Active vs. Passive Decisions and Crowd-out in Retirement Savings Accounts: Evidence from Denmark

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Do retirement savings policies – e.g., tax subsidies or employer-provided pensions – raise total wealth accumulation?

Or simply induce shifting across accounts?

Central questions for understanding optimal design of retirement policies


Largely due to limitations in data and research designs [Bernheim 2002]
Overview

- We estimate crowd-out in retirement savings accounts using Danish tax data
  - 41 million observations on savings from administrative sources

- We analyze two types of policies
  - Automatic contributions by government or firms to workers’ retirement savings accounts
  - Price subsidies for retirement savings

- Main finding: Automatic contributions raise total savings much more than price subsidies
  - Interpret this result through a model of active and passive choice
Consumers can use their income \((W)\) for 3 purposes:

- Consumption \((C)\)
- Non-Pension Savings \((S)\)
- Pension Savings \((P^I)\)

Government has two policies:

- Automatic pension contributions \((P^G)\)
- Subsidy for pension contributions \((\psi)\)

Budget constraint (ignoring corners):

\[
C_1 = W - S - (P^I + P^G) \\
C_2 = (1 + r)S + (1 + r + \psi)(P^I + P^G)
\]
# Impacts of Government Policies on Saving for Active vs. Passive Savers

## Automatic Contribution

<table>
<thead>
<tr>
<th></th>
<th>Raises Pension Contribs. $P^G + P^I$?</th>
<th>Raises Total Saving $P^G + P^I + S$?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Savers</td>
<td>No</td>
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<td>Yes/Uncertain</td>
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### Impacts of Government Policies on Saving for Active vs. Passive Savers

#### Automatic Contribution

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Prior work (e.g., Madrian and Shea 2001, Choi et al. 2004) suggests that automatic contributions raise total pension contributions.
Impacts of Government Policies on Saving for Active vs. Passive Savers

**Automatic Contribution**

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But impact of auto. contrib. on total saving unclear for passive agents
Impacts of Automatic Contributions on Savings

Effect of automatic contribution on total savings depends on how passive agents adjust to reduction in disposable income.

Two extreme cases span potential responses:

1. Absorb reduction in income by running down bank balance
   - Fixed consumption plan → smaller end-of-year bank balance
   - $1 automatic contribution leads to no change in total savings

2. Absorb reduction in income by reducing consumption
   - Fixed savings target → cut consumption to meet savings goal
   - $1 automatic contribution leads to $1 increase in total savings
### Impacts of Government Policies on Saving for Active vs. Passive Savers

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Prior work on match rates (e.g. Duflo et al. 2006, Engelhardt and Kumar 2007) suggests that subsidies increase pension saving
## Impacts of Government Policies on Saving for Active vs. Passive Savers

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But impact of price subsidy on total saving again unclear
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These two policies affect different types of individuals.
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<td></td>
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1. Test the four predictions

2. Estimate fraction of active vs. passive savers

3. Analyze heterogeneity to test active vs. passive choice mechanism

Diagram:
- Passive
- Data
- Active
- Response to $P^G$ and $\psi$
Denmark has three major retirement savings policies similar to U.S.:

1. Tax-deferred individual savings accounts
2. Tax-deferred employer savings accounts
3. Defined benefit public pension system
   - Fixed benefit of DKr 140,000 (US $23,000) with earnings test based on income
Data and Sample Definition

- Universe of Danish income tax returns, 1995-2009

- Sample restrictions: (1) not self employed and (2) age 18-60
  - 4.0 million unique individuals
  - 41 million observations on savings and liabilities

- Data on household balance sheet from 3rd party reports to tax authority
Part 1
Impacts of Automatic Contributions
Impact of Automatic Contributions

- Do automatic contributions to retirement accounts affect individuals’ total saving?

- Ideal experiment: randomize automatic contributions holding fixed total compensation ($100 increase in pension + $100 reduction in earnings)

- Two quasi-experimental research designs:
  1. Variation in employer-provided pensions
  2. Government mandatory savings plan

- Both designs yield similar results; focus today on employer changes
Impacts of Employer-Provided Pensions

- Research design: event studies around job changes
  - Compare impacts of sharp increases or decreases in employer pension contributions at the time of job change

- Two potential concerns with this design
  - Job switches may be endogenous
  - Total compensation changing as well; need to net out income effect

- We address both concerns after presenting baseline results
Event Study around Switches to Firm with >3% Increase in Employer Pension Rate
Individuals with Positive Pension Contributions or Savings Prior to Switch

Δ Employer Pensions = 5.64
Event Study around Switches to Firm with >3% Increase in Employer Pension Rate

Individuals with Positive Pension Contributions or Savings Prior to Switch

Δ Employer Pensions = 5.64
Δ Individual Pensions = -0.56
Event Study around Switches to Firm with >3% Increase in Employer Pension Rate
Individuals with Positive Pension Contributions or Savings Prior to Switch

$\Delta$ Employer Pensions = 5.64
$\Delta$ Taxable Savings = 0.02
Fraction Saving More than New Level of Employer Pension Contribution

\[ \Delta \text{Total Pensions} = 25.8\% \]

Predicted = 27.2%
Fraction Saving More than New Level of Employer Pension Contribution

Δ Total Pensions = 25.8%
Predicted = 27.2%

Year Relative to Firm Switch

Fraction Saving More than New Level of Employer Pension

-4 -2 0 2 4

Total Pension Contribs.
Predcited with Full Pass-Through
Fraction Saving More than New Level of Employer Pension Contribution

\[ \Delta \text{Total Pensions} = 25.8\% \]

Predicted = 27.2\%

\[ \Delta \text{Total Savings} = 21.0\% \]

Predicted = 34.0\%

\[ \Delta \text{Total Pensions} = 25.8\% \]

Predicted = 27.2\%

\[ \Delta \text{Total Savings} = 21.0\% \]

Predicted = 34.0\%
Distribution of Changes in Individual Pension Contributions in Year of Firm Switch

Change required to offset 3% increase

Percent of Individuals

D Individual Pension Contributions as a Percentage of Labor Income

≥3% Increase in Employer Pension at Job Change

No Change in Employer Pension at Job Change
Changes in Total Pension Contributions vs. Changes in Employer Pension Rates

Total Pensions Pass-Through Rate: $\phi_E = 94.9\%$ (0.2%)
Changes in Total Savings Rates vs. Changes in Employer Pension Rates

Total Savings Pass-Through Rate: $\phi_E = 77.7\%$ (2.2%)
Changes in Total Savings Rates vs. Changes in Labor Income

Marginal Propensity to Save: $\beta = 11.8\%$ (0.3%)
Pass-Through of Employer Pension to Total Savings by Years Since Firm Switch
Total Wealth Accrued from Switch to Retirement (Age 60) vs. Changes in Employer Pension Rate at Switch

\[ \Delta \text{Accrued Wealth} / \Delta \text{Emp. Pension} = 4.54 \quad (0.43) \]
<table>
<thead>
<tr>
<th>Sample:</th>
<th>All Firm Switches</th>
<th>All Firm Switches</th>
<th>Mass Layoff</th>
<th>Top Tax Sample</th>
<th>All Firm Switches</th>
<th>First Switch</th>
<th>Switch Age 46-54</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dep. Var.:</td>
<td>Δ Tot. Pension Rate</td>
<td>Δ Tot. Savings Rate</td>
<td>Δ Tot. Savings Rate</td>
<td>Δ Tot. Savings Rate</td>
<td>Δ Net Savings Rate</td>
<td>Δ Tot. Savings Rate</td>
<td>Δ Accrued Wealth</td>
</tr>
<tr>
<td>(1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Δ Emp. Pens.</td>
<td>0.949 (0.002)</td>
<td>0.777 (0.022)</td>
<td>0.828 (0.187)</td>
<td>0.750 (0.038)</td>
<td>0.745 (0.037)</td>
<td>0.784 (0.040)</td>
<td>4.541 (0.426)</td>
</tr>
<tr>
<td>Contrib. Rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Δ Wages</td>
<td>0.118 (0.003)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of Obs.</td>
<td>867,075</td>
<td>1,890,220</td>
<td>37,432</td>
<td>876,922</td>
<td>1,890,642</td>
<td>727,372</td>
<td>54,147</td>
</tr>
</tbody>
</table>
## Employer Pensions: Pass-Through Estimates
### Robustness Checks

<table>
<thead>
<tr>
<th>Sample:</th>
<th>Full Sample Including Corners</th>
<th>Renters</th>
<th>All Firm Switches</th>
<th>Single Individuals</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dep. Var.:</strong></td>
<td><strong>Δ Net Savings</strong></td>
<td><strong>Δ Savings Rate</strong></td>
<td><strong>Δ Household Savings</strong></td>
<td><strong>Δ Savings Rate</strong></td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>Δ Emp. Pens.</td>
<td>0.747</td>
<td>0.818</td>
<td>0.739</td>
<td>0.775</td>
</tr>
<tr>
<td>Contrib. Rate</td>
<td>(0.015)</td>
<td>(0.027)</td>
<td>(0.024)</td>
<td>(0.034)</td>
</tr>
<tr>
<td>No. of Obs.</td>
<td>3,582,391</td>
<td>841,398</td>
<td>1,840,435</td>
<td>708,579</td>
</tr>
</tbody>
</table>
Impacts of Mandates

- Employer pensions provide good identifying variation but may not be identical to impacts of government policies
  - For instance: workers may be more willing to change consumption plans when switching firms

- In the paper, we also directly study a mandate imposed by Danish government in 1998
  - Required individuals above eligibility threshold of DKr 35,000 to contribute 1% of savings to mandatory savings account
  - Estimate impacts using RD and DD designs
  - Main finding: $1 contribution to mandatory savings plan → ~ $1 increase in pensions and total savings
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<td>Uncertain</td>
</tr>
<tr>
<td>Data</td>
<td>Yes</td>
<td>Yes</td>
</tr>
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</table>

### Notes:
- $P^G$ indicates pension contributions from the government.
- $P^I$ indicates individual contributions.
- $S$ indicates additional savings or contributions.
Part 2
Impacts of Subsidies for Retirement Saving
Denmark has two types of tax-deductible savings accounts:

- Capital pensions: paid as a lump sum
- Annuity pensions: paid as annuity

- Subsidy for *capital* pensions for individuals in top income tax bracket was reduced in 1999
  - Tax treatment of annuity pensions unchanged
## Taxation of Capital Pensions

<table>
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<tr>
<th>Pre-1999</th>
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<tbody>
<tr>
<td>Tax At Time of Contribution</td>
</tr>
<tr>
<td>Tax on Capital Gains</td>
</tr>
<tr>
<td>Tax on Payout</td>
</tr>
</tbody>
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### Taxation of Capital Pensions

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<th></th>
<th>Pre-1999</th>
<th>Post-1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax At Time of Contribution</td>
<td>0%</td>
<td>14% if in top tax bracket</td>
</tr>
<tr>
<td>Tax on Capital Gains</td>
<td>~20%</td>
<td>~20%</td>
</tr>
<tr>
<td>Tax on Payout</td>
<td>40%</td>
<td>40%</td>
</tr>
</tbody>
</table>
Subsidy for Capital Pensions in 1999

Note: $1 \equiv 6$ DKr

ΔSubsidy = -14%

Gross Income Prior to Pension Contribution (DKr 1000s)

![Graph showing the impact of 1999 Capital Pension Subsidy Reduction on Capital Pension Contributions.](image-url)

Income Relative to Top Tax Cutoff (DKr)

Capital Pension Contribution (DKr)

1996
1997

Capital Pension Contribution (DKr)

Income Relative to Top Tax Cutoff (DKr)


Capital Pension Contribution (DKr)

Income Relative to Top Tax Cutoff (DKr)

- 1996
- 1997
- 1998
- 1999
- 2000
Impact of 1999 Capital Pension Subsidy Reduction on Distribution of Capital Pension Contributions for Prior Contributors
Impact of 1999 Capital Pension Subsidy Reduction on Distribution of Capital Pension Contributions for Prior Contributors

Percent Change in Capital Pension Contributions

- 1997 to 1998
- 1998 to 1999
Effect of 1999 Reform on Fraction of Capital Pension Contributors by Year for Individuals Contributing Prior to Reform
### Impacts of Government Policies on Saving for Active vs. Passive Savers

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<td></td>
</tr>
<tr>
<td></td>
<td>Raises Total</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Saving $P^G + P^I + S$?</td>
<td></td>
</tr>
<tr>
<td>Active Savers</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>(Neoclassical)</td>
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<td>Passive Savers</td>
<td>Yes</td>
<td>No</td>
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Two crowd-out parameters of interest

1. Shifting across pension accounts

   - What happens to each $1 taken out of capital pensions?
     
     ➔ 55% goes to annuity pension, 45% taken out of pension

   - Relevant parameter for impacts of a policy that targets one type of retirement account (e.g. firm match for 401k)
Crowd-out of Retirement Savings

- Two crowd-out parameters of interest

1. Shifting across pension accounts
   - What happens to each $1 taken out of capital pensions?
     - 55% goes to annuity pension, 45% taken out of pension
   - Relevant parameter for impacts of a policy that targets one type of retirement account (e.g. firm match for 401k)

2. Shifting from pension accounts to taxable savings accounts
   - What happens to each $1 taken out of pension savings?
   - Relevant parameter for determining overall impact of retirement savings subsidies on total savings
To estimate crowdout, focus on changes in slopes (i.e., MPS) over time

- Does marginal propensity to save in taxable accounts rise when individuals cross into top bracket after 1999?

Could also study change in mean level of pension contributions and taxable saving

- Yields similar estimates of crowd-out within retirement accounts
- But fluctuations in MPS across years generates extremely imprecise estimates of impacts on taxable saving
Capital Pensions vs. Income in 1996

Change in MPS at cutoff = 0.6%
Change in Marginal Propensity to Save in Annuity vs. Capital Accounts at Top Tax Cutoff by Year

Diff-in-Diff: $\mu^{MPS} = -0.021 (0.002)$
Change in Marginal Propensity to Save in Annuity vs. Capital Accounts at Top Tax Cutoff by Year

Crowd-out: $\phi^{MPS} = 47.1\%$ (5.6%)
Use change in capital pension subsidy as an instrument for *total* pension contributions

- $1 reduction in capital pensions $\rightarrow$ 45 cent reduction in total pensions

- Does this 45 cents go into consumption or saving in taxable accounts?
Change in Marginal Propensity to Save in Retirement vs. Non-Retirement Accounts at Top Tax Cutoff by Year

Difference in MPS Above vs. Below Top Tax Cutoff

Year


Retirement Accounts
Change in Marginal Propensity to Save in Retirement vs. Non-Retirement Accounts at Top Tax Cutoff by Year

Crowd-out: $\phi^L = 120\%$ (59%)
## Estimates of Crowd-out Induced by Subsidy Change Based on Changes in Marginal Propensity to Save

<table>
<thead>
<tr>
<th></th>
<th>Annuity Contrib.</th>
<th>Total Pension Contrib.</th>
<th>Taxable Saving</th>
<th>Trimmed Taxable Saving</th>
<th>Taxable Saving Threshold</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>Capital Pension Contrib.</td>
<td>-0.471 (0.056)</td>
<td>0.529 (0.056)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Total Pension Contrib.</td>
<td></td>
<td></td>
<td>-1.200 (0.588)</td>
<td>-0.984 (0.267)</td>
<td>-0.994 (0.215)</td>
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<tr>
<td>No. of Obs.</td>
<td>7,026,187</td>
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98% of the change in pension contributions due to subsidies is financed by offsetting changes in savings in taxable accounts.

Based on this estimate, we calculate that each DKr 1 of tax expenditure on subsidies raises personal saving by less than 1 cent.
## Impacts of Government Policies on Savings for Active vs. Passive Savers

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| **Data** | Yes                                       | Yes                                      | Yes | No

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<th>Raises Pension Contribs. ( P^G + P^L )?</th>
<th>Raises Total Saving ( P^G + P^L + S )?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Active Savers</strong></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Passive Savers</strong></td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
| **Data** | Yes                                       | Yes                                      | Yes | No

\( P^L \) denotes the pension contribution from the government, \( P^I \) denotes the individual's own contribution, and \( S \) denotes any additional savings.
Do automatic contributions raise saving more when subsidies are larger?

We estimate interaction effect using two sources of variation in subsidy:

- Pre vs. post 1999 for those in top bracket
- Below vs. above tax bracket cutoffs

Pass-through of employer contributions very similar in all cases

→ Change in subsidy of 14 cents per DKr (50% reduction) has no impact on efficacy of automatic contributions
Part 3
Identifying Active vs. Passive Savers
Heterogeneity: Active vs. Passive Savers

- Are differences between impacts of automatic contributions and subsidies driven by active vs. passive choice?
- Test the mechanism by analyzing heterogeneity of responses across individuals
Recall that roughly 15% of agents respond actively to all 3 policies:

- Employer Pensions: 1 minus pass-through = 6.1%
- Mandated Savings Plan: 1 minus pass-through = 15.5%
- Subsidy Reduction: fraction who reoptimize pension = 19%
Heterogeneity: Active vs. Passive Savers

- Test active vs. passive choice mechanism by analyzing 3 predictions

1. [State dependence] Individuals should respond more to subsidy when actively changing pensions for other reasons
   - Test if new pension contributors allocate more money to annuity accounts than capital accounts than prior contributors
Impact of Subsidy Change: Old vs. New Contributors

% Contributing to Capital Pensions

Year

1998

Old contributors

New contributors
Heterogeneity: Active vs. Passive Savers

- Test active vs. passive choice mechanism by analyzing 3 predictions

1. [State dependence] Individuals should respond more to subsidy when actively changing pensions for other reasons

2. [Types] Individuals who optimize actively should respond to subsidy and undo automatic contributions to a greater degree

- Proxy for active optimization: frequency of changes in pension contributions in other years
Percent Responding to Capital Pension Subsidy Change in 1999 by Frequency of Active Changes in Other Years

\[ \beta = 17.6\% \quad (0.6\%) \]
Pass-Through of Employer Pension Changes for Firm-Switchers by Frequency of Active Changes in Other Years

\[ \beta = -0.096 (0.004) \]
Heterogeneity: Active vs. Passive Savers

- Test active vs. passive choice mechanism by analyzing 3 predictions

1. [State dependence] Individuals should respond more to subsidy when actively changing pensions for other reasons

2. [Types] Active savers should respond to subsidy *and* undo automatic contributions to a greater degree

3. [Observable heterogeneity] Active savers likely to be those who are already saving and planning for retirement

- Carroll et al. (2009): individuals with high discount rates *both* don’t save for retirement *and* delay financial planning
Heterogeneity in Response to Capital Pension Subsidy by Wealth/Income Ratio

\[ \beta = 7.8\% \]

\[ (0.5) \]
Heterogeneity in Pass-Through of Employer Pensions by Wealth/Income Ratio

Wealth/Income Ratio in Year Prior to Switch

Pass-Through of Employer Pensions to Total Savings

$\beta = -0.435$ (0.005)
Heterogeneity in Responses to Subsidies and Employer Pensions by Age

% Extensive Margin Substitution in 1999

Pass-Through (β) From Employer Pension Changes

Subsidy Response

Employer Pension Pass-Through

Age in Year of Subsidy Change (1999) or Firm Switch

25 35 45 55
Heterogeneity in Responses to Subsidies and Employer Pensions by Age

Pass-Through (β) From Employer Pension Changes

% Extensive Margin Substitution in 1999

Age in Year of Subsidy Change (1999) or Firm Switch

Subsidy Response

Employer Pension Pass-Through
Heterogeneity in Responses to Subsidies by Educational Attainment

% Exiting Capital Pension and Raising Annuity in 1999

Education

No College  College

Education
Heterogeneity in Responses to Subsidies by Educational Attainment

% Exiting Capital Pension and Raising Annuity in 1999

- No College
- College
- Economics

Education
Two important strands of research have developed independently

- Crowd-out of retirement savings in non-retirement accounts
- Impacts of active vs. passive policies within retirement accounts

These two issues are closely related

- Degree of crowd-out depends fundamentally on whether savings change is made actively or passively
Implications for Tax Policy

- Tax subsidies are ineffective at raising savings for three reasons:
  1. Spend money subsidizing the savings of the 85% who are passive savers, who do not respond at all
  2. Crowd-out rates high among the 15% of active savers
  3. Active savers are already saving at higher rates → subsidies do not target those who may be least prepared for retirement

- Automatic contributions resolve all three of these problems

- United States flow tax expenditure on tax-deferred savings accounts exceeds $100 billion [JCT 2012]

  Are these policies the best way to raise retirement savings?
Implications for Models of Consumption

1. MPC differs sharply by the form of compensation
   - Increases in automatic pension contributions raise savings much more than increases in disposable income
   - Difference is persistent over time even for large shocks

2. Data point to a “Spenders/Savers” model with heterogeneous agents
   - 85% of individuals are “spenders” with cash-on-hand rule-of-thumb for consumption

3. Interest elasticity of savings is low for two reasons:
   - Among “savers,” reductions in pension savings due to the cut in the subsidy almost entirely offset by increases in taxable savings
   - 85% who are “spenders” not do respond to changes in the subsidy
Supplementary Slides
<table>
<thead>
<tr>
<th>Variable</th>
<th>Full Sample</th>
<th>Top Bracket Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Labor Income ($Y$)</td>
<td>202,981</td>
<td>277,585</td>
</tr>
<tr>
<td>Taxable Income ($Y^{tax}$)</td>
<td>217,284</td>
<td>264,698</td>
</tr>
<tr>
<td>Assets (not incl. home equity)</td>
<td>54,431</td>
<td>62,706</td>
</tr>
<tr>
<td>Assets &gt;10% of labor income</td>
<td>52.1%</td>
<td>41.7%</td>
</tr>
<tr>
<td>Assets/Gross Labor Inc. Ratio</td>
<td>37.0%</td>
<td>20.8%</td>
</tr>
<tr>
<td>Total Savings</td>
<td>29,920</td>
<td>39,974</td>
</tr>
<tr>
<td>Saving Rate</td>
<td>12.8%</td>
<td>9.6%</td>
</tr>
<tr>
<td>Liabilities (not incl. home mortgage)</td>
<td>78,995</td>
<td>95,444</td>
</tr>
<tr>
<td>Change in Liabilities</td>
<td>5,892</td>
<td>5,567</td>
</tr>
<tr>
<td>Net Savings Rate</td>
<td>0.9%</td>
<td>9.3%</td>
</tr>
<tr>
<td><strong>Pension Flows</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fraction with Indiv. Pension</td>
<td>27.6%</td>
<td>36.0%</td>
</tr>
<tr>
<td>Indiv. Pension</td>
<td>3,081</td>
<td>4,007</td>
</tr>
<tr>
<td>Indiv. Pension Contribution Rate</td>
<td>1.2%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Indiv. Capital Pension</td>
<td>1,868</td>
<td>2,589</td>
</tr>
<tr>
<td>Indiv. Annuity Pension</td>
<td>1,213</td>
<td>1,417</td>
</tr>
<tr>
<td>Fraction with Employer Pension</td>
<td>60.4%</td>
<td>83.0%</td>
</tr>
<tr>
<td>Employer Pension</td>
<td>15,205</td>
<td>21,220</td>
</tr>
<tr>
<td>Employer Pension Contribution Rate</td>
<td>5.8%</td>
<td>7.0%</td>
</tr>
<tr>
<td>Fraction with Any Pension</td>
<td>68.3%</td>
<td>90.0%</td>
</tr>
</tbody>
</table>
## Summary Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Full Sample</th>
<th>Top Bracket Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td><strong>Demographics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>38.3</td>
<td>40.5</td>
</tr>
<tr>
<td>Female</td>
<td>52.0%</td>
<td>44.3%</td>
</tr>
<tr>
<td>Married</td>
<td>49.4%</td>
<td>57.7%</td>
</tr>
<tr>
<td>Has Partner</td>
<td>63.7%</td>
<td>73.0%</td>
</tr>
<tr>
<td>Homeowner</td>
<td>52.9%</td>
<td>68.0%</td>
</tr>
<tr>
<td>College Degree</td>
<td>29.3%</td>
<td>44.8%</td>
</tr>
<tr>
<td>Economics Major in Terminal Degree</td>
<td>4.0%</td>
<td>4.0%</td>
</tr>
<tr>
<td><strong>Number of Individuals</strong></td>
<td>4,001,015</td>
<td>1,345,753</td>
</tr>
<tr>
<td><strong>Number of Observations</strong></td>
<td>41,159,806</td>
<td>16,457,106</td>
</tr>
</tbody>
</table>
Employer pensions provide good identifying variation but may not be identical to impacts of government policies.

- E.g. workers may perceive increases in employer-sponsored pensions differently than universal mandate.

- Now directly study a mandate imposed by Danish government.
In 1998, Denmark introduced a Mandatory Savings Plan (MSP)

- Forced individuals with income above DKr 35,000 to contribute 1% of their income to a retirement savings account
- Contribution withheld at source and deposited in an account administered like other private account pensions

We present estimates from a RD design around eligibility cutoff first

Then show that similar results are obtained throughout income distribution using a difference-in-differences design
### Your ATP rate pension [MSP]

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value as of Jan 1. 2004</td>
<td>6,722.59</td>
<td>Dkr.</td>
</tr>
<tr>
<td>Return in 2004</td>
<td>750.49</td>
<td>Dkr.</td>
</tr>
<tr>
<td>Tax on return in 2004</td>
<td>-93.56</td>
<td>Dkr.</td>
</tr>
<tr>
<td>Administrative costs in 2004</td>
<td>-37.92</td>
<td>Dkr.</td>
</tr>
<tr>
<td>Contribution in 2003</td>
<td>3,349.00</td>
<td>Dkr.</td>
</tr>
<tr>
<td>Net return on your contribution</td>
<td>66.89</td>
<td>Dkr.</td>
</tr>
<tr>
<td><strong>Value as of Jan 1. 2005</strong></td>
<td><strong>10,757.49</strong></td>
<td><strong>Dkr.</strong></td>
</tr>
</tbody>
</table>
Mandated Savings (M) Around Eligibility Threshold in 1998

Income (DKR 1000s)

14.5 24.5 34.5 44.5 54.5
Balance Test 1: Income Distribution Around Eligibility Threshold

Number of Taxpayers in Income Bin vs Income (DKr 1000s)
Effect on Mandate on Total Pension Contributions

Percent with Total Pension Contribution > DKr 1265

Income (DKR 1000s)
Effect on Mandate on Total Pension Contributions

Total Pensions
Pass-Through Rate: $\phi_G = 85\% (11\%)$

Empirical
Predicted with 100% Pass-Through
Effect on Mandate on Total Saving

Total Pensions Pass-Through Rate: $\phi_G = 127\%$ (36%)
## Mandated Savings Plan: Pass-Through Estimates

<table>
<thead>
<tr>
<th>Dep. Var.:</th>
<th>Δ Total Pensions</th>
<th>Total Pension Threshold</th>
<th>Total Saving Threshold</th>
<th>Total Ind. Saving Threshold</th>
<th>Net Saving Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pass-Through Estimate</td>
<td>0.883 (0.204)</td>
<td>0.801 (0.310)</td>
<td>0.845 (0.113)</td>
<td>1.336 (0.349)</td>
<td>2.188 (0.587)</td>
</tr>
<tr>
<td>Research Design</td>
<td>Linear</td>
<td>Linear</td>
<td>Quadratic</td>
<td>Linear</td>
<td>Linear</td>
</tr>
<tr>
<td>No. of Obs</td>
<td>35,578</td>
<td>35,578</td>
<td>35,578</td>
<td>158,229</td>
<td>148,380</td>
</tr>
</tbody>
</table>
RD estimates only apply to a low-income group of individuals.

Now show that similar results are obtained throughout income distribution using a difference-in-differences design.

Note that MSP was terminated in 2004.
Mandatory Pension Contributions by Income Group

- **1% MSP Introduced**
- **1% MSP Terminated**

**Mandated Savings (DKr)**

- **Bottom Tercile**
- **Middle Tercile**
- **Top Tercile**
Total Individual Pension Contributions by Income Group

Individual Private Pension Contributions (DKr)

- Bottom Tercile
- Middle Tercile
- Top Tercile

Year

1995 2000 2005 2010
Alternative estimator to identify impacts of change in subsidy: compare mean *level* of pension contributions in treatment and control rather than MPS

Yields similar estimates within pension accounts, but much noisier estimates of crowdout because of fluctuations in MPS

See Appendix C of paper for details
Impact of Subsidy Reduction On Individual Capital Pension Contribs.

Diff-in-Diff: $\mu^L = -2,449$

(121)

Subsidy for Capital Pension Reduced

Below Top Tax Cutoff

Above Top Tax Cutoff
Impact of Capital Pension Subsidy Reduction On Annuity Pension Contributions

Crowd-out: $\phi^L = 56.8\%$

Subsidy for Capital Pension Reduced

Year

Mean Levels of Taxable Saving Above vs. Below Top Tax Cutoff by Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Taxable Saving (DKr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>12,000</td>
</tr>
<tr>
<td>1997</td>
<td>18,000</td>
</tr>
<tr>
<td>1998</td>
<td>10,000</td>
</tr>
<tr>
<td>1999</td>
<td>8,000</td>
</tr>
<tr>
<td>2000</td>
<td>15,000</td>
</tr>
<tr>
<td>2001</td>
<td>10,000</td>
</tr>
</tbody>
</table>

- **25-75K Below Top Tax Cutoff**
- **25-75K Above Top Tax Cutoff**
Empirical Distribution of Reduced-Form Placebo Coefs for Taxable Saving

Predicted Impact with 100% Crowd-Out

CDF of Placebo Coefficients

Placebo Treatment Effect Estimate on Taxable Saving
Empirical Distribution of Reduced-Form Placebo Coefs for Trimmed Taxable Saving

Predicted Impact with 100% Crowd-Out

CDF of Placebo Coefficients

Placebo Treatment Effect Estimate on Taxable Saving
Marginal Propensity to Save in Taxable Accounts for Individuals Above vs. Below Top Tax Cutoff by Year
CDF of Placebo t-statistics for Crowd-out Estimates: Trimmed Means

Estimate for Actual Reform
CDF of Placebo t-statistics for Crowd-out Estimates: Threshold Estimates

Estimate for Actual Reform
CDF of Placebo P values for Crowd-out Estimates: Trimmed Means

Estimate for Actual Reform
Permutation-Based P value = 0.0010
Estimate for Actual Reform
Permutation-Based P value = 0.0027
Change in Taxable Savings