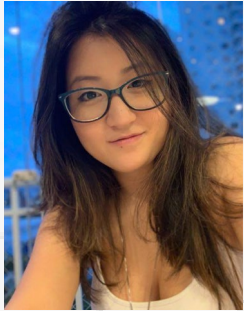


Viability Analysis of Brazilian Market for Universal Life

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About the authors



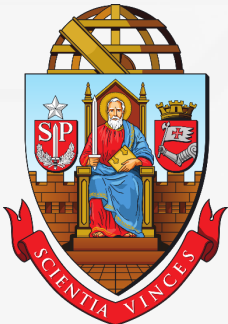
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Agenda

- A brief introduction about this insurance product
- What is the market scenario like in the US and current situation in Brazil?
- Opportunities in Brazil and its Economy overview;
- Objective, the Mechanism and Methodological Procedures;
- Results: the individual's and the firms' perspectives;
- Additional exercise;
- Final remarks.

Introduction

Insurance products

- ✓ Financial protection in case of incurrance of the risks covered;
- ✓ Mutualistic bases and risk sharing;
- Maximum financial amount received is previously known and only accessed in case of occurrence of the generating event.

Investment products

- ✓ Generation of monetary resources;
- ✓ Increase in personal wealth;
- ✓ Greater liquidity and profitability;
- No mitigation or transfer of financial onus arising from risk.



Universal Life

✓ Transparency of individual accounts

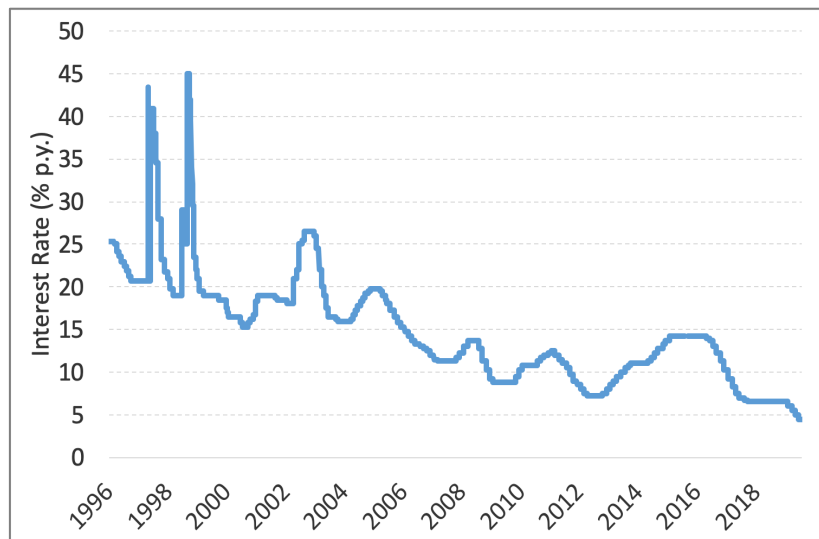
✓ Profit sharing

✓ Premium and coverage flexibility

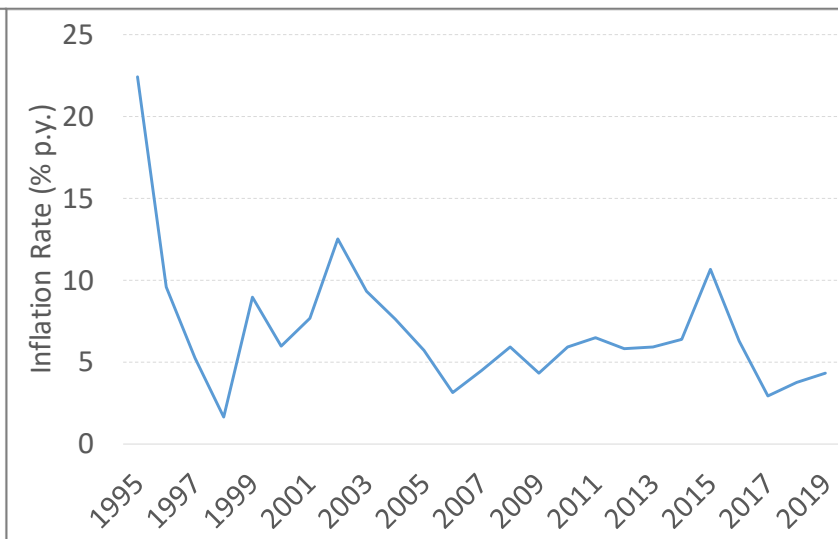
USA x Brazil

- Life insurance is estimated to generate more than **\$14 billion** in the US per year.
- UL: **37%** of the market share.
- Whole life insurance: **36%** of annualized premiums.
- Term life insurance: **21%** of annualized premiums.
- Product regulation has not been completed yet.
- In December 2016, CNSP Resolution No. 344 was released, approving the structuring of the model in the country.
- SUSEP has not published the UL norms. The discussion deals with the dubious nature of the product, generating disputes related to **tax issues and tax benefit**.

Opportunities in Brazilian Market



Historical average: 10-15% p.y.
Last year average: 6% p.y.



Historical average: 5-10% p.y.
Last year average: 4% p.y.



Historical average: 30.000-60.000
Last year average: 100.500

Opportunities for UL's penetration in Brazilian market:

- ✓ Limitations of national short-term insurance (no accumulated amount is available for surrender);
- ✓ Insureds have fully guaranteed coverage only with a leveled premium;
- ✓ Reform of public pension system (2019): possibility of retirement planning.

The Main Objective

The main objective of this work is to evaluate the **viability of Universal Life insurance in Brazil** from two perspectives:

- (i) from **the contractors' point of view**, considering different profiles of clients and investment scenarios, and;
- (ii) from a **business perspective**, verifying whether insurers see UL advantages.

Literature Review

DOLL (1990): history of the product creation in the 1970s.

Chung and Skipper (1987): analysis of the relationship between interest rates and surrender values for a UL contract.

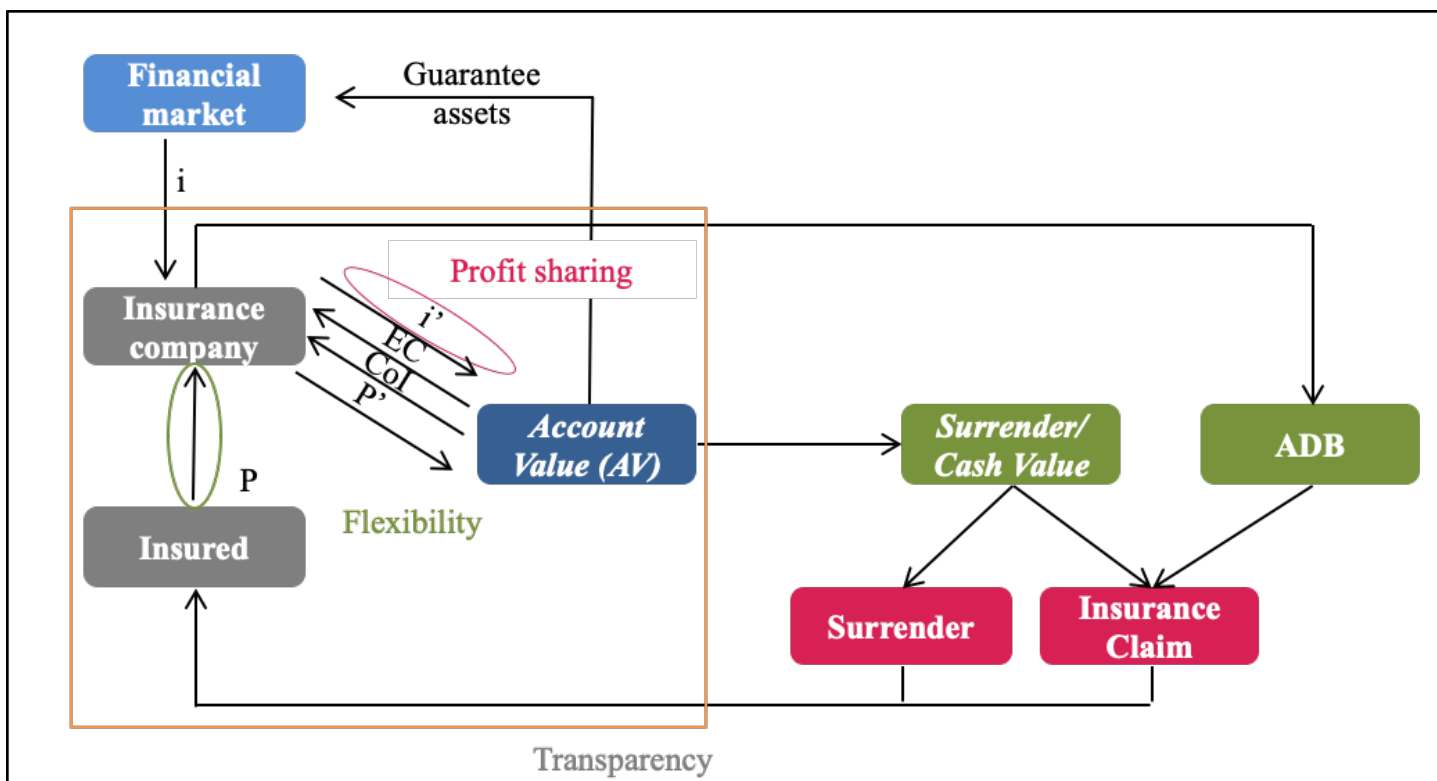
Carson (1996): effects of expenses, mortality rates and surrender penalties.

Cherin and Hutchins (1987): comparison of UL insurance with the purchase of life insurance and financial investment in the open market.

D'Arcy and Lee (1987): comparison of UL insurance with similar financial strategies, incorporating tax effects.

Corbett and Nelson (1992): comparison of UL's protection portion with the premiums paid for a renewable term insurance.

Mechanism of Universal Life Insurance



$$AV_t = (AV_{t-1} + P_t - EC_t - CoI_t) \times (1 + i_t).$$

AV_t : account value in t ;

P_t : premiums paid at time t ;

EC_t : administrative and operational charges in t ;

CoI_t : cost of insurance in t ;

i_t : interest rate earned in t .

Type B: level and predetermined additional death benefit;

Type A: fixed total benefit and existence of the corridor factor adjustment.

Methodological Procedures

Account Value

Type B - level and predetermined additional death benefit.

$$CoI_t = A_{x+t:\bar{1}} \times ADB_t.$$

$A_{x+t:\bar{1}}$: pure single premium paid by an individual aged $x+t$ for a one-year temporary life insurance with post-mortem benefit.

ADB_t : fixed amount for death coverage.

P_t : CoI_t plus the additional loading margin and the volume allocated to the investment portfolio.

EC_t : 1% of the premiums paid plus an absolute value (approximation for the administration fees charged by investment funds).

i_t : conservative posture (80% of assets invested in fixed income – 4% per year interest plus a 4% per year inflation, with a tolerance range of ± 1.5 percentage points – and 20% in variable income – average return of 12% per year with a tolerance range of ± 8 percentage points) or moderate posture (60% allocated in fixed income).

Type A - fixed total benefit.

$$CoI_t = \max(CoI_t^f, CoI_t^c);$$

$$ADB_t = \max(ADB_t^f, ADB_t^c);$$

$$CoI_t^f = A_{x:\bar{1}} \times ADB_t^f = \frac{A_{x:\bar{1}} \times [FA - (AV_{t-1} + P_t - EC_t) \times (1+i_t)] + CoI_t^f \times (1+i_t)}{1 - A_{x:\bar{1}} \times (1+i_t)};$$

$$CoI_t^c = A_{x:\bar{1}} \times ADB_t^c = \frac{A_{x:\bar{1}} \times (1+i_t) \times (\gamma_t - 1) \times (AV_{t-1} + P_t - EC_t)}{1 + A_{x:\bar{1}} \times (1+i_t) \times (\gamma_t - 1)};$$

$$ADB_t^f = FA - AV_t;$$

$$ADB_t^c = (\gamma_t - 1) \times AV_t.$$

FA : total death benefit ($AV_t + ADB_t$).

γ_t : corridor factor adjustment in t .

□ **The superscript c indicates the application of the adjustment factor.**

Methodological Procedures

Internal rate of return

Would the individual be in a better position by acquiring Universal Life or by purchasing a renewable temporary life insurance in the open market and investing the surplus in portfolios or investment funds with similar benefits and risks?

Cherin and Hutchins (1987): fictitious investment scenario for the individual (premiums paid at each instant of time minus the average commercial premium practiced by the open market for temporary one-year life insurance), who receives, after keeping the contract, the cash value.



Profit testing

Dickson, Hardy and Waters (2013): evaluation of the insurance company financial results at each period of time.

$$Pr_t = AV_{t-1} + P_t - E_t + I_t - EDB_t - ESB_t - EAV_t.$$

EDB_t : expected death benefit in t ;

ESB_t : expected surrender benefit in t ;

EAV_t : expected account value in t .

$$\pi_t = Pr_t \times p_{x+t-2}^{00} \times (1 - p_{x+t-1}^{0d} - q_{x+t-1}^w + p_{x+t-1}^{0d} \times q_{x+t-1}^w).$$

p_{x+t-2}^{00} : probability that the policy will be in force until time $t-1$;

p_{x+t-1}^{0d} : probability that the individual will not die between $t-1$ and t ;

q_{x+t-1}^w : probability of surrendering the policy between $t-1$ and t .

$$NPV_t = \pi_t \times (1 + j_t)^{-t} + NPV_{t-1}.$$

j_t : company discount rate.



Assumptions

General Criteria	
Mortality table	AT-2000 and BR-EMS 2015, by sex
Sex	Male/Female
Product hiring age	20 to 60 years
Percentage allocated to fixed income	60% and 80%
Profitability of fixed income products (real + inflation)	6.60%, 8.16% and 9.72% per year
Profitability of variable income products	4% to 20% per year
Policy duration	5 to 20 years
Specific Criteria - Insured	
Initial insurance premium	\$ 2.250,00
Duration of insurance premium	100% of the contract term
Additional death benefit (<i>ADB</i>) – B-type	\$ 100,000.00
Face Amount – A-type	\$ 100,000.00
Percentage of standard mortality	100%
Expense charges (<i>EC</i>)	1% of the insurance premium + \$ 50.00
Specific Criteria – Insurance company	
Initial operating expenses	\$ 2.000,00
Expenses incurred at the time of policy renewal	1% of the insurance premium + \$ 45.00
Interest spread	2%
Expenses incurred in the claim	\$ 100.00
Fixed expenses incurred at the time of surrender	\$ 50.00
Discount rate	2% per year
Specific Criteria – Financial Market	
Loading factor on the actuarially fair insurance premium (<i>k</i>)	30%, 40% and 50%

The surrender rates, surrender penalties and the corridor factor adjustment were extracted from Dickson, Hardy and Waters (2013).

Results | Individual perspective

IRR for a B-type UL contract, for different sex (S), age of entry (A) and duration of the policy (D), considering 80% of the assets invested in fixed income..

Base scenario: insured **40** years old **man**, holding a **B-type** policy for **10** years, earning the expected returns from each application and with 80% of the assets allocated in fixed-income investments.

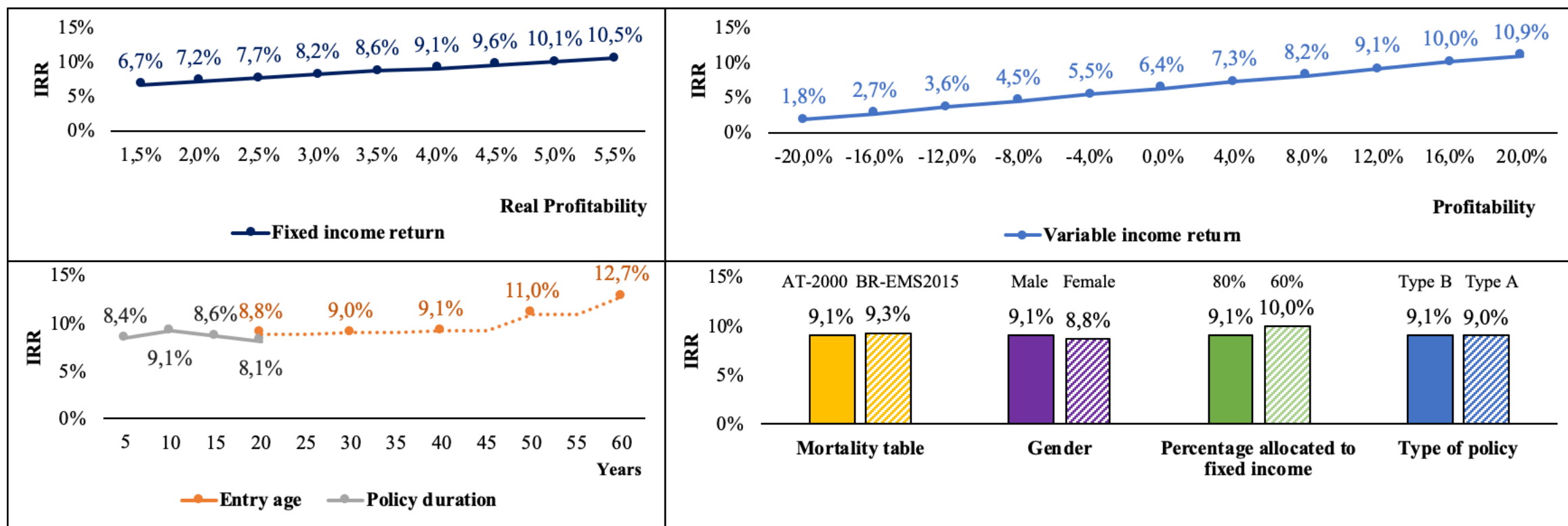
Nominal IRR obtained with Universal Life: 9,10% per year.

- Higher IRR values when financial returns are high → IRR generally exceeds the rate of return obtained in the open market, as the interest credited to the policyholder's accounts behaves as a discount factor in insurance values and loadings;
- Sex / age → effects on IRR depends on the mortality table (men usually die younger than women);
- Policy's duration → optimal level in 8 years.

		Profitability of fixed income products									
		6.6%			8.2%			9.7%			
S	A	D	Profitability of variable income products								
			4.0%	12.0%	20.0%	4.0%	12.0%	20.0%	4.0%	12.0%	20.0%
20	M	5	4.1%	6.6%	9.0%	6.0%	8.4%	10.8%	7.9%	10.3%	12.7%
		10	5.6%	7.4%	9.2%	7.0%	8.8%	10.7%	8.4%	10.3%	12.1%
		20	4.7%	6.4%	8.1%	6.0%	7.7%	9.4%	7.3%	9.0%	10.7%
	60	5	4.1%	6.5%	9.0%	6.0%	8.4%	10.8%	7.9%	10.3%	12.7%
		10	5.9%	7.7%	9.5%	7.3%	9.1%	10.9%	8.7%	10.5%	12.3%
		20	5.2%	6.8%	8.4%	6.5%	8.1%	9.7%	7.7%	9.4%	11.0%
20	F	5	5.4%	8.1%	10.9%	7.5%	10.3%	12.9%	9.7%	12.4%	15.0%
		10	9.7%	11.4%	13.1%	11.0%	12.7%	14.4%	12.3%	14.1%	15.8%
		20	10.2%	11.2%	12.3%	10.9%	12.0%	13.2%	11.8%	13.0%	14.2%
	60	5	3.8%	6.2%	8.6%	5.7%	8.1%	10.5%	7.5%	9.9%	12.3%
		10	5.3%	7.1%	9.0%	6.7%	8.6%	10.4%	8.2%	10.0%	11.9%
		20	4.6%	6.3%	8.0%	5.9%	7.6%	9.3%	7.2%	8.9%	10.6%
60	M	5	3.9%	6.3%	8.7%	5.7%	8.2%	10.6%	7.6%	10.0%	12.4%
		10	5.5%	7.3%	9.2%	6.9%	8.8%	10.6%	8.4%	10.2%	12.0%
		20	4.8%	6.5%	8.1%	6.1%	7.8%	9.4%	7.4%	9.1%	10.7%
	F	5	4.2%	6.8%	9.3%	6.2%	8.8%	11.3%	8.2%	10.8%	13.3%
		10	7.2%	9.0%	10.8%	8.6%	10.4%	12.2%	10.0%	11.8%	13.6%
		20	6.7%	8.1%	9.6%	7.8%	9.3%	10.8%	9.0%	10.5%	12.0%

Results | Individual perspective

Marginal effects of the variables related to the composition of the UL IRR



Results | Supply's perspective

Base scenario: insured **40** years old **man**, holding a **B-type** policy for **10** years, earning the expected returns from each application and with 80% of the assets allocated in fixed-income investments.

Result of the profit testing of an insurance policy: \$701, payback after 9 years of the contract.

- Importance of the insured's entry age and the duration of the policy → increasing mortality rates, reversal of initial expenses and taking advantage of interest rates from financial applications.

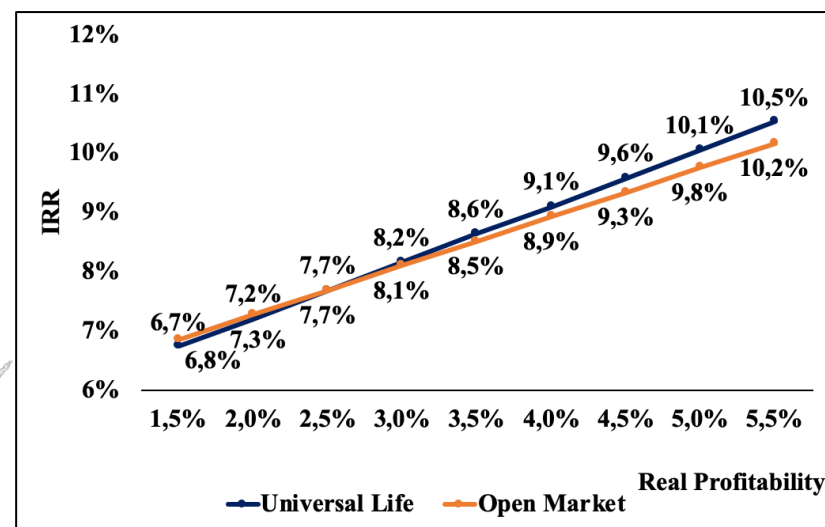
Profit testing for B-type UL contract, for different sex (S), age of entry (A) and duration of the policy (D), considering 80% of the assets invested in fixed income.

S	A	D	Profitability of fixed income products																		
			6.6%			8.2%			9.7%												
			Profitability of variable income products																		
4.0%			12.0%			20.0%			4.0%			12.0%			20.0%						
		5	-988	-973	-957	-976	-961	-945	-964	-948	-932										
	20	10	577	677	782	654	758	869	735	844	960										
		20	3,084	3,502	3,977	3,406	3,867	4,393	3,761	4,271	4,853										
		5	-998	-983	-967	-986	-971	-955	-974	-958	-942										
M	40	10	522	621	725	598	701	811	678	786	901										
		20	2,839	3,241	3,696	3,148	3,591	4,095	3,489	3,979	4,537										
		5	-1,167	-1,151	-1,135	-1,155	-1,139	-1,122	-1,142	-1,126	-1,109										
	60	10	-94	-14	70	-32	51	140	32	120	214										
		20	963	1,229	1,534	1,168	1,463	1,802	1,395	1,723	2,100										
		5	-982	-966	-950	-969	-954	-938	-957	-941	-925										
	20	10	604	704	811	682	787	899	763	874	991										
		20	3,155	3,579	4,062	3,481	3,950	4,483	3,842	4,360	4,950										
		5	-991	-975	-960	-979	-963	-947	-967	-951	-934										
F	40	10	565	665	770	642	746	857	723	832	948										
		20	3,018	3,433	3,905	3,337	3,796	4,317	3,690	4,196	4,774										
		5	-1,084	-1,068	-1,051	-1,072	-1,055	-1,037	-1,058	-1,041	-1,024										
	60	10	185	273	367	253	346	444	325	422	526										
		20	1,848	2,183	2,564	2,105	2,476	2,899	2,390	2,801	3,272										

Results | One last exercise

▶ The best scenario happens when there is an increase in financial returns and, in general, the best potential contractor for UL is a typically older individual, with prospects of long-term permanence at UL.

What if interest rates fall?



Interest reducing expenses with the insurance portion and administrative charges (mainly for profiles with high associated premiums).

Mechanism closer to the dynamics of the open market. Incidence of administrative charges and the interest spread.

Conclusion

- ▶ The main objective of the work was to evaluate the viability of UL in Brazil (from the supply and demand point of view), identifying the most favorable profiles and scenarios for the product.
- ▶ In the base scenario, the nominal IRR of 9.1% is higher than the return obtained from the combined purchase of life insurance and financial investments in the open market, due to the **hybrid aspect** of UL insurance (interest as a **discount factor** in the insurance portion and charges) and the possibility of maintaining the **same insured coverage** through constant and **leveled premiums** (opportunity cost).
- ▶ From the insurer's point of view, the most sensitive variable is the **duration of the contract**, because of the interest spread and the high initial operating costs.
- ▶ There are arguments that justify the commercialization of UL in Brazil, especially when there are **high interest rates**, broad stimulus to buy **long-term policies** and when the **policyholder is older**.

Thank you for your attention!



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