Competition, Asymmetric Information, and the Annuity Puzzle: Evidence from a Government-run Exchange in Chile

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Chile: Exception to Annuity Puzzle

- Previous literature has documented a lack of annuitization - “annuity puzzle” - in many countries
- In contrast, more than 60% of eligible retirees in Chile voluntarily annuitize
  - At a 3-5% markup over actuarially fair
- What lessons can we learn about this well-functioning market?
- Today: reforming the system to make it more similar to the US setting would likely cause the market to unravel
Related Literature

- Documenting US annuity puzzle and implications for consumer preference
  - Friedman and Warshawsky (1990), Mitchell et al. (1999), Davidoff et al. (2005), Lockwood (2012)
- Identifying and analyzing private information in markets with asymmetric information
- Methodology - nonparametric estimation of unobservable consumer preference
  - Fox et al. (2011), Nevo et al. (2016)
Today

1. Setting: The Chilean Retirement Exchange
2. Descriptive Evidence
3. Model
4. Calibration Exercise
5. Demand Estimation
6. Counterfactuals
The Chilean Retirement Exchange

- Chileans save throughout their lives in private retirement accounts
- Access these funds through an exchange called SCOMP
- SCOMP takes retirees’ info and sends it to life insurance companies, who send annuity offers back
- SCOMP compiles info and sends it to the retiree
- Retiree can choose an annuity offer, or to take “Programmed Withdrawal”
  - Government-set withdrawal schedule, savings continue to be invested
  - Upon death, balance received by heirs
- Minimum pension guarantee (MPG): annuity offers can’t fall below it, PW payouts are topped-up
Simulated PW Path vs. Annuity, 60 yr old female
# Sample SCOMP Printout, One Annuity Contract Type

## MODALIDAD RENTA VITALICIA INMEDIATA

### RENTA VITALICIA INMEDIATA SIMPLE

<table>
<thead>
<tr>
<th>N° Oferta</th>
<th>Compañía de Seguros de Vida</th>
<th>Pension final Mensual sin Retiro de Excedente UF</th>
<th>Pension final Mensual en UF Considerando un retiro de excedente de 0,00 UF</th>
<th>Pension con retiro de Excedente Máximo</th>
<th>Clasificación de riesgo de la Compañía de Seguros</th>
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<tbody>
<tr>
<td>43872093</td>
<td>CRUZ DEL SUR</td>
<td>26,61</td>
<td>˂ Monthly payment</td>
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<td>AA-</td>
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<td>43872099</td>
<td>RENTA NACIONAL</td>
<td>26,58</td>
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<td>BBB-</td>
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<td></td>
<td></td>
<td>AA</td>
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<td>43872100</td>
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<td></td>
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<tr>
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<td></td>
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<td>AA-</td>
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<tr>
<td>43872084</td>
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<td>AA-</td>
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<td>43872091</td>
<td>CHIO NATIONAL</td>
<td>26,24</td>
<td></td>
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<td>AA</td>
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<td>SURA</td>
<td>26,21</td>
<td></td>
<td></td>
<td>AA</td>
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<tr>
<td>43872095</td>
<td>CN LIFE</td>
<td>25,90</td>
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<td>AA</td>
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<td>43872092</td>
<td>BICE VIDA</td>
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<td>43872085</td>
<td>CHILENA CONSOLIDADA</td>
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<tr>
<td>43872088</td>
<td>CONSORCIO VIDA</td>
<td>25,36</td>
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<td></td>
<td>AA+</td>
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</tbody>
</table>
Data Sources

- Individual-level administrative dataset from SCOMP, 2004-2013
  - All info life insurance companies see about the retiree
  - Every offer made & choices
- 230,000 retirees and over 30 million annuity offers
- Match to death records, see death by 2015
- Focus on single life annuitants:
  - Married retirees get joint survival annuities
  - So do retirees with children under 18 (or under 25 but in college)
Unconcentrated Market

Accepted Annuities/PW by Firm

Number of annuities

Programmed Withdrawal

CONSORCIO NACIONAL
METLIFE
CORPVIDA
SURA
PRINCIPAL
OHIO
CRUZ DEL SUR
BICE
CHILENA CONSOLIDADA
PENTA

Accepted firm
Probability of Taking PW, by Savings

Offered Markups by Wealth

Fraction Annuitized

Percentile Wealth

Percentile Wealth
(Almost) always low markups

Offered Markups by Wealth

Percentile Wealth

Avg Markup

Percentile Wealth

Avg Markup

0 0.1 0.2 0.3 0.4

0 20 40 60 80 100
MWR: PW is not a bad deal

<table>
<thead>
<tr>
<th></th>
<th>Annuity</th>
<th>PW</th>
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<tbody>
<tr>
<td>No Bequest</td>
<td>0.789</td>
<td>0.925</td>
</tr>
<tr>
<td>Bequest = 2.5%</td>
<td>0.896</td>
<td>0.955</td>
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</table>
Adverse selection into annuities

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Death</td>
<td>Death</td>
<td>Death</td>
</tr>
<tr>
<td>Choose annuity</td>
<td>-0.00801**</td>
<td>-0.00495**</td>
<td>-0.00471**</td>
</tr>
<tr>
<td></td>
<td>(0.00133)</td>
<td>(0.00133)</td>
<td>(0.00150)</td>
</tr>
<tr>
<td>Individual characteristics</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Request characteristics</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>53356</td>
<td>53356</td>
<td>53356</td>
</tr>
<tr>
<td>Base group mean</td>
<td>0.015</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.121)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
20% of population takes dominated offers

Distribution of Better Offers Refused

Number of Better Offers Refused

Density
Model

- Goal: comparisons across contracts with different flow payments over time, exposures to risk, and inheritance properties
- Set up a finite-horizon consumption-savings model with the following features:
  - Uncertain longevity
  - CRRA utility
  - Bequest motive
- Given a level of risk aversion $\gamma$, outside wealth $\omega$, bequest motive $\beta$, and mortality shifter $\mu$, can calculate the expected PDV of utility for an annuity offer or for PW.
  - Solve numerically using EGM (Carroll (2011))
Calibration

- We take a 60 year old female, retiring in 2007 with $90,000 USD in the system and $360,000 USD outside.
- Set risk aversion parameter ($\gamma = 3$) & bequest motive ($\beta = 10$).
- Death probabilities follow the Chilean pension authorities’ tables.
  - Include private information through shifts around these tables: a 60 year old with a mortality shifter of $x$ has the mortality probabilities of a $60 + x$ year old.
- Abstract away from multiple annuity contracts and firm preferences: consider an immediate, non-guaranteed annuity against PW.

Utility Plot
Calibration - Chilean Equilibrium

Annuitization Equilibrium, Chilean Programmed Withdrawal

- Mrg. Indifference
- Fair Annuity
- 95% FA
- 90% FA

Annuity vs. Fraction Annuitized
US-like reform

- Consider reforming the system to make it more like Social Security
- Following Mitchell et al (1999), have half of pension wealth in a mandatory, actuarially fair annuity
- Other half is unconstrained wealth, can be annuitized in the private market

Utility Plot
Calibration - US-like Equilibrium
Demand Model

- Let:

\[ U_{i,o,j}^A = V^A(X_{i,o,j}, \pi_i) + \xi_j + \xi_o + \xi_{o,j} + \epsilon_{i,o} \]
\[ U_{i}^{PW} = V_{i}^{PW}(X_{i,o,j}, \pi_i) + \xi_0 + \epsilon_{i,0} \]

- Goal: recover the distribution of types and the \( \xi \)'s
- Challenge: \( \xi \)'s potentially known by firms when making offers
- Paper: strategy for tackling this (endogeneity) issue via an exclusion restriction
- Here: assume \( \xi = 0 \), no non-financial utility
FKRB (2011) Framework

- Take a grid over the space of unobserved types, find values conditional on each type $r$ ($V^A(X_{ioj}, \pi_r$ and $V_i^{PW}(X_{ioj}, \pi_r)$)
- Calculate choice probabilities given types $s_{iojr}$
- Find distribution of types $\phi$ that minimizes distance between predicted shares and observed shares

$$\min_{\phi} \sum_{i,o,j}(y_{ioj} - \sum_{r}s_{iojr}\phi_r)^2$$

s.t.

$$\phi_r \geq 0 \forall r$$

$$\sum_{r} \phi_r = 1$$
Preliminary Results

Distribution conditional on inside wealth

First Quartile

Second Quartile

Third Quartile

Fourth Quartile
Preliminary Results

Annuitization Equilibrium, Chilean Programmed Withdrawal

- Mrg. Indifference
- Fair Annuity
- 95% FA
- 90% FA

Annuity vs. Fraction Annuitized
Preliminary Results

Annuitization Equilibrium, US-Style Social Security

- Mrg. Indifference
- Fair Annuity
- 95% FA
- 90% FA

Annuity vs. Fraction Annuitized
Next Steps and Conclusion

▶ Next steps:
  ▶ Demand estimation needs to be refined, & non-financial value needs to be added (dominated offers)
  ▶ Counterfactuals can be expanded to consider all annuity contracts

▶ Conclusion
  ▶ Preliminary demand results highlight significant degree of private information about mortality & high bequest motives
  ▶ Moving the Chilean system to US-style Social Security setup would cause market to fully unravel
Additional Slides
PW Info from SCOMP

Expected monthly PW payouts by age, averaged over rates of return

Monto Pensión mensual promedio: 24,18 UF
Monto Comisión mensual promedio: 0,30 UF
### Summary Statistics

<table>
<thead>
<tr>
<th>Panel A: Retiree Characteristics</th>
<th>N</th>
<th>Mean</th>
<th>10th Pctile</th>
<th>Median</th>
<th>90th Pctile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total wealth (UFs)</td>
<td>39252</td>
<td>2188.09</td>
<td>979.12</td>
<td>1830.08</td>
<td>3784.43</td>
</tr>
<tr>
<td>Female (dummy)</td>
<td>53356</td>
<td>0.747</td>
<td>0</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Age</td>
<td>53356</td>
<td>61.98</td>
<td>59</td>
<td>61</td>
<td>66</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel B: Contract Characteristics</th>
<th>N</th>
<th>Mean</th>
<th>10th Pctile</th>
<th>Median</th>
<th>90th Pctile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choose annuity (dummy)</td>
<td>53356</td>
<td>0.736</td>
<td>0</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Monthly payment (UFs)</td>
<td>39252</td>
<td>11.24</td>
<td>5.06</td>
<td>9.26</td>
<td>19.57</td>
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<tr>
<td>Deferral years</td>
<td>39252</td>
<td>0.53</td>
<td>0</td>
<td>0</td>
<td>2</td>
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<tr>
<td>Guarantee months</td>
<td>39252</td>
<td>123.61</td>
<td>0</td>
<td>120</td>
<td>216</td>
</tr>
</tbody>
</table>
Model

\[
\max E_0 \left[ \sum_{\tau=0}^{T} \delta^\tau u(c_\tau, d_\tau) \right]
\]

\[\text{s.t.}\]
\[a_t = m_t - c_t \quad \forall t\]
\[b_{t+1} = a_t \cdot R \quad \forall t\]
\[m_{t+1} = b_{t+1} + z_{t+1}(d_{t+1}, q_{t+1}, D, G) \quad \forall t\]
\[a_t \geq 0 \quad \forall t\]
Utility of Retirement Program, Chilean Market

Utility comparison, Chilean system
Calibration

Utility of Retirement Program, US Market

- Utility
- Life Expectancy

- SS
- Annuity