

# Asset-liability management in life insurance: Evidence from France

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# Introduction

- Safe and liquid claims account for 80% of aggregate life insurance premiums in Europe
- Liquidation (surrender) option creates liquidity risk for life insurers
  - fear of liquidity problems in the insurance sector
- This paper: test of asset-liability management of life insurers

# Preview of results

- Stylized facts
  1. cross-sectional dispersion in risky assets holdings
  2. liabilities are homogenous
  3. interest rate risk exposure
- Liquidity (surrender) risk is less pronounced than in banking
  - ... but heterogeneous across life insurers
  - decreases holdings of risky assets (active asset-liability management)
  - use an exogenous measure of liquidity (surrender) risk to attempt causality

# Outline

Introduction

Data

- Data and institutional setting

- Stylized facts

- Testable hypotheses

- Empirical approach

Estimations

Conclusion

# Data sources

- Regulatory reports ("*Dossiers Annuels*"): 1999-2015
  - solvency and accounting statements
- Asset portfolio ("*Tableau Complémentaire aux Éléments de Placement*"): 2011-2015
  - line-by-line asset holdings of all French insurers
- Surrender Surveys ("*Enquêtes Rachats*") from Fédération Française de l'Assurance (FFA): 2007-2015
  - surrenders and mathematical provisions by contract age for 2011-2015 only

# Life insurance in France

## Assets and liabilities

- Euro-denominated contracts = savings products with guaranteed capital (+ ratchet effect)
- Life insurers' mathematical provisions are
  - computed using a technical interest rate which above limit is set by the regulator (*Code des Assurances*, art. A.132-1)
  - remunerated at least at the technical interest rate (guarantee)
- Life insurers can back these mathematical provisions using (art. R.332-.):
  - bonds, stocks and real-estate from OECD countries

## Life insurers - summary statistics

	Mean	Median	Std.Dev.	N
Account value (bn euros)	12.3	2.6	27.5	978
Inflows (%)	10.2	9.4	5.7	978
Surrenders (%)	5.1	4.9	2.9	978
Death payments (%)	3.1	2.4	2.5	978
Contract transfer (%)	0.7	0.0	2.1	978
Total fund reserves (%)	11.9	11.0	8.8	978
Share bonds (%)	81.2	83.3	11.6	978
Share stocks (%)	12.4	11.0	8.4	978
Asset return (%)	5.2	4.5	5.7	978
Contract return (%)	3.8	3.8	1.0	978

Source: Regulatory reports, 2000 – 2015.

# Testable hypothesis

- Life insurers issue money-like claims that are safe and liquid: asset-liability management is key
- Investment behavior of long-term investors
  - intergenerational risk-sharing enables more risky investment (Gollier, 2008)
  - Riskiness of asset returns depends on time horizon : relative risk of stocks vs bonds decreases over time (Campbell and Viceira, 2002, Bec and Gollier, 2008)
- Testable hypothesis: Do life insurers invest less into risky securities when exposed to liquidity (surrender) risk?



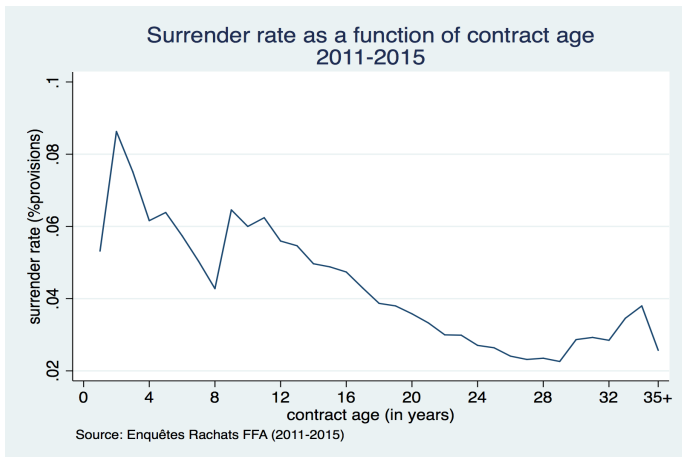
# Surrenders

- The older a life-insurance contract, the less taxed the returns
  - reduced tax rate for contracts older than 4 years (35 → 15 %)
  - lowest tax rate for contracts older than 8 years (15 → 7.5% with rebate)

## Example

- Fiscal lockups as a driver of surrender behavior: adverse fiscal consequences provide a main item of protection against surrender (EIOPA 2014, Bryis and de Varenne 1987)

# Surrenders ctd



## Surrenders ctd

Table 1: Summary stats on surrenders

	Observations	Average	SD	p90	p50	p10
surrender rate (%)	8	.07	.01	.08	.07	.05
average age (years)	8	10.44	1.13	12.34	10.23	8.95
surrender rate (%)	28	.07	.03	.11	.05	.03
average age (years)	28	10.51	3.58	15.42	9.83	6.08

Rows 1-2: aggregated over years

Rows 3-4: aggregated over insurers

Sources: Enquetes Rachats FFA (2007-2015)

# Methodology

$$Y_{i,t} = \gamma_t + \beta \times \text{surrenders}_{i,t} + \epsilon_{it}$$

where  $\gamma_t$  is a year fixed effect, and  $\epsilon_{it}$  is an error term

- The outcome variable  $Y_{i,t}$  is the % of stocks in the portfolio
- The dependent variable is the liquidation (surrender) percentage

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## Surrenders as a fonction of contract age

Can we make a causal interpretation of liquidity risk on insurers' holdings of stocks?

- Use the market hazard rate  $s(j)$  where  $j = \text{contract age}$  as an IV for insurers' exposure to liquidity (surrender) risk:

$$\text{Predicted surrenders (\%)} = \frac{\sum_j s(j) \times \text{prov}(j)}{\sum_j \text{prov}(j)}$$

- Exogeneity: driven by (tax) incentives to surrender orthogonal to insurers portfolio

# Results

	% of stocks in insurer's portfolio			
	(1)	(2)	(3)	(4)
Surrender rate_1 (%)	-.48*			
	(.26)			
Surrender rate_2 (%)		-.7***		
		(.24)		
Predicted surrenders (%)			-.53**	-.61***
			(.22)	(.17)
Observations	303	86	86	85
Year FE	yes	yes	yes	yes
Insurer FE	no	no	no	yes
$R^2$	0.05	0.22	0.22	0.74

Source: Regulatory reports (2000 – 2015).

Surrender rates are observed in regulatory reports (1) and FFA surveys (2). Predicted surrenders can only be computed using FFA surveys (2011 – 2015).

# Are predicted surrenders truly exogenous?

## Flow elasticities

	Inflows	Inflows Unit-linked	Surrenders	Surrenders (+transfers)	Inflows	Inflows Unit-linked	Surrenders	Surrenders (+transfers)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Past contract returns (%)	.029 (.3)	-1* (.59)	-.4*** (.14)	-.4*** (.14)	.08 (.21)	-.8 (.73)	-.1 (.066)	-.15* (.074)
Observations	992	992	992	992	992	992	992	992
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Insurer FE	no	no	no	no	yes	yes	yes	yes
$R^2$	0.06	0.03	0.03	0.02	0.62	0.66	0.74	0.65



# Conclusion

- Life insurers issue money-like claims (safe and liquid)
- Assets and liabilities are highly homogenous
- Liquidity (surrender) risk:
  - much lower dispersion than in mutual funds or hedge funds, although means are comparable
  - decreases holding of risky assets