on age, gender, education, and household composition, as well as third-party reported information on income and wealth.

2.1 Inaction in the Pension Context

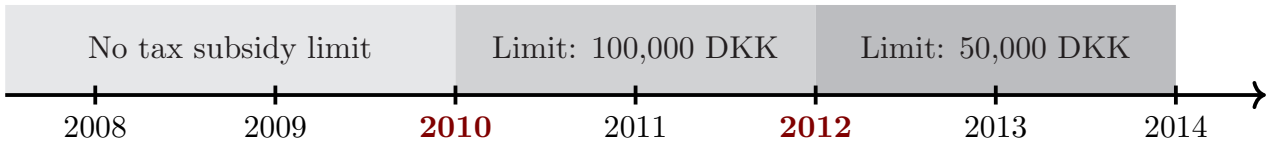
The Danish pension system is similar to most pension systems in other developed countries. It consists of three pillars: A state-provided defined benefit (DB) plan, employer-administered defined contribution (DC) accounts, and individual voluntary retirement accounts.[1] Within employer-administered and individual accounts, there are three types of defined contribution schemes at the time of policy changes that we exploit in our analysis: term annuity pensions (hereafter, annuity pensions), life annuity pensions, and lump-sum pensions. All pension schemes are subject to an exemption-taxation-taxation (ETT) scheme, where contributions are tax-deductible, return on investment is taxed, and payouts are taxed. However, the three schemes differ in tax structure and pay-out profiles. Payouts from the lump sum pension are taxed at 40 percent. Payouts from the annuity pension scheme are made over a span of 10 to

[1] These pillars are analogous to Social Security, 401(k)s and IRAs, respectively, in the United States.

25 years and taxed as regular income. Payouts from the life annuity pension scheme are made until death and are taxed as regular income.[2]

In 2010 and 2012, the Danish government passed two tax policies that changed the subsidy thresholds for contributions to the annuity pension scheme, as shown in Figure 1. Prior to 2010, there were no subsidy thresholds in place and thus it was possible to contribute any amount per year to an annuity pension scheme and be eligible. From the 1st of January 2010, the sum of employer-administered and individual contributions to the annuity pension scheme was only tax-deductible up to a limit of 100,000 DKK (14,400 USD) per year. In 2012, an almost identical policy was implemented which further lowered the subsidy limit to 50,000 DKK per year.

Figure 1: The 2010 and 2012 policies



Each of the two policies provides exogenous variation to saving incentives through sharp changes in taxation rules. These changes created an incentive to reallocate savings for individuals affected by the reduced deductibility. According to standard life-cycle theory, individuals would respond to changes to the after-tax return by re-allocating their savings by some non-zero amount. We would therefore expect them to reduce their contributions to or below the new limit and shift their savings elsewhere. Specifically, the life annuity pension scheme did not face any changes and would make individuals equally eligible for the lower capital return tax rate, and therefore it constitutes a close substitute for annuity pension contributions. Following the method of Andersen (2018) who investigated the 2010 policy, we identify all treated individuals as people who previously contributed above the limit and, therefore, faced an incentive to reduce their annuity contributions following each policy.

Sample restrictions. We impose three restrictions on the population-wide panel data to arrive at the analysis sample. First, we focus on individuals who have positive pension

[2]Further information on return taxation, withdrawal options, and the lump-sum pension scheme in particular can be found in Chetty et al. (2014).

contributions and exclude individuals who are below the age of 18 the year prior to the policies or at or above the age of 60 the year after the policies, since individuals become eligible for early retirement at age 60. Second, we exclude self-employed and spouses of self-employed because they faced different retirement saving incentives during the time of the two policies. Third, we exclude individuals who are not fully liable to taxation in Denmark. This leaves us with a dataset that includes more than 2 million individuals for whom we observe the full saving portfolio before and after the policies.

Individuals who contributed above the limit of 100,000 DKK prior to the 2010 change or contributed above the limit of 50,000 DKK prior to the 2012 change are assigned to the treatment group who are affected by changes in incentives. The treated individuals face an incentive to reduce their annuity contributions following the policy change under the assumption that retirement saving preferences would not have changed in absence of the policy, and we therefore determine the active and inactive response solely based on the treated individuals.[3]

Contributions are determined based on the size of individual and employer-administered contributions to the annuity pension scheme. To ensure that we assign an active/inactive response based on individual saving decisions, we focus on individuals with private contributions to the annuity pension scheme. In our estimation sample, we focus on individuals who have employer-administered contributions that do not exceed the policy-induced contribution limit so that there is room for individual contributions to adjust.[4] This leaves us with a dataset of 50,077 individuals with an incentive to reduce their contributions.

Active/inactive savers. We follow Chetty et al. (2014) and Andersen (2018) and define active savers as those who reduce their annuity pension contributions to or below the new

[3]A control group consisting of individuals who contributed just below the threshold before the policy change shows little change in retirement savings following the reform, supporting the interpretation that observed changes among higher contributors are driven by the policy (Andersen, 2018).

[4]Individual accounts face the same tax schemes as employer-administered accounts but are otherwise completely independent of employer-administered accounts and do not require updates after being set up nor when individuals switch jobs. Employer-administered contributions in Denmark are mandatory and are generally determined by collective bargaining agreements between employers' associations and workers' unions that set a fixed proportion of earnings for retirement contributions. These contributions are then managed by an independent pension fund, which means that employees have less decision power over their employer-administered contributions. In unreported regressions, we show that the results across decisions are unaffected if we completely exclude individuals with employer-administered contributions and only look at individuals with private contributions.

limit and increase contributions to the life annuity pension scheme, which is the closest saving substitute.[5] We adopt a conservative definition of inaction whereby an individual is inactive if they do not respond to any of the two policy changes, implying they are active if they respond to at least one of the changes. This gives a simple indicator of inaction in the pension context for each individual. We show in Section 6.1 that the results are robust to alternative definitions of the indicator.

2.2 Inaction in the Mortgage Context

The Danish mortgage system shares key features with the U.S. system: fixed-rate mortgages are prevalent, and borrowers can refinance without prepayment penalties. This gives rise to clear refinancing incentives and relatively low barriers to action. As emphasized by Campbell (2013) and Andersen et al. (2020), the Danish system is among the closest international analogues to the U.S. in terms of refinancing flexibility. For our purposes, the key point is that institutional frictions are limited, making inaction in this domain economically meaningful.

Borrowers can refinance their fixed-rate mortgages to adjust payments, change maturity, or benefit from changes in the interest rate—without cashing out or undergoing a credit review. While there are fixed refinancing costs that increase with loan size, as in the United States, borrowers can roll these costs into the mortgage principal, eliminating liquidity constraints. As a result, refinancing to lock in lower rates during periods of declining interest rates can benefit all borrower types.

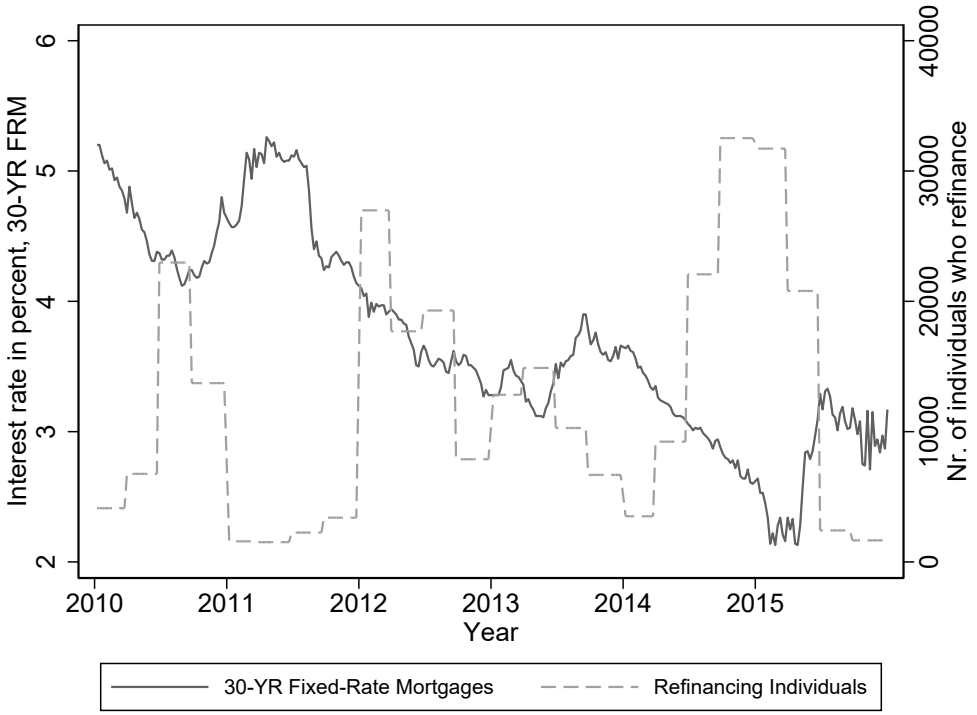
Sample restrictions. Our sample starts from the universe of Danish mortgage holders during the period of 2009-2016, which includes 2,021,742 adult individuals that we can link to the administrative data to add borrower characteristics. We use sample restrictions similar to those in Andersen et al. (2020). First, we exclude individuals with adjustable-rate mortgages and thus focus on fixed-rate mortgages. About half of all Danish mortgages were fixed-rate mortgages in 2009. Second, we exclude individuals with more than one fixed-rate mortgage and

[5] In an alternative specification, we define active savers as those who reduce their annuity pension contributions to or below the limit regardless of how they re-balance their remaining saving portfolio. It turns out that this alternative definition does not affect the results from our test of systematic inaction across decisions contexts, cf. Section 6.1.

individuals who only appear as owners of a fixed-rate mortgage for a single year. Third, we include only observations pertaining to stable households with at most two adults. This leaves us with a sample of 1,018,358 individuals.

The mortgage data allow us to identify the exact timing of a refinancing decision for a mortgage on a particular property. We follow Andersen et al. (2020) and include any refinancing of a fixed-rate mortgage, regardless of whether individuals refinanced from fixed-rate to adjustable-rate mortgages or from fixed-rate to fixed-rate mortgages. Figure 2 shows the movements in the 30-year market interest rate on fixed-rate mortgages across the sample period and the number of individuals who refinance in a given quarter. It is clear that more people refinance their mortgage when the interest rate declines. We use exactly these changes in the interest rate to determine whether individuals have an incentive to refinance their mortgage and then whether they do, in fact, refinance.

Figure 2: Interest Rates and Refinancing Activity



Notes: This figure shows weekly interest rates for 30-year fixed-rate mortgages on the first y-axis from 2010 to 2016, which is a replication of Appendix Figure B2 from Andersen et al. (2020) using the same data from the Association of Danish Mortgage Banks. The second y-axis shows the number of individuals who refinance in each quarter in our estimation sample.

Incentives to refinance. We identify treated individuals with an incentive to refinance their mortgage using the closed-form solution of the optimal refinancing threshold proposed by

Agarwal, Driscoll, and Laibson (2013). The incentive to refinance is positive when the interest saving, defined as the difference between the current interest rate and the potential new interest rate from refinancing, is larger than the optimal refinancing threshold:

$$Incentive_{it} = (Interest_{it}^{old} - Interest_{it}^{new}) - OptimalRefinancingThreshold_{it} \quad (1)$$

The optimal refinancing threshold describes the minimum required reduction in interest expenses that would make refinancing profitable. We follow the procedure described in Andersen et al. (2020) accounting for the fixed cost of refinancing, the size of the mortgage, the maturity, and the probability of termination based on borrower characteristics. The resulting sample includes 591,111 individuals with an incentive to refinance their mortgage at some point between 2009 and 2016. Appendix A describes the assumptions, adopted parameters, and calculation in more detail.

Active/inactive savers. In our main estimation sample, we define active savers as those who refinance their mortgage in the same year the interest rate difference becomes greater than the optimal refinancing threshold. Inactive savers are thus those who do not refinance their mortgage as soon as they have an incentive to do so. We therefore construct an indicator of inaction that we can map across mortgage refinancing decisions and retirement saving decisions.[6]

2.3 Estimation Sample

Our estimation sample is the joint set of individuals who have incentives to change both their pension savings and their mortgage loans, which applies to 10,619 individuals. Table 1 presents summary statistics for the full population of working-age individuals in Denmark (column 1) and the estimation sample (column 2). It shows that individuals in the estimation sample

[6]In alternative specifications, we define active savers as those who refinance at any point after the incentive becomes positive such that inactive savers are those who never refinance during the sample period. We also define active savers as those who refinance when they face a positive incentive according to the rule-of-thumb that is typically communicated by banks (refinance if the interest rate has dropped by at least 1 percentage points and your mortgage is larger than DKK 500,000 and has remaining maturity of at least 10 years.) These changes of definition do not affect the results from our test of systematic inaction across decision contexts, cf. Section 6.1.

are older, more likely to be male, and more likely to be married compared to the average in the working-age population. Finally, the individuals exposed to these two incentives are more educated and more likely to be in the upper part of the income and wealth distribution. This is natural as only people who are homeowners and have non-trivial pension savings will face these incentives.

Table 1: Summary Statistics

	(1) Full Population	(2) Estimation Sample
Demographics		
Age	43.25	47.93
Male (share)	0.50	0.69
Married (share)	0.51	0.72
Tertiary education (share)	0.27	0.55
Financial education (share)	0.03	0.05
Income and wealth		
Gross income (DKK)	293,269	669,346
Top tax payers (share)	0.23	0.63
Total assets excl. pension wealth (DKK)	897,236	2,051,580
Total liabilities (DKK)	600,087	1,282,237
Private pension contributors (share)	0.58	1.00
Total pension contributions (DKK)	63,176	167,544
- Annuity contributions (DKK)	23,301	98,839
Individuals	3,664,569	10,619

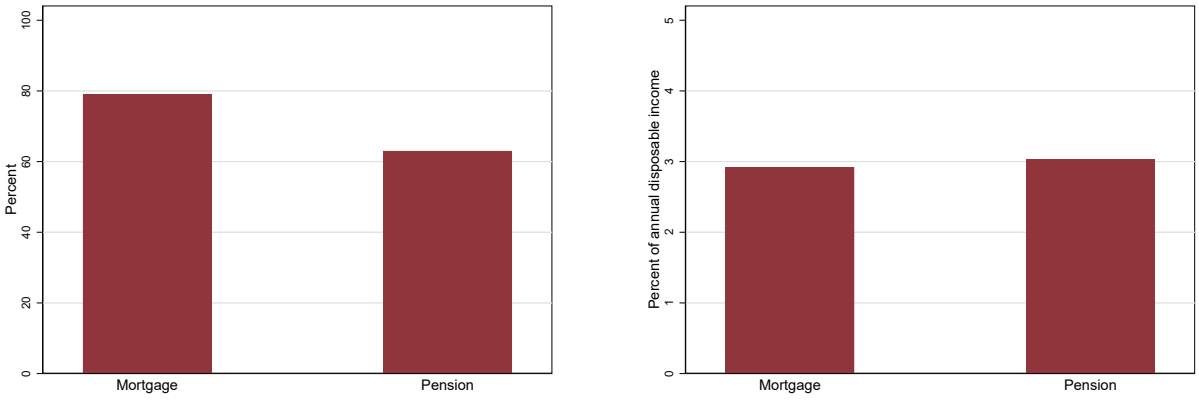
Notes: The means reported are from 2009. The full population is defined as residents in Denmark aged 18-68. The estimation sample is described in Section 2. Gross income includes labor income, public transfers, and capital income excluding employer-administered pension contributions. The education variables are dummies that indicate the highest completed level of education.

3 Prevalence of Inaction and Size of Foregone Gains

Figure 3 shows how inaction is widespread and associated with substantial foregone gains. Panel (a) displays the share of individuals with financial incentives to respond who are inactive. In the mortgage decision, we find that 79 percent of individuals who have an incentive to refinance their fixed-rate mortgage do not refinance at the time. In pension decisions, 65 percent of those with a financial incentive to reduce their retirement contributions do not react. Thus, for each decision, the majority does not respond to the incentive.

Foregone gains. Inaction has significant consequences for the household budget as it is associated with substantial foregone economic gains. Panel (b) in Figure 3 shows that the first-

Figure 3: Inaction and Foregone Gains



(a) Share inactive

(b) Foregone gains

Notes: The figure shows the share of individuals in the estimation sample (10,619) who are inactive when facing incentives to refinance their mortgage or change their pension savings, as well as as the foregone gains of those who are inactive (8,377 for the mortgage decision and 6,888 for the pension decision). Panel (a) displays the share of individualsin the estimation sample with an incentive to respond who do not refinance or adjust retirement contributions even if they have an incentive to do so. Panel (b) displays the median of the computed first-year foregone gains by those who are inactive in each context. Foregone gains are measured based on a back-of-the-envelope computation that is described in Appendix B. The estimation sample is described in Section 2.

year foregone gains from inaction in the mortgage and pension decisions amount to around 3 percent of annual disposable income on the median. This is a back-of-the-envelope calculation based on each individual's prior loan interest payments or prior retirement contributions and taxation. The numbers reflect the payments that each individual could have saved if they had instead reduced contributions or refinanced at the time the incentive became positive. Further details on the calculation can be found in Appendix B. The consequences of not responding are sizable across each of the changes in incentives. If individuals stick to their current financial decisions for several subsequent years and do not reduce contributions or refinance later, the accumulated foregone gains could be higher. Moreover, the accumulated costs of inaction may be considerably higher if an individual is systematically inactive across decision contexts.

Prediction of inaction. Previous work has studied systematic variation in inactive behavior by analyzing whether individuals with certain characteristics are more or less likely to be active in a given decision. Following this approach, Table 2 reports the results from estimating probit models of inaction as a function of observable characteristics measured using the administrative data. These include age, gender, marital status, higher education, financial education, income, the size of the incentive, and an indicator for the likelihood of being liquidity constrained. Many of these variables predict inaction and are statistically significant.

For example, as might be expected, we observe less inaction among individuals with financial education who are more likely to respond actively to changes in incentives. Conditional on the other characteristics, individuals with financial education are 5 and 7 percentage points less likely to be inactive. This could be an indication of major systematic differences in the behavior of people.

However, note that the coefficients in many cases vary a lot in size across the two decision contexts and, albeit statistically significant, they explain in total less than 1 and 5 percent of the variation in each decision context (R^2). As a consequence, it is impossible to know from these results whether inactive decisions carry a strong individual component. In Appendix Table C.1, we extend this analysis by including third-degree polynomials in the continuous variables (age, income, and incentive) and including more detailed information on education. With these much more flexible specifications, the ratio of explained variation to total variation is still less than 5 percent in each context.

Table 2: Inaction and Observable Characteristics

	(1)	(2)
	Inactive Pension	Inactive Mortgage
Tertiary education	-13.799***	-0.884
	(0.945)	(0.851)
Financial education	-6.681***	-4.580***
	(2.009)	(1.688)
Age	-0.179***	0.185***
	(0.060)	(0.050)
Male	6.628***	-1.632*
	(1.003)	(0.897)
Married	0.988	-2.971***
	(1.035)	(0.917)
Gross income (1000 DKK)	0.005***	-0.002
	(0.001)	(0.002)
Liquidity constrained	1.479	-0.356
	(0.961)	(0.845)
Incentive (1000 DKK)	0.186***	0.167***
	(0.019)	(0.033)
Individuals	10,619	10,619
Pseudo R^2	0.042	0.006

Notes: The table presents marginal effects (in percentage points) from a probit regression of a dummy indicating inaction in either the pension decision or the mortgage decision on observable characteristics for individuals in the estimation sample. Gross income includes labor income, public transfers, and capital income excluding employer-administered contributions. The education variables are dummies that indicate the highest completed level of education. Liquidity constrained indicates that the individual's bank account savings are lower than two times monthly disposable income. Appendix Table C.2 presents the coefficients from the regression. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4 Testing Whether Inaction Is Systematic

Inaction occurs when an individual does not respond to a financial incentive and thereby forgoes potential economic gains. Theoretically, the inaction of an individual i in decision contexts j may be rooted in inherent behavioral traits, μ_i, which vary across individuals but are identical across decisions for the same individual. This could be traits such as limited attention, low financial literacy, or impatience. In this case, we would expect to see that some individuals systematically respond to incentives, while others are systematically inactive. Alternatively, inaction could be driven by factors specific to each individual decision, ε_{ij}, and thus independent across decision contexts.

The relative importance of the two unobserved factors, μ_i and ε_{ij}, can be inferred from observations linked across decision contexts. To see this, consider two decisions, where for each decision p percent of the individuals are inactive. If inaction is entirely driven by inherent behavioral traits, μ_i, then this will lead to inactive responses in both decisions for p percent of the individuals in the population. In other words, some people are always active, and some people are always inactive. In contrast, if purely decision-specific factors drive inaction, ε_{ij}, then the two decisions of an individual are independent, which implies that only p^2 percent of the individuals will be inactive in both decision contexts. This example illustrates how it is possible to distinguish between the two polar cases of only inherent factors or only decision-specific factors. We are interested in the relative importance of these two unobserved factors. Our empirical model includes both types of factors and estimates their relative importance from the observed decision-making pattern.

Linking up to theory on inaction, Handel and Schwartzstein (2018) distinguish between two broad classes of models of inactive/passive decision-making: "frictional" models and models where inaction is driven by "mental gaps". In practice, both classes of mechanisms could be relevant in our context, and our empirical model embraces both.

Consider first a model where inaction is due to frictions. In frictional models, agents must overcome a costly hurdle in order to be active. Thus, individual i will be inactive in decision j

if the level of frictions is greater than the size of their economic incentive, x_{ij}, such that

$$d_{ij} = 1\left(x_{ij} < \mu_i + \varepsilon_{ij}\right). \tag{2}$$

where frictions consist of an individual-specific component, included in μ_i, and a component that is specific to the decision, included in ε_{ij}. If the individual-specific component, μ_i, is the most important determinant of inaction, then each individual tends to be either active or inactive in all decision contexts. If ε_{ij} is the most important determinant, then inactive behavior is specific to each decision.

Alternatively, consider a model where inaction is driven by mental gaps. The decision maker contemplates whether to respond actively to a positive incentive $x_{ij} > 0$, but faces mental gaps, for example, some psychological distortion related to information gathering or processing that is independent of the size of the incentive. In this model, individual i is inactive in decision j if the mental gap is greater than a threshold level, α_j, such that

$$d_{ij} = 1\left(\alpha_j < \mu_i + \varepsilon_{ij}\right), \tag{3}$$

where the mental gap can similarly have an individual-specific component, included in μ_i, and a component that is specific to the decision, included in ε_{ij}. The threshold level α_j allows for differences in decision contexts that are common to all individuals, for example that one decision is more complicated and demanding than another decision.

Common to both classes of models is that the propensity to be inactive is governed by the two factors μ_i and ε_{ij}. Since our key interest is in the relative importance of these two factors, we consider the following generalized equation that nests both classes of behavioral models:

$$d_{ij} = 1\left(\alpha_j + \beta x_{ij} < \mu_i + \varepsilon_{ij}\right), \tag{4}$$

Both observable characteristics, including the magnitude of the incentive, and unobserved factors, including the individual-specific component, μ_i, and the random component, ε_{ij}, are potential determinants of whether an individual i is inactive in decision context j. Equation

(4) summarizes this as a binary response model with observed and unobserved effects where we are interested in estimating the relative variance $\rho = \sigma_\mu^2/(\sigma_\mu^2 + \sigma_\varepsilon^2)$, i.e., how large a share of the variation reflects a common individual component. In order to estimate equation (4), we assume $\mu_i \sim \mathcal{N}(0, \sigma_\mu^2)$ and $\varepsilon_{ij} \sim \mathcal{N}(0, 1)$, which includes a standard normalization of σ_ε^2 to one. Given these assumptions, equation (4) has the structure of a probit model with unobserved effects where we estimate α_j, β, and ρ using maximum likelihood estimation.

5 Main Results

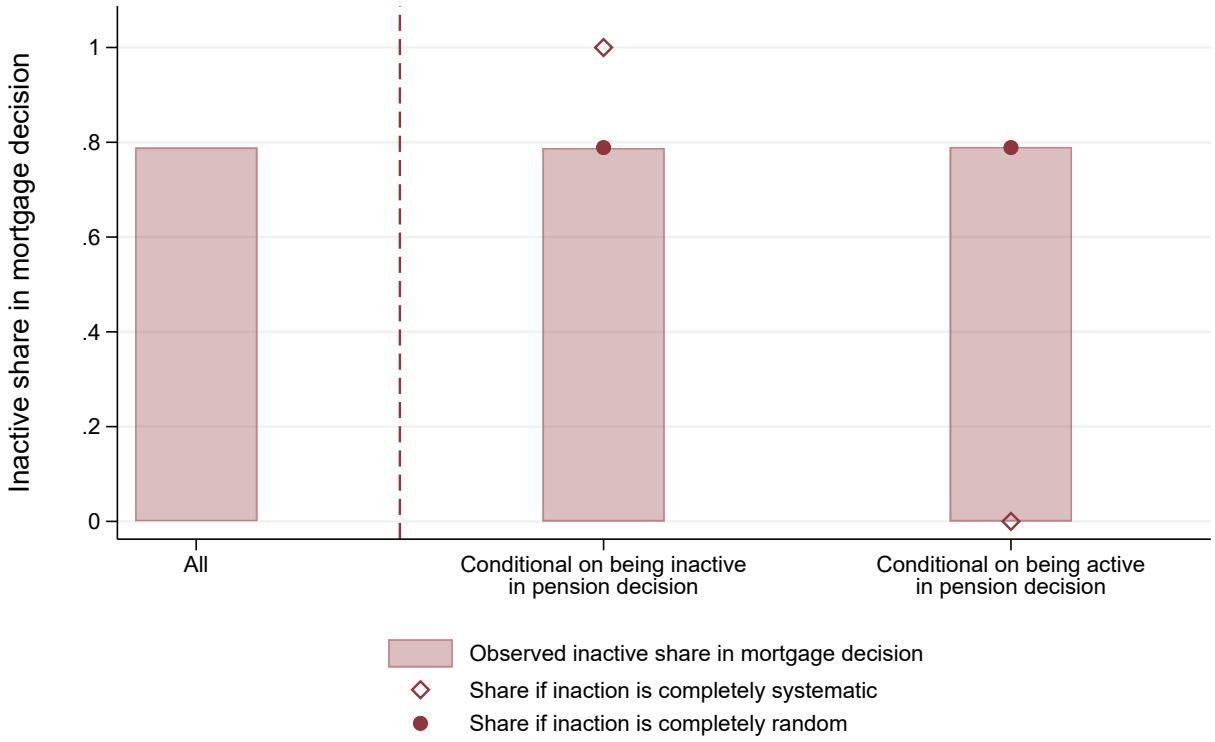
We start with a simple graphical inspection of the relationship between the decisions in the pension and mortgage contexts, which can reveal whether people are systematically inactive across the two decisions. Figure 4 shows the result. The first bar to the left repeats the finding from Figure 3 that 79 percent of individuals respond inactively to the incentive to refinance their mortgage.

Next, we look at the share of people who are inactive in this decision context conditional on being inactive in the other decision context. The diamonds and circles illustrate two extreme hypothetical outcomes. If inaction is driven only by systematic differences across people then a person who is inactive in the pension context is also inactive in the mortgage context and vice versa. In this case, 100 percent of the people who were inactive in the pension context would also be inactive in the mortgage context, and none of the people who were active in the pension context would be inactive in the mortgage context. This is illustrated with the diamonds in Figure 4. Alternatively, if inaction is entirely determined by random factors, then the conditional and unconditional shares of inaction in the mortgage context would be identical and equal to 79 percent regardless of whether they were active or inactive in the pension context. This is indicated by the circles in Figure 4.

The second and third bars show the actual fraction of individuals who are inactive in the mortgage context conditional on being inactive (second bar) or active (third bar) in the pension context. They reveal a striking independence between the decisions with the bars completely aligned with the circles. The exact estimate is 79 percent (95 percent confidence interval: 78-

80) in both cases. Thus, the share of inaction in the mortgage context is practically identical regardless of whether an active or inactive decision is made in the pension context. This strongly suggests that inaction is not systematic across the decision contexts of individuals.

Figure 4: Observed Inactive Share in Mortgage Decision Conditional on Pension Response



Notes: This figure presents the unconditional share of inaction in the mortgage decision in the first bar and the share of inaction conditional on an active or inactive decision in the pension context in the second and third bar . The diamonds and the circles represent the counterfactual shares that would have appeared if inaction was completely systematic (diamonds) or completely random (circles). The estimation sample includes all individuals who had an incentive to refinance their mortgage between 2009 and 2016 and who also had an incentive to adjust their retirement contributions following either the 2010 policy or the 2012 policy as described in Section 2.

The analysis based on Figure 4 does not account for the fact that individuals may face different magnitudes of incentives across decisions. To take this into account and measure the systematic share of the underlying variation in inaction, we estimate equation (4). The results are presented in Table 3. Column (1) shows the estimate of ρ when we only include decision-context-specific constants in the estimation (the α_j terms in the equation). The difference between these constants in column (1) is 14 percentage points, which aligns with inaction being 14 percentage points more prevalent in the mortgage context than in the pension context according to the simple averages in panel (a) of Figure 3.

The estimate of ρ is zero, implying that systematic differences between individuals play

no role. This corresponds to our previous finding of independence between decisions in the nonparametric graphical analysis in Figure 4. The estimate of ρ is precise and implies that we can rule out a value greater than 3 percent at a level of significance of 5 percent.[7]

Table 3: Estimated Proportion of Systematic Inaction

	(1)	(2)	(3)
Systematic share of variation, ρ (%)	0.003	0.006	0.002
	(0.838)	(0.926)	(0.456)
Pension, α_P (d)	12.596	8.123	9.586***
	(0.374)	(0.457)	(1.995)
Mortgage, α_M (d)	26.484	24.352	25.741***
	(0.325)	(0.358)	(2.062)
Incentive, β (1000 DKK)		0.214	0.221***
		(0.012)	(0.014)
Other characteristics			✓
Individuals	10,619	10,619	10,619

Notes: This table presents marginal effects (in percentage points) from a random effects probit regression. The estimated systematic share is the proportion of the total variance that is explained by individual-level unobserved factors (in percent). Observables include age, marital status, education, financial education, gender, gross income, liquidity constraints, and the size of the incentive. The table including the full set of estimated marginal effects can be found in Appendix Table C.3, and the table with the full set of raw coefficients can be found in Appendix Table C.4. The estimation sample includes all individuals who had an incentive to refinance their mortgage between 2009 and 2016 and who also had an incentive to adjust their retirement contributions following either the 2010 policy or the 2012 policy as described in Section 2. Standard errors in parentheses are calculated as the standard deviation of the bootstrapped sampling distribution, based on 1,000 replications. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

One potential reason for the finding that inaction is not systematic across decision contexts could be that the incentives of the individuals vary across the two contexts (creating bias because the incentive, x_{ij}, is omitted from the estimation of equation (4)). To address this, we include the size of the incentive in each decision in the estimation. This results in the main estimate presented in column (2), which also points to close to zero systematic variation. In column (3), we further add all the observable characteristics that were included in the probit regressions in Table 2. Although there is some variation over time in these observables, most of the variation reflects persistent differences between people. When included in the estimation, this absorbs some of the systematic variation in inaction, causing the estimate of ρ to move even closer to zero.

In summary, the results provide strong and robust evidence that inaction across the retirement saving and mortgage refinancing contexts does not share a common individual component. Thus, while a large fraction of the population is inactive in both decision contexts, it is not

[7]The 95% confidence interval for ρ is [0.000, 3.063], obtained from the empirical percentiles of the bootstrapped sampling distribution, based on 1,000 replications.

systematically the same people who behave inactively in different contexts.

6 Additional Analyses

6.1 Alternative Definitions of Inaction

In our main analysis, we define inaction as not responding to an incentive change in the year where the incentive changes. In reality, individuals' adjustment may be sluggish and only realized after some time. Thus, they may not change their retirement contributions immediately, but do so with a lag, and they may not refinance their mortgages exactly at the optimal threshold. Table 4 shows that the estimated systematic share continues to be close to zero when using alternative definitions of inactive behavior.

Table 4: Proportion of Systematic Inaction - Alternative Definitions of Inaction

Specification	(1) Systematic share (%)	(2) Individuals
Main result repeated	**0.006 (0.926)**	**10,619**
(a) Mortgage: Active at some point	0.021 (0.842)	10,619
(b) Pension: Active at some point	0.000 (0.101)	10,619
(c) Active at some point both contexts	0.003 (0.495)	10,619
(d) Pension: Without substitution	0.640 (1.223)	10,619
(e) Mortgage: Active acc. to rule-of-thumb	0.001 (0.382)	15,282

Notes: This table summarizes the results from applying alternative definitions of inaction when estimating the proportion of systematic inaction across mortgage and pension contexts. Details about the alternative definitions are described in the text. The first row repeats the main result, cf. to column (2) of Table 3.Standard errors in parentheses are calculated as the standard deviation of the bootstrapped sampling distribution, based on 1,000 replications.

Row (a) reproduces the main estimation, but in this case defines individuals to be active in the mortgage context if they refinance at any point between the time the incentive appears and 2016, which is the last year of the data period. Similarly, row (b) changes the definition in the pension context by classifying individuals as active if they respond to the retirement saving incentives in any year following the policies until 2016. Row (c) combines the changes of definitions in (a) and (b) by allowing individuals to make an active choice later in both contexts. With these definitions, we find that 48 percent of individuals respond inactively to pension incentives and 55 percent of individuals respond inactively to mortgage refinancing incentives. More importantly, the results in rows (a)-(c) show that defining inactive behavior

as not being active right away or never being active does not affect our key conclusion. The systematic variation in inaction is still close to zero and is precisely estimated.

Row (d) shows the results when using a different definition of inaction in the pension context. In our main specification, individuals are classified as inactive if they do not reduce their annuity contributions below the new limit while increasing life annuity contributions, which is the closest substitute. This is the same definition used by Chetty et al. (2014) and Andersen (2018) in similar analyses, but both papers also consider a definition without substitution, that is, where individuals are only classified as inactive if they do not reduce their annuity contributions below the new limit, regardless of whether they rebalance their remaining saving portfolio or not. Row (d) shows that implementing this alternative definition increases the systematic share, but it is still below 1 percent and with an upper bound of 4 percent when computing the 95 percent confidence interval.

Row (e) shows what happens when using a different definition of inaction in the mortgage context. In our main specification, we determine whether individuals have an incentive to refinance their mortgage through the optimal refinancing threshold as is done in Andersen et al. (2020). However, the optimal refinancing threshold is based on a complex calculation, and individuals may be more likely to consider the rule-of-thumb for optimal refinancing that banks typically communicate. This rule-of-thumb suggests that you should refinance your fixed-rate mortgage if the interest rate has dropped by at least 1 percentage point and your mortgage is larger than 500,000 DKK with a remaining maturity of at least 10 years. Row (e) shows that determining inaction in the mortgage context based on having an incentive to refinance if the above conditions hold does not change the result of the analysis.

6.2 Inaction in Pension Saving Decisions Across Time

Given our result that inaction is not systematic across the two different decision contexts, it is natural to ask whether there are any systematic differences between people in inactive behavior more generally. To address this question, we examine the degree of systematic inaction within the context of pension savings, where we can analyze whether individuals who did not respond

to the 2010 cap on pension contributions were also inactive following the further reduction of the cap in 2012. This case is interesting because the two changes in incentives occur within the same context, they are similar in nature, and they occurred within a short time frame. Therefore, it is natural to expect a more systematic pattern, with some individuals remaining active in both decisions, while others remain inactive in both.

To carry out this analysis, we identify a sample of individuals who face an incentive to reduce contributions to annuity accounts in both 2010 and 2012. In Table 5, we estimate equation (4) and quantify the fraction of the variation in inaction that can be explained by individual-specific factors. Column (1) shows the estimate of ρ when we only include context-specific constants in the estimation. It suggests that 46 percent of the variation in active versus inactive decisions reflects systematic differences between individuals. In column (2), we account for variation in the size of the incentive, which reduces the estimate of ρ to 35 percent. Adding the other observable characteristics does not affect the estimate, as shown in column (3). These results point to significant individual differences in decision making within the pension context, with some people systematically being inactive and others systematically being active. However, even in this case, most of the variation remains unsystematic, and from the previous results we know that the common individual component in the pension context is not shared with the mortgage context.

Table 5: Proportion of Systematic Inaction in the Pension Context

	(1)	(2)	(3)
Systematic share of variation, ρ (%)	45.840	34.901	35.888
	(2.794)	(3.131)	(3.252)
2010, α_{2010} (d)	26.780***	20.422***	9.437**
	(0.381)	(0.853)	(4.169)
2012, α_{2012} (d)	21.017***	13.578***	2.604
	(0.400)	(0.969)	(4.340)
Incentive: β (1000 DKK)		0.096***	0.056***
		(0.014)	(0.014)
Other characteristics			✓
Individuals	3,728	3,728	3,728

Notes: This table presents marginal effects (in percentage points) from a random effects probit regression. The estimated systematic share is the proportion of the total variance that is explained by individual-level unobserved factors (in percent). Observables include age, marital status, education, financial education, gender, gross income, liquidity constraints, and the size of the incentive. The estimation sample includes all individuals who had an incentive to adjust their retirement contributions in both pension policies as described in Section 2. Standard errors in parentheses are calculated as the standard deviation of the bootstrapped sampling distribution, based on 1,000 replications. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

6.3 Other Robustness Results

Table 6 reports the results of additional robustness checks of the main analyses where we change the empirical specification (rows a-b) and consider different subsamples (rows c-h). Our main estimation result from Table 3, column 2, repeated in the top row of the table, is based on a random effects probit model where the size of the economic incentive to make an adjustment enters linearly as an explanatory variable, cf. equation (4). In row (a), we instead base the estimation on a random effects logit model, while we control more flexibly for the impact of the incentive by including a third-order polynomial in the size of the incentive in row (b). These changes still give an estimated systematic share close to zero.

The limited influence of a common individual factor across decisions may arise because these decisions are affected by life events that occur coincidentally and influence people's awareness, mental resources, etc. Individuals who are getting married or divorced are already excluded from the sample. In row (c), we further remove individuals who get a child or experience an unemployment spell in the same year as they face an incentive to respond in either context. Related, in row (d), we zoom in on the shorter time period 2010-12, thereby limiting the potential role of time-varying shocks that can make an individual active in one year but inactive in another year. These changes reduce the sample size but still give precise estimates close to zero.

The remaining rows show results from heterogeneity analyses based on different sample splits. In (e), we divide the sample into individuals in couples and singles who may behave differently, for example, because of joint decision-making among couples. In (f), we divide the sample of individuals into those above and below the median age of 50, reflecting that those closer to retirement might be more active in the pension context, while younger individuals on average became homeowners more recently and may be more active in the mortgage context. In (g), we study the heterogeneity in behavior depending on the size of the economic incentive. People might face different foregone gains from inaction across contexts, which could potentially give them an incentive to respond in only one context and not in the other. We study whether systematic behavior exists only for those with similar sizes of incentives across contexts

Table 6: Proportion of Systematic Inaction - Robustness

	(1) Systematic share (%)	(2) Individuals
Main result repeated	**0.006 (0.926)**	10,619
Specification changes		
(a) Logit	0.040 (0.870)	10,619
(b) Polynomial specification, incentive	0.259 (1.103)	10,619
Subsample analyses		
(c) No life events	0.005 (0.725)	10,276
(d) Everyone with an incentive 2010-12	0.002 (1.231)	5,596
(e) Split by marital status		
- 1. Couples	0.124 (1.305)	7,928
- 2. Singles	0.002 (1.485)	3,029
(f) Split by age		
- 1. Above median	0.002 (1.144)	5,441
- 2. Below median	2.251 (2.090)	5,862
(g) Split by size of incentive		
- 1. Above median	2.560 (2.983)	2,761
- 2. Below median	0.000 (0.219)	2,762
(h) Split by income		
- 1. Above median	5.026 (2.601)	5,921
- 2. Below median	0.002 (0.640)	5,935

Notes: This table reports robustness checks for the estimated systematic inaction across the mortgage and pension contexts. (a) uses a random effects logit model for the estimation instead of the random effects probit model used in the main analysis. (b) extends the main analysis by including a third-order polynomial in the incentive. (c) removes individuals who get married or have a child in the same year as they face an incentive to make an adjustment. (d) restricts the observation period to 2010-12. The "below median" samples in e.2, f.2, g.2, and h.2 include those at the median. The robustness checks are described in greater details in the text. In the first row, the main result repeated, cf. column (2) of Table 3. Standard errors in parentheses are calculated as the standard deviation of the bootstrapped sampling distribution, based on 1,000 replications.

by considering a subsample of people who face an above-median incentive in both contexts and a subsample facing a below-median incentive in both contexts. Finally, in (h), we study heterogeneity between income groups by splitting the sample into high-income individuals with above-median income and low-income individuals with below-median income.

The estimated systematic share is close to zero across all sub-samples. We find the highest share when we zoom into the high-income group. Even in this case, the systematic share is only 5 percent and with a 95 percent confidence interval going from 0 to 10 percent.

7 Concluding Remarks

Recent studies document that many people do not make active decisions when faced with incentives to refinance their mortgage or to adjust retirement savings, which are among the most important financial decisions of households. Our study is the first to analyze systematic financial

inaction, that is, whether it is the same people who are systematically inactive across different financial decisions. This is made possible by the availability of comprehensive administrative data, which we use to measure individual-level responses to multiple quasi-experiments that change incentives for retirement saving and mortgage refinancing in Denmark. We find striking independence between decisions. Individuals who behave inactively in the mortgage context do not behave systematically inactively in the pension context, and this independence is precisely estimated.

Our findings provide new insights into the nature of financial inaction by demonstrating a limited role for differences in inherent behavioral traits of people. The findings imply that the costs of inaction tend to be evenly spread across all rather than concentrated on certain individuals. This may be good news from a welfare economics perspective, but it also makes it difficult to target better decision-making initiatives to certain individuals.

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Internet Appendix

A Optimal Refinancing Threshold

We identify treated individuals with an incentive to refinance their mortgage using the closed-form solution of the optimal refinancing threshold proposed by Agarwal, Driscoll, and Laibson (2013) (ADL). We follow the description and calibration in Andersen et al. (2020) closely, and this section therefore largely mirrors the description on pages 3194–3196 of their paper.

The incentive to refinance is positive when the difference between the current interest rate and the potential new interest rate exceeds the optimal refinancing threshold:

$$Incentive_{it} = (Interest_{it}^{old} - Interest_{it}^{new}) - OptimalRefinancingThreshold_{it} \tag{5}$$

The threshold from ADL (from here on defined as O_{it}) thus describes the minimum required reduction in interest expenses that would make refinancing profitable:

$$O_{it} = \frac{1}{\psi_{it}}[\phi_{it} + W(-\exp(-\phi_{it}))], \text{ where} \tag{6}$$

$$\psi_{it} = \sqrt{\frac{2(\rho + \lambda_{it})}{\sigma}}, \text{ and} \tag{7}$$

$$\phi_{it} = 1 + \psi_{it}(\rho + \lambda)\frac{\kappa(m_{it})}{m_{it}(1-\tau)} \tag{8}$$

This solution includes the Lambert W-function and the two inputs ψ_{it} and ϕ_{it}, which depend on market parameters and borrower characteristics. Adopting the calibration in Andersen et al. (2020), we set $\rho = 0.05$ (discount rate), $\sigma = 0.0074$ (interest rate volatility), and $\tau = 0.33$ (marginal tax rate for interest deductions).

The remaining inputs are m_{it}, the observed mortgage balance, and λ_{it}, the expected rate of real principal decline. Following Andersen et al. (2020), we approximate total refinancing costs as:

$$\kappa(m_{it}) = 3,000 + \max(0.002m_{it}, 4,000) + 0.0001m_{it}, \tag{9}$$

which includes a fee range of $3,000 - 7,000$ DKK and refinancing implementation costs. We winsorize $\kappa(m_{it})$ at the 99th percentile to limit the influence of unusually large mortgages.

The expected principal decline λ_{it} is given by:

$$\lambda_{it} = \mu_{it} + \frac{Y_{it}^{old}}{\exp(Y_{it}^{old} T_{it}) - 1} + \pi_t \tag{10}$$

where Y_{it}^{old} is the yield on the existing mortgage (based on 10-year bond yields), T_{it} is remaining maturity, and $\pi_t = 0.02$ is the inflation rate.

The mortgage termination probability μ_{it} is estimated using a logistic regression: $\mu_{it} = \mathbb{P}(\mu' \mathbf{z}_{it} + \epsilon_{it} > 0)$, where $\mathbf{z}_{it}$ includes individual-level characteristics (age, gender, marital status, children, immigration status, education, financial education, region, income, financial wealth, and housing assets).

In sum, the refinancing threshold accounts for fixed costs, mortgage size, maturity, and prepayment risk. The refinancing incentive is decreasing in fixed costs and termination hazard, and increasing in mortgage size and maturity.

B Back-of-the-envelope Calculation of Incentive Size

B.1 Incentives in the Pension Decision

The size of the incentive in the pension decision is calculated as the after-tax difference between the cap and the individual's contributions to the annuity pension scheme one year before the policy. As we do not know the exact marginal tax rates of individuals in the sample, we perform a simple calculation of the after-tax amount by assuming that individuals are either subject to a marginal tax rate of 40 percent or 55 percent if they are registered as top-tax payers in the income register. Tax rates in Denmark are sums of a fixed bottom tax rate, top tax rate (if the individual's income falls within the top tax income bracket), labor market tax, church tax, health system contribution, and a municipal tax that varies across municipalities. The individual can also receive an employment allowance, a job allowance, and a pension allowance. The 40 percent and 55 percent tax rates correspond to the lowest and highest tax rates in

2010 reported by The Danish Ministry of Taxation (2025), where the lowest rate includes the average municipal tax. Within the same tax bracket, differences in incentive size are therefore solely driven by differences in initial contributions.

The calculated size of incentive can thus be interpreted as the potential saving an individual could achieve by reducing contributions to the exact contribution limit. For the inactive savers who do not reduce their contributions, this amount therefore reflects their foregone gains from inaction. For the active savers who do in fact reduce their contributions, their actual saving could potentially be larger if they reduce their contributions more.

B.2 Incentives in the Mortgage Decision

In the mortgage decision, the size of the incentive is calculated as the direct interest saving on the loan if the individual had refinanced exactly at the time when the incentive became positive according to the optimal refinancing threshold. For each year, we calculate the principal and interest payments directly from the data based on the mortgage principal, maturity, term payments, and interest, and use this to determine the remaining value of the mortgage. Then we calculate a potential interest payment using the market interest rate that the borrower would have faced if they had refinanced exactly at the time that the incentive became positive. The size of the incentive is then calculated as the difference between the actual interest payment and the potential interest payment, which thus reflects foregone saving on the loan.

C Additional Tables and Figures

Table C.1: Inaction and Observable Characteristics - Flexible Specifications

	Inactive Pension				Inactive Mortgage			
	(1) Main	(2) Flex 1	(3) Flex 2	(4) Flex 3	(1) Main	(2) Flex 1	(3) Flex 2	(4) Flex 3
Observable characteristics	✓	✓	✓	✓	✓	✓	✓	
Polynomials in age		✓		✓		✓		✓
Polynomials in income		✓		✓		✓		✓
Polynomials in incentive		✓		✓		✓		✓
Detailed education groups			✓	✓			✓	✓
Individuals	10,619	10,619	10,619	10,619	10,619	10,619	10,619	10,619
Pseudo R^2	0.042	0.045	0.046	0.049	0.006	0.031	0.007	0.033

Notes: The table presents coefficients from a probit regression of a dummy indicating inaction in either the pension decision or the mortgage decision on observable characteristics for individuals in the estimation sample. Flex 1 includes 2nd and 3rd degree polynomials in age, income and the size of the incentive. Flex 2 replaces tertiary education with five dummies for highest completed education being high school, vocational training, short tertiary education, middle-length tertiary education and long tertiary education. Flex 3 combines the specifications of Flex 1 and Flex 2.

Table C.2: Inaction and Observable Characteristics - Coefficients

	(1) Inactive Pension	(2) Inactive Mortgage
Tertiary education	-0.385***	-0.031
	(0.027)	(0.030)
Financial education	-0.187***	-0.159***
	(0.056)	(0.059)
Age	-0.005***	0.006***
	(0.002)	(0.002)
Male	0.185***	-0.057*
	(0.028)	(0.031)
Married	0.028	-0.103***
	(0.029)	(0.032)
Gross income (1000 DKK)	0.000***	-0.000
	(0.000)	(0.000)
Liquidity constrained	0.041	-0.012
	(0.027)	(0.029)
Incentive (1000 DKK)	0.005***	0.000***
	(0.001)	(0.000)
Constant	0.466***	0.637***
	(0.088)	(0.098)
Individuals	10,619	10,619
Pseudo R^2	0.042	0.006

Notes: The table presents the coefficients from a probit regression of a dummy indicating inaction in either the pension decision or the mortgage decision on observable characteristics for individuals in the estimation sample. Gross income includes labor income, public transfers, and capital income excluding employer-administered contributions. The education variables are dummies that indicate the highest completed level of education. Liquidity constrained indicates that the individual's bank account savings are lower than two times monthly disposable income. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C.3: Estimated Proportion of Systematic Inaction - Marginal Effects Full Table

	(1)	(2)	(3)
Systematic share of variation, ρ (%)	0.003	0.006	0.002
	(0.838)	(0.926)	(0.456)
Pension, α_P (d)	12.596	8.123	9.586***
	(0.374)	(0.457)	(1.995)
Mortgage, α_M (d)	26.484	24.352	25.741***
	(0.325)	(0.358)	(2.062)
Incentive, β (1000 DKK)		0.214	0.221***
		(0.012)	(0.014)
Tertiary education			-7.265***
			(0.634)
Male			2.572***
			(0.692)
Financial education			-5.787***
			(1.373)
Age			0.015
			(0.037)
Married			-0.821
			(0.692)
Gross income (1000 DKK)			0.001
			(0.000)
Liquidity constrained			0.750
			(0.681)
Individuals	10,619	10,619	10,619
Pseudo R^2	0.024	0.035	0.047

Notes: This table presents marginal effects (in percentage points) from a random effects probit regression. The estimated systematic share is the proportion of the total variance that is explained by individual-level unobserved factors (in percent). The estimation sample includes all individuals who had an incentive to refinance their mortgage between 2009 and 2016 and who also had an incentive to adjust their retirement contributions following either the 2010 policy or the 2012 policy as described in Section 2. Standard errors in parentheses are calculated as the standard deviation of the bootstrapped sampling distribution, based on 1,000 replications. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C.4: Estimated Proportion of Systematic Inaction - Coefficients Full Table

	(1)	(2)	(3)
Systematic share of variation, ρ	0.000	0.000	0.000
	(0.018)	(0.018)	(0.019)
Pension, α_P (d)	0.382***	0.249***	0.296***
	(0.013)	(0.015)	(0.065)
Mortgage, α_M (d)	0.803***	0.747***	0.796***
	(0.015)	(0.016)	(0.068)
Incentive, β (1000 DKK)		0.007***	0.007***
		(0.000)	(0.000)
Tertiary education			-0.225***
			(0.012)
Male			0.080***
			(0.020)
Financial education			-0.179***
			(0.040)
Age			0.000
			(0.001)
Married			-0.025
			(0.021)
Gross income (1000 DKK)			0.000
			(0.000)
Liquidity constrained			0.023
			(0.020)
Individuals	10,619	10,619	10,619
Pseudo R^2	0.024	0.035	0.047

Notes: This table presents the estimated coefficients from a random effects probit regression. The estimated systematic share is the proportion of the total variance that is explained by individual-level unobserved factors. Observables include age, marital status, education, financial education, gender, gross income, liquidity constraints, and the size of the incentive. The estimation sample includes all individuals who had an incentive to refinance their mortgage between 2009 and 2016 and who also had an incentive to adjust their retirement contributions following either the 2010 policy or the 2012 policy as described in Section 2. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$