Stock Market Returns and Annuitization.
A Case of Myopic Extrapolation.

Alessandro Previtero, *UWO Ivey School of Business*

Ibid, November 2011
Why study post-retirement financial decisions?

- Within the next ten years, 31 million Americans are expected to retire
  - In 2011, the first Boomers cohort reached age 65

There is a worldwide trend from defined benefit plans toward defined contribution plans.

In 2010, DC plans: $4.2 trillions; IRAs: $4.5 trillions

More autonomy, but also many options for future retirees

Life expectancy at later ages has increased over the last century

Life expectancy at age 65 has increased four years since 1950s

What about the distribution of life expectancy?
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- Life expectancy at later ages has increased over the last century
  - Life expectancy at age 65 has increased of four years since 1950s
  - What about the distribution of life expectancy?
Variation in life expectancy at age 65 is stunning

Source: Benartzi, Previtero, Thaler, Journal of Economic Perspectives (forthcoming)
One potential solution for longevity risk...

- Dogbert the Financial Planner: With advances in health care, you could live to be 200.
- If you have a good financial plan, only the last 120 years will be spent in squalor.
- I recommend a diversified portfolio. And bacon.
A better solution

- Annuities that pay lifetime income are the simplest way to hedge longevity risk
  - Economists have investigated annuities for almost 50 years (Yaari, 1965)
A better solution

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- Empirical evidence on annuitization is scant
  - The individual annuity market is very thin, the well-known "annuity puzzle"
  - Collective pension forms did not traditionally offer multiple payout options
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- This paper investigates the (time-series) determinants of annuitization
  - Over 100,000 actual payout decisions between annuities and lump sums
  - In practice, no default option
Annuity sales dramatically vary over time.
Fixed annuity sales track stock market returns

Source: annuity sales (LIMRA Data); correlation: -0.748
What drives annuitization?

- The decision to annuitize can be affected in the time-series by:
  - Wealth effects
  - Endogenous timing of retirement
  - Volatility of returns
  - Expectations about labor income or inflation
  - Extrapolation from past returns

Note: the following are more likely to play a role in the cross-section:
  - Life expectancy
  - Marital status
  - Pre-existing level of annuitization
  - Precautionary or bequests motives

References on Annuitization

Thought experiment
Ale Previtero (Ivey)
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11/24/11 8 / 34
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- Thought experiment
Do stock market returns affect annuitization?

- How strong and robust is the effect of stock returns?
  - Over 103,000 actual payout decisions from 112 DB plans in seven years
    - What past time horizon is relevant?
  - A retirement plan from IBM (with financial education)
  - Fixed annuity sales between 1985Q1-2009Q2

What is driving it?
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- For individual welfare
- For policy makers
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Challenges in this study

- I do not observe the overall wealth of employees
  - Real estate prices as proxy for wealth
  - Exogenous wealth shock caused by a natural disaster (Hurricane Katrina)
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- I do not observe the overall wealth of employees
  - Real estate prices as proxy for wealth
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- I have no information on how employees invest the lump sum
  - Expectations about future returns cannot be inferred from actual decisions
  - Confidence Index as proxy for expectations
Outline of the talk

- How strong and robust is the effect of stock market returns
  - Sample description
  - Methodology
  - Main sample results
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This decision significantly impacts retirement wealth

<table>
<thead>
<tr>
<th>Sample:</th>
<th>Main Sample</th>
<th>IBM</th>
<th>SCF (age 50-75)</th>
</tr>
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<tbody>
<tr>
<td>Annuity</td>
<td>(1) Mean 0.49 (2) Median 0.00</td>
<td>(3) Mean 0.88 (4) Median 1.00</td>
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<td>Age</td>
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<td>(3) Mean 58.33 (4) Median 57.86</td>
<td>(7) Mean 60.63 (8) Median 59.60</td>
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<td>Tenure</td>
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<td>(3) Mean 28.92 (4) Median 30.59</td>
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<td>DB Benefits</td>
<td>(1) Mean 188.13 (2) Median 86.46</td>
<td>(3) Mean 413.04</td>
<td>(4) Median 387.1</td>
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<tr>
<td>Net Finc. Wealth</td>
<td>(1) Mean 213.33 (2) Median 166.10</td>
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<td>(7) Mean 262.79 (8) Median 6.72</td>
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<td>Med. House Price</td>
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<td>(3) Mean 18,688 (4) Median 18,688</td>
<td>(7) Mean 5,835 (8) Median 5,835</td>
</tr>
</tbody>
</table>
Methodology: estimating equation

\[ Ann_{ijt} = \alpha + \beta A_t(\lambda) + \gamma' x_i + \delta_j + \varepsilon_i \]  

(1)

where:

- \( A_t(\lambda) \) is the weighted average of past monthly returns
- \( x_i \) is a vector of control variables
- \( \delta_j \) are plan fixed effects
- \( \varepsilon_i \) is the error term
The weighting functional form is flexible

![Graph showing the weighting functional form with a line for \( \lambda = 0.2 \)]

Source: Malmendier and Nagel (2011)
The weighting functional form is flexible II

Source: Malmendier and Nagel (2011)
The weighting functional form is flexible III

Source: Malmendier and Nagel (2011)
Stock market returns affect annuitization

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
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<tbody>
<tr>
<td>Past stock return coefficient $\beta$</td>
<td>-5.627***</td>
<td>-4.336**</td>
<td>-4.815**</td>
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<tr>
<td></td>
<td>(1.513)</td>
<td>(1.609)</td>
<td>(1.921)</td>
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<tr>
<td>Weighting parameter $\lambda$</td>
<td>5.163***</td>
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<tr>
<td>Calendar Months F. E.</td>
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<td>Yes</td>
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<tr>
<td>Years F. E.</td>
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- From 25th to 75th Percentile of Returns: $-5.627\times1.71 \text{ pp} \approx -9.6 \text{ pp}$
- From 10th to 90th: $-5.627\times2.62 \text{ pp} \approx -14.8 \text{ pp}$
The weights quickly decrease over time.

![Graph showing weight decrease over lag K (in months)](image_url)

Lambda = 5.16

After 12 months the weight decreases to 1/3.

Almost no weight is assigned to returns older than two years.
The weights quickly decrease overtime

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  - Wealth effects
  - Extrapolation from past returns

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  - For individual welfare
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  - Mitchell et al. (1999) show that, as risk aversion increases, people should be willing to pay more for annuities
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- Which of the two effects prevails is an empirical matter
  - I use real estate prices as a proxy for wealth
  - For a truly exogenous shock to wealth, I study the Hurricane Katrina event
Wealth effects are not likely to explain my results

<table>
<thead>
<tr>
<th>Lag in Med. House Prices:</th>
<th>1 Year (2)</th>
<th>2 Years (3)</th>
<th>3 Years (4)</th>
<th>1 Year (5)</th>
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<tbody>
<tr>
<td>Past stock return $\beta$</td>
<td>-6.079**</td>
<td>-5.963**</td>
<td>-6.135**</td>
<td>-4.730*</td>
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<td>(2.505)</td>
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<td>(2.498)</td>
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<td>5.095</td>
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<td>Median House Price</td>
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<td>(0.720)</td>
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<td>Var. Med. House Price</td>
<td>1.873*</td>
<td>1.122**</td>
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<td>(0.951)</td>
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<td>Additional Controls</td>
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<td>58,897</td>
<td>58,897</td>
<td>58,897</td>
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<tr>
<td>R-squared</td>
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<td>0.174</td>
<td>0.173</td>
<td>0.376</td>
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The effect of an exogenous shock to wealth

- In August 2005, Hurricane Katrina hit the Gulf Area
  - More than 1,800 deaths
  - Estimated total property damage: $81 billion
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- I use a differences-in-differences methodology to estimate the effect of this catastrophe on annuitization
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- Other than an exogenous shock to wealth, the event might have caused:
  - An immediate need for liquidity
  - A revision of the life expectancy in the four and neighboring states (Fier and Carson, 2009)
The negative shock to wealth reduces annuitization

<table>
<thead>
<tr>
<th>Sample:</th>
<th>All States</th>
<th>Without LA</th>
<th>All States</th>
<th>Without LA</th>
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<td>3.911</td>
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<td></td>
<td>(3.422)</td>
<td>(3.284)</td>
<td>(3.601)</td>
<td>(3.458)</td>
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<tr>
<td>Katrina States</td>
<td>5.131*</td>
<td>4.196</td>
<td>5.918**</td>
<td>4.975*</td>
</tr>
<tr>
<td></td>
<td>(2.544)</td>
<td>(2.342)</td>
<td>(2.600)</td>
<td>(2.396)</td>
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<td></td>
<td>(2.195)</td>
<td>(2.183)</td>
<td>(2.104)</td>
<td>(2.170)</td>
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<tr>
<td>Neigh. States</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>3.427**</td>
<td>3.434**</td>
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<td>(1.353)</td>
<td>(1.375)</td>
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<td>K.Date*N.States</td>
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<td>-0.661</td>
<td>-0.662</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>(2.227)</td>
<td>(2.239)</td>
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<tr>
<td>Observations</td>
<td>95,997</td>
<td>94,557</td>
<td>95,997</td>
<td>94,557</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.197</td>
<td>0.195</td>
<td>0.197</td>
<td>0.195</td>
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</table>

Weighting parameter fixed at 5.163. Additional controls included.
Individual investors’ beliefs affect the decision to annuitize

<table>
<thead>
<tr>
<th>Sample: Individual Investors</th>
<th>(1)</th>
<th>(2)</th>
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<tbody>
<tr>
<td>Confidence Index</td>
<td>-9.803**</td>
<td>-2.771</td>
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<td>(4.570)</td>
<td>(3.920)</td>
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<tr>
<td>Past return $\beta$</td>
<td>-5.168**</td>
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<tr>
<td></td>
<td>(1.761)</td>
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<tr>
<td>Weigh. par. $\lambda$</td>
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<td>5.163</td>
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<tr>
<td>Add. Controls</td>
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<tr>
<td>Observations</td>
<td>101,053</td>
<td>101,053</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.186</td>
<td>0.19</td>
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</table>

Go to Final Remarks
Beliefs affect the decision to annuitize: a placebo test

<table>
<thead>
<tr>
<th>Sample:</th>
<th>Institutional Investors</th>
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<tr>
<td></td>
<td>(4)</td>
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<tr>
<td>Confidence Index</td>
<td>-3.217</td>
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<td></td>
<td>(1.930)</td>
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<td>Past return $\beta$</td>
<td>-5.732***</td>
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<td></td>
<td>(1.871)</td>
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<tr>
<td>Weigh. par. $\lambda$</td>
<td>5.163</td>
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<tr>
<td>Add. Controls</td>
<td>Yes</td>
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<tr>
<td>Observations</td>
<td>101,053</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.184</td>
</tr>
</tbody>
</table>
An extrapolation explanation

The influence of past stock market returns has been documented in various settings:

- Investors’ beliefs and stockholdings (Vissing-Jorgensen, 2003)
- Investments by young mutual fund managers (Greenwood and Nagel, 2008)
- Mutual funds flows (Chevalier and Ellison, 1997; Sirri and Tufano, 1998)
- IPOs subscription (Kaustia and Knupfer, 2008)
- Saving for retirement (Benartzi, 2001; Benartzi and Thaler, 2007, Choi et al, 2009)
Outline of the talk

- How strong and robust is the effect of stock market returns
  - Sample description
  - Methodology
  - Main sample results
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- Interpretation of the evidence
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  - Extrapolation from past returns
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- How strong and robust is the effect of stock market returns
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  - Extrapolation from past returns

- Implications
  - For individual welfare
  - For policy makers
What are the welfare implications of these results?

- Back-of-the-envelope calculation for someone annuitizing "too early"
  - Potential welfare loss = probability of annuitizing too early * expected cost

What is the effect of stock returns on two employees: one retiring before the credit crises (12/2007) and the other a year later (12/2008)?

- Men, age 65, with 20 years of tenure and $200,000 in benefits

  - From my estimates the latter employee will be 24 percentage points more likely to choose an annuity
  - The probability of choosing an annuity in December 2007: 39 percent
  - In December 2008: 63 percent
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Welfare implications can be serious

- Simulations show that investor can increase their retirement wealth if they defer annuitization to later in life from 20 up to 40 percent
  - Intuition: the longer I defer annuitization the more I can benefit from the equity premium (Milevsky and Young, 2007; Hornef et al., 2009)

From back-of-the-envelope calculations, the welfare reduction for the employee retiring in December 2008 is:
- 5 to 10 percent of his/her retirement wealth or
- 2 to 5 additional working years

What about annuitizing “too late” or never?
- For healthy individuals, access to (additional) annuitization can increase welfare by 16% (Yogo, 2011)
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Implications for policy makers

- What is the role of the government in providing retirement income solutions?

In the UK: annuitization is mandated

In the US: large debate among policy makers

Especially after the paternalistic approach of the PPA

The effect of extrapolation dramatically increases with age (compared to age 50-59):

- It increases by 2.5 times in age 60-69
- It increases by 4 times in age 70-75

What are the effects of promoting annuitization on stock markets?

- Elderly tend to reduce their equity exposure as they retire
- Myopic extrapolation is a different channel that can potentially exacerbate the previous effect

Ale Previtero (Ivey)

Stock Returns and Annuitzation

11/24/11 30 / 34
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Summary of major findings

- I document a strong and robust negative relationship between stock market returns and annuitization
  - Very recent stock market returns matter most
- A belief-based story appears the most likely explanation
  - Myopic extrapolation
- These results have implications for:
  - Retirees’ welfare
  - Policy makers wishing to promote annuitization
Thank you

I’LL TAKE THE LUMP SUM!
I’LL TAKE THE ANNUITY!
I’LL TAKE THE LUMP SUM!
I’LL TAKE THE ANNUITY!
I’LL TAKE THE LUMP SUM!

Ale Previtero (Ivey)
Stock Returns and Annuitzation
11/24/11 32 / 34
Thank you

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Stock Returns and Annuitzation
11/24/11 32 / 34
Empirical studies on annuitization

- **US Evidence**
  - Self-reported intentions from DC plans (Brown, 2001)
  - Actual decisions from Oregon public employees (Chalmers and Reuter, 2009)

- **International Evidence**
  - UK compulsory and voluntary annuity market (Finkelstein and Poterba, 2004)
  - UK voluntary annuity market (Inkmann et al., 2007)
  - Swiss employer-based pension plans (Bütler and Teppa, 2007)
References on annuitization

- Life expectancy, adverse selection and fair pricing
- Risk sharing between couples
- Pre-existing annuitization
- Bequests and Precautionary Motives