$100 Bills on the Sidewalk: Suboptimal Saving in 401(k) Plans

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Motivation

• **Question:** are individuals saving properly for retirement?

• **Answer:** Hmmmm……..

• From a theoretical standpoint, nearly *any* choice can be justified by some combination of preferences and information not observed by the econometrician.

• This paper examines the extent to which individuals engage in a set of savings behaviors that are *clearly dominated*. 
Motivation

• Who?
  • Individuals >59.5
  • 401(k) plan
    • Matches 401(k) contributions
    • Allows withdrawals for any reason (not just hardship)
    • Allows withdrawals while still employed
    • Allows withdrawals without precluding future contributions
    • No tax penalty (>59.5)

• What? Dominating “withdrawal strategy”
  • Increase 401(k) contribution rate to the match threshold
  • Immediately withdraw incremental contribution
Motivation

- Example
  - Employee earns $100,000
  - Employer matches $1/$1 up to 6% of pay
  - Employee does not contribute to 401(k) plan

- Dominating withdrawal strategies
  - Contribute 6% and immediately withdraw own contribution → same consumption + $6000 extra in 401(k)
  - Contribute 6% and immediately withdraw own contribution and employer match → $6000 extra consumption with no decease in savings

- Lower bound loss—optimal savings rate may be above the match threshold
Motivation

- If anyone should get saving for retirement right, it should be workers >59.5
  - Life experience
  - Salience—staring retirement in the face!
  - Long tenure—time to understand company 401(k) plan
Data

• Seven firms
  • Employer match
  • Employees >59.5 can make penalty-free withdrawals for any reason without an ensuing freeze on contributions

• Administrative data
  • Year-end cross-sections from 1998-2002
  • Demographic information: age, tenure, gender, compensation
  • 401(k) information: participation status, contribution rate, withdrawals, asset transfers
Calculating Welfare Losses

• Conceptual approach
  • Total possible match – actual match received

• Example
  • Employee earns $100,000
  • Employer matches $1/$1 up to 6% of pay
  • Employee contributes 3% of pay

• Loss calculation
  • Actual match: $100K x 3% = $3000
  • Possible match: $100K x 6% = $6000
  • Loss: $6000-$3000 = $3000
Calculating Welfare Losses

- **COMPLICATION #1**: IRS contribution limits
  - Elective deferral limit: $10K in 1998, increases over time ($14k today)
  - Allowable compensation limit: $160K in 1998, increases over time ($210K today)

- Example
  - Employee earns $200K
  - Employer matches $1/$1 up to 6% of pay

- Loss calculation
  - Maximum contribution rate: $10K/$160K = 6.25%
  - Possible match: $160K x 6% = $9600
Calculating Welfare Losses

- **COMPLICATION #2**: Vesting
- *Ex ante* loss calculation approach: use employees’ vesting status at the time of the contribution

**Example**
- Employee earns $100,000
- Employer matches $1/$1 up to 6% of pay
- Employee contributes 3% of pay
- Employee 20% vested

**Ex ante loss calculation**
- Actual match: $100K x 3% x 20% = $600
- Possible match: $100K x 6% x 20% = $1200
- Loss: $1200 - $600 = $600
Calculating Welfare Losses

• **COMPLICATION #2: Vesting**

• *Ex post* loss calculation approach: use employees’ *ex post* vesting status from realized employment history

• Example
  - Employee earns $100,000
  - Employer matches $1/$1 up to 6% of pay
  - Employee contributes 3% of pay
  - Employee 20% vested at time of contribution, but 80% vested when employee leaves the firm

• *Ex post* loss calculation
  - Actual match: $100K \times 3\% \times 80\% = $2400
  - Possible match: $100K \times 6\% \times 80\% = $4800
  - Loss: $1200 - $600 = $2400
Calculating Welfare Losses

- **COMPLICATION #3**: After tax contributions and capital gains
  - Three firms require that employees deplete after-tax accounts first \( \rightarrow \) withdrawals may cause employees to incur capital gains
  - Of employees >59.5 at these firms, 9% have after tax balances

- Conservative approach: do not classify as undersaver anyone with after-tax balances, regardless of capital gains or match

- Example
  - Employee earns $100,000
  - Employer matches $1/$1 up to 6% of pay
  - Employee contributes 3% of pay
  - Employee has $20K in after-tax 401(k) account

- Loss calculation
  - Actual match: \( 100K \times 3\% \) = $3000
  - Possible match: \( 100K \times 6\% \) = $6000
  - Loss: = $0
## Welfare Losses: Employees > 59.5

<table>
<thead>
<tr>
<th>Loss Calculation Method</th>
<th>Ex ante</th>
<th>Ex post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number undersavers</td>
<td>3,179</td>
<td>3,520</td>
</tr>
<tr>
<td>Fraction undersavers</td>
<td>49.0%</td>
<td>54.3%</td>
</tr>
<tr>
<td>Non-participants</td>
<td>79.1%</td>
<td>79.7%</td>
</tr>
<tr>
<td>&lt; match threshold</td>
<td>21.0%</td>
<td>20.3%</td>
</tr>
<tr>
<td>Undersaver loss</td>
<td>$256</td>
<td>$259</td>
</tr>
<tr>
<td>Loss as % of pay</td>
<td>1.30%</td>
<td>1.32%</td>
</tr>
<tr>
<td>% total match lost</td>
<td>18.4%</td>
<td>19.4%</td>
</tr>
</tbody>
</table>
Welfare Losses

- Loss calculation results
  - Roughly half of employees fail to exploit full 401(k) match
    - 80% of undersavers are non-participants
    - 20% of undersavers contribute below the match threshold
  - Losses for those undersaving are non-trivial
    - $260 per year
    - 1.3% of pay
  - 20% of total possible matching contributions foregone
- Ex ante and ex post loss calculations very similar
  - Most (83%) older employees fully vested
  - Many more partially vested
Welfare Losses

• **Caveat #1:** Match in employer stock
  • Four firms match in employer stock and restrict diversification
  • Loss calculation potentially overstated
  • Bias likely to be small
    • These four have the smallest fraction of undersavers
    • All four allow either full or partial diversification on the basis of age (50 or 55) or after a two-year holding period

• **Caveat #2:** Cumulative losses
  • Loss calculations in Table 3 for one-year period only
  • Over half of undersavers have never participated in 401(k)
  • Average tenure of undersavers is 14 years
  • Cumulative losses much larger
Younger Worker Comparison

- No conceptual analog to ex ante or ex post losses for younger workers
  - Hardship withdrawal restrictions
  - Tax penalty
- Alternative calculation: total matching contributions foregone
  - Does not account for tax penalty
  - Does not account for incomplete vesting
  - Does not account for after-tax balances
Foregone Matching Contributions

<table>
<thead>
<tr>
<th>Loss Calculation Group</th>
<th>&gt;59.5</th>
<th>&lt;59.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number sub-match savers</td>
<td>3,673</td>
<td></td>
</tr>
<tr>
<td>Fraction sub-match savers</td>
<td>56.7%</td>
<td>53.9%</td>
</tr>
<tr>
<td>Non-participants</td>
<td>79.1%</td>
<td>47.2%</td>
</tr>
<tr>
<td>&lt; match threshold</td>
<td>20.9%</td>
<td>52.8%</td>
</tr>
<tr>
<td>Sub-match saver loss</td>
<td>$263</td>
<td>$450</td>
</tr>
<tr>
<td>Loss as % of pay</td>
<td>1.35%</td>
<td>1.30%</td>
</tr>
<tr>
<td>% total match lost</td>
<td>20.2%</td>
<td>26.6%</td>
</tr>
</tbody>
</table>
Matching Contributions Foregone

• Exploiting the full employer match: employees >59.5 vs. <59.5
  • Those >59.5 *less* likely to fully exploit 401(k) match
  • Older sub-match savers more likely to be non-participants
  • Magnitude of foregone match
    • Nominal amount higher for <59.5 ($450 vs. $260)
    • But <59.5 higher paid—1.3% of pay for both groups
  • 20% of total possible matching contributions foregone
Failure to Exploit the Full 401(k) Match

The graph illustrates the fraction of match-eligible employees who fail to exploit the full match over their working lives. The graph shows three categories:

- **Sub-match savers**: The green line represents employees who save below the full match rate.
- **Ex ante undersavers**: The blue line indicates employees who save at a rate that is less than what is required to fully benefit from the match.
- **Ex post undersavers**: The gray line shows employees who save even after benefiting from the match.

The x-axis represents age, ranging from 20 to 70, while the y-axis represents the fraction of match-eligible employees.
Predictors of Foregoing Matching Contributions (Marginal Effects)

<table>
<thead>
<tr>
<th></th>
<th>Ex ante undersaver &gt;59.5</th>
<th>Ex post undersaver &gt;59.5</th>
<th>Sub-match saver &gt;59.5</th>
<th>Sub-match saver &lt;59.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>0.0630**</td>
<td>0.0755**</td>
<td>0.0805**</td>
<td>0.0456**</td>
</tr>
<tr>
<td>Married</td>
<td>-0.0412**</td>
<td>-0.0517**</td>
<td>-0.0654**</td>
<td>-0.0461**</td>
</tr>
<tr>
<td>Age</td>
<td>0.0257**</td>
<td>0.0158**</td>
<td>0.0100**</td>
<td>-0.0034*</td>
</tr>
<tr>
<td>Ln(tenure)</td>
<td>0.0264**</td>
<td>-0.0621**</td>
<td>-0.1147**</td>
<td>-0.0801**</td>
</tr>
<tr>
<td>Ln(salary)</td>
<td>-0.1909**</td>
<td>-0.2483**</td>
<td>-0.2765**</td>
<td>-0.2919**</td>
</tr>
<tr>
<td>Sample size</td>
<td>N=6,481</td>
<td>N=6,481</td>
<td>N=6,481</td>
<td>N=165,651</td>
</tr>
</tbody>
</table>

All regressions include firm fixed effects; ** denotes significance at the 1% level
Survey/Field Experiment

• Survey mailed to employees >59.5 at Company A
  • All employees below the match threshold
  • Randomly selected employees above the match threshold

• Control survey
  • All employees above the match threshold
  • Half of employees below the match threshold
  • Questions on satisfaction with and knowledge of 401(k) plan, financial literacy, savings preferences

• Treatment survey
  • Half of employees below the match threshold
  • Additional questions to explain withdrawal strategy and help employees calculate potential 401(k) match
## Experiment Sample

<table>
<thead>
<tr>
<th></th>
<th>Employees &gt;59.5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control Group</td>
</tr>
<tr>
<td>Below match threshold</td>
<td>344</td>
</tr>
<tr>
<td>Above match threshold</td>
<td>200</td>
</tr>
<tr>
<td>TOTAL</td>
<td>544</td>
</tr>
</tbody>
</table>
Rationales for Undersaving: Direct Transactions Costs

- Perceived time cost of 401(k) transactions
  - Non-participants
    - Enroll: 1.7 hours
    - Change contribution rate: 1.3 hours
    - Change asset allocation: 1.5 hours
  - Participants
    - Enroll: 1.4 hours
    - Change contribution rate: 0.6 hours
    - Change asset allocation: 0.6 hours
- Questions 23 and 25: none of those planning never to enroll in the 401(k) plan cite the time it takes to enroll as a reason for not participating
- Indirect transactions costs
Rationales for Undersaving: Current Saving Adequate

- Question 16—not currently saving enough for retirement
  - Above match threshold: 70%
  - Below match threshold: 86%

- Question 15—actual vs. ideal savings rate
  - Above match threshold: 15.3% vs. 20.0%
  - Below match threshold: 7.4% vs. 17.1%

- Question 16—able to save more ($10/week)
  - Above match threshold: 78%
  - Below match threshold: 67%
Rationales for Undersaving: Financial Literacy

- Question 8—very or relatively knowledgeable investor (self-assessed)
  - Above match threshold: 20%
  - Below match threshold: 8%

- Question 20—employer stock less risky than a large U.S. stock mutual fund
  - Above match threshold: 26%
  - Below match threshold: 53%

- Question 4—correctly understand 401(k) match rate
  - Above match threshold: 41%
  - Below match threshold: 21%

- Question 4—correctly understand 401(k) match threshold (6%)
  - Above match threshold: 59%
  - Below match threshold: 27%
Rationales for Undersaving: Procrastination

- Survey response rate
  - Above match threshold: 52%
  - Below match threshold: 19%

- Response time
  - Above match threshold: 15.1 days
  - Below match threshold: 17.2 days

- Question 10—tendency to often or always leave things to the last minute
  - Above match threshold: 11%
  - Below match threshold: 16%
  - Bias from differential survey response—inveterate procrastinators didn’t respond!
Experiment Component

- Treatment survey
  - Questions 26-28: 401(k) plan facts
    - Plan match for first 6% of pay contributed
    - Transactions can be made through the internet or on the telephone
    - Withdrawals for those over 59.5 penalty-free
  - Question 29: Calculate potential employer match
  - Question 30: Interest in increasing 401(k) savings rate
- Sample: below match threshold employees only
- Median potential 401(k) match of $1200
## Field Experiment Results

<table>
<thead>
<tr>
<th></th>
<th>Control Group</th>
<th>Treatment Group</th>
<th>t-statistic of difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-survey contribution rate (August 1, 2004)</td>
<td>1.73%</td>
<td>1.48%</td>
<td>1.38</td>
</tr>
<tr>
<td>Post-survey contribution rate (November 1, 2004)</td>
<td>1.81%</td>
<td>1.64%</td>
<td>0.86</td>
</tr>
<tr>
<td>Change (post-pre)</td>
<td>0.08%</td>
<td>0.16%</td>
<td>0.86</td>
</tr>
<tr>
<td>Sample size</td>
<td>N=341</td>
<td>N=337</td>
<td>--</td>
</tr>
</tbody>
</table>
Conclusions

• Roughly half of employees fail to exploit full 401(k) match
  • 20% of total possible matching contributions foregone
  • 1.3% of pay for those leaving money on the table

• Cannot be explained by:
  • Liquidity constraints
  • Early withdrawal penalties
  • Incomplete vesting
  • Direct transactions costs
  • Adequate current savings

• Potential explanations
  • Financial literacy → substantial indirect transactions costs (e.g. decision-making)
  • Procrastination
Implications

- Financial incentives not sufficient for reluctant savers
- Financial education interventions not sufficient for reluctant savers
  - Small effects in this paper
  - Consistent with prior literature (Madrian and Shea, 2001; Choi et al. 2002 and 2004; Duflo and Saez 2003)
- Persistence of arbitrage opportunities in economic equilibria