



# Improving the Design of DC Pensions

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# Background

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- There has been a shift from public pension provision and DB pensions to DC pension plans in most OECD countries.
- In many countries DC pensions are now the main source to finance retirement (e.g. Australia, Chile, Hungary, Poland.)
- In the near future it may also in Canada, the US, and the UK.

# Background

- The financial and economic crisis has highlighted the need to look into the design of DC pension plans:
  - The main parameters affecting retirement income from DC plans (OECD, 2009)
  - The parameters that are risky or uncertain (OECD WPPP 2010)
  - Default investment strategies (OECD 2010)
  - Minimum return guarantees (Session 3)
  - The design of the payout phase: life annuities (OECD 2009)



# Main parameters affecting retirement income from DC pensions

# Main parameters: choice variables

- The level of retirement income from DC pensions depends on the interaction among various pension parameters.
- Retirement inc. from DC depends on variables that individuals and policy makers have some control over. These ***choice variables*** include:
  - The level of contributions
  - The length of the contribution and accumulation period. Principally, when people retires?
  - The structure of the payout phase (i.e. how assets accumulated at retirement are allocated)

## Main parameters: risk variables

- Other pension parameters are beyond the control of individuals, regulators and policy makers. They are uncertain. These **risk variables** include:
  - Financial market risks: final realisations of investment, inflation, and interest rates are uncertain
  - Demographic risks: improvements in life expectancy are also uncertain
  - Labour market risks: the risk of unemployment or that one's career wage path disappoints.



**Choice variables:**  
How much people  
needs to save?

# How much people needs to save?

- OECD work addresses the following policy question: How much people need to save?
- It assesses the amount of wages that would be needed to put aside each period to finance a certain level of retirement income.
  - It looks at the level of retirement income relative to final salary (RR) for given values of choice and risk variables.
  - It assesses the level of the choice variables needed to achieve a certain RR.

# Conclusions

- People need to save 5-15% of wages during their working life to achieve a level of retirement income btw 25-70% of final wages (RR).
- Increase the length of the contribution period by postponing retirement. This is the more efficient approach (less contribution effort) to increase retirement income.
- The contribution effort increases with life expectancy, but at a decreasing rate → future increases in LE will require smaller contribution efforts to offset them



**Risk variables:**  
Is there a large potential  
shortfall in retirement  
income?

# Main risk variables

- Financial market risks

- rate of return on investment,
- inflation,
- interest or discount rate

- Demographic risk

- life expectancy

- Labour market risk

- People may suffer spells of unemployment
- People have diff. career wage paths (flat or hump-shaped instead of growing).

## Methodology

- The OECD assess the impact of this uncertainty on retirement income by using ***stochastic simulations*** of returns on asset classes, inflation, interest rates, life expectancy, probabilities of suffering unemployment and of having different career wage paths.
- Analysis assumes correlation btw returns on equities and unemployment, and wages; and yields on gov. bonds and inflation

# Main outcome of the modelling

- Given contributions and contribution period:
- 10,000 MC simulations of assets accum. (and RR) for each investment strategy
- Distribution function of the value of assets accumulated, and depending on structure payout phase: retirement income and RR
  - Mean, median, standard deviation
  - Different percentiles, in particular the 5<sup>th</sup> and the 95<sup>th</sup> percentiles.

## Main messages

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- There is a large potential shortfall in retirement income. Retirement income and/or replacement rates are far from being more or less fixed. There is a large likelihood of being below, 54%.
- The impact of human capital risk (u/e and career wage profiles) is quite large. HKR as well as investment returns and inflation are the main drivers of uncertainty surrounding retirement income from DC plans.
- Yet, life expectancy and interest rates play an important role as well.

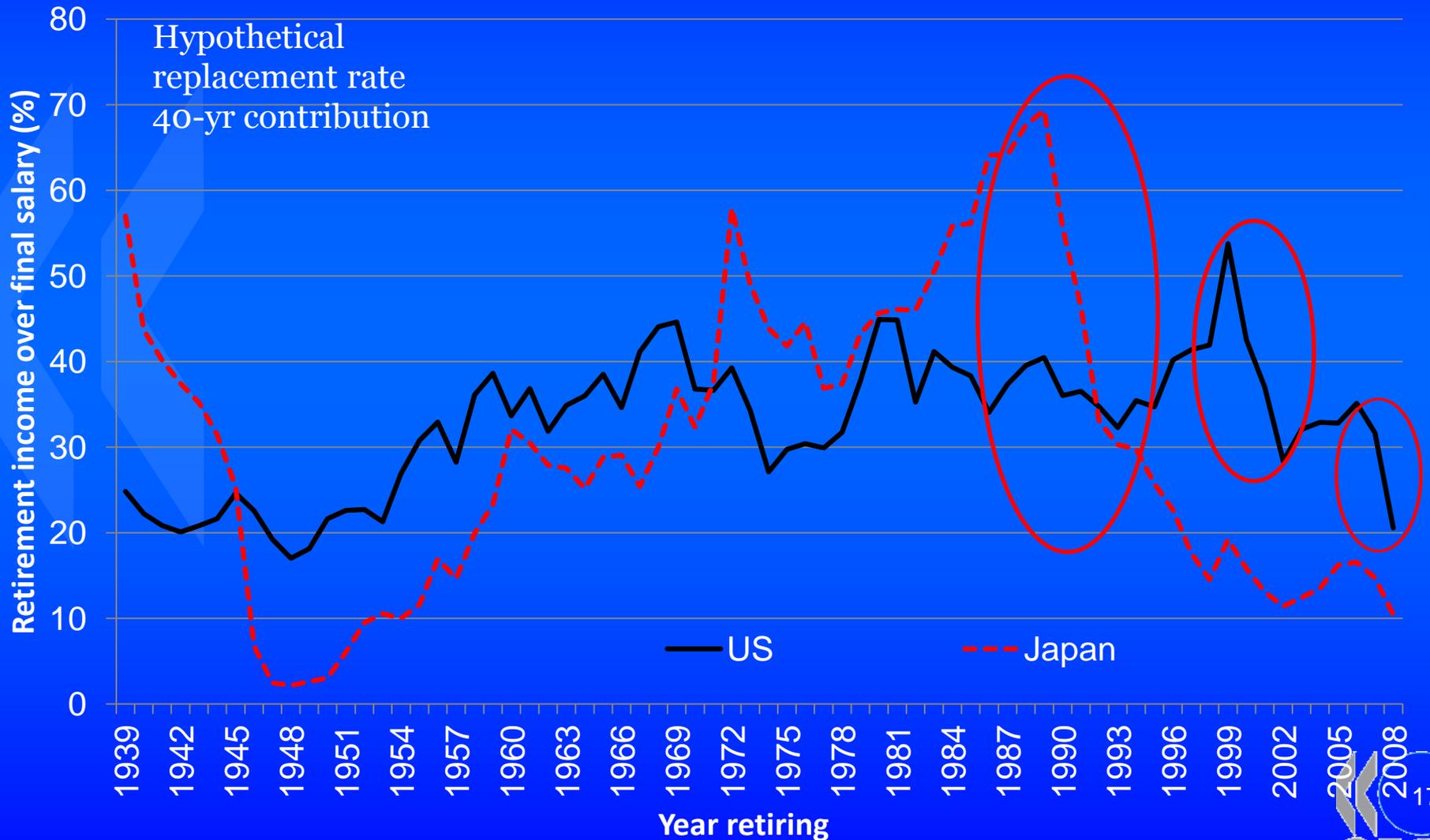


# Why Default Investment Strategies?

# Retirement income from DC plans

- Let's examine the impact of market risk of retirement income from DC pension plans from an **historical perspective**
- Hypothetical replacement rates using returns on equities, and government bonds, interest rates and inflation since 1900 until 2008 (source: Credit Suisse and Barclays).
- Assuming contributions of 5% wages, 40-year accumulation period, buying an annuity at retirement, life expectancy at 65, 20 years.

# Impact of market conditions at the time of retirement is large → large fluctuations in RR



# How can the effects of market risk on DC pensions be alleviated?

- There are two approaches being discussed by regulators, policy makers and the industry
  1. Introducing minimum return guarantees.
  2. Setting up default life cycle investment strategies.
- The OECD study assesses the hypothetical impact that those measures would have had on RR from DC pensions given historical data and in a stochastic context.

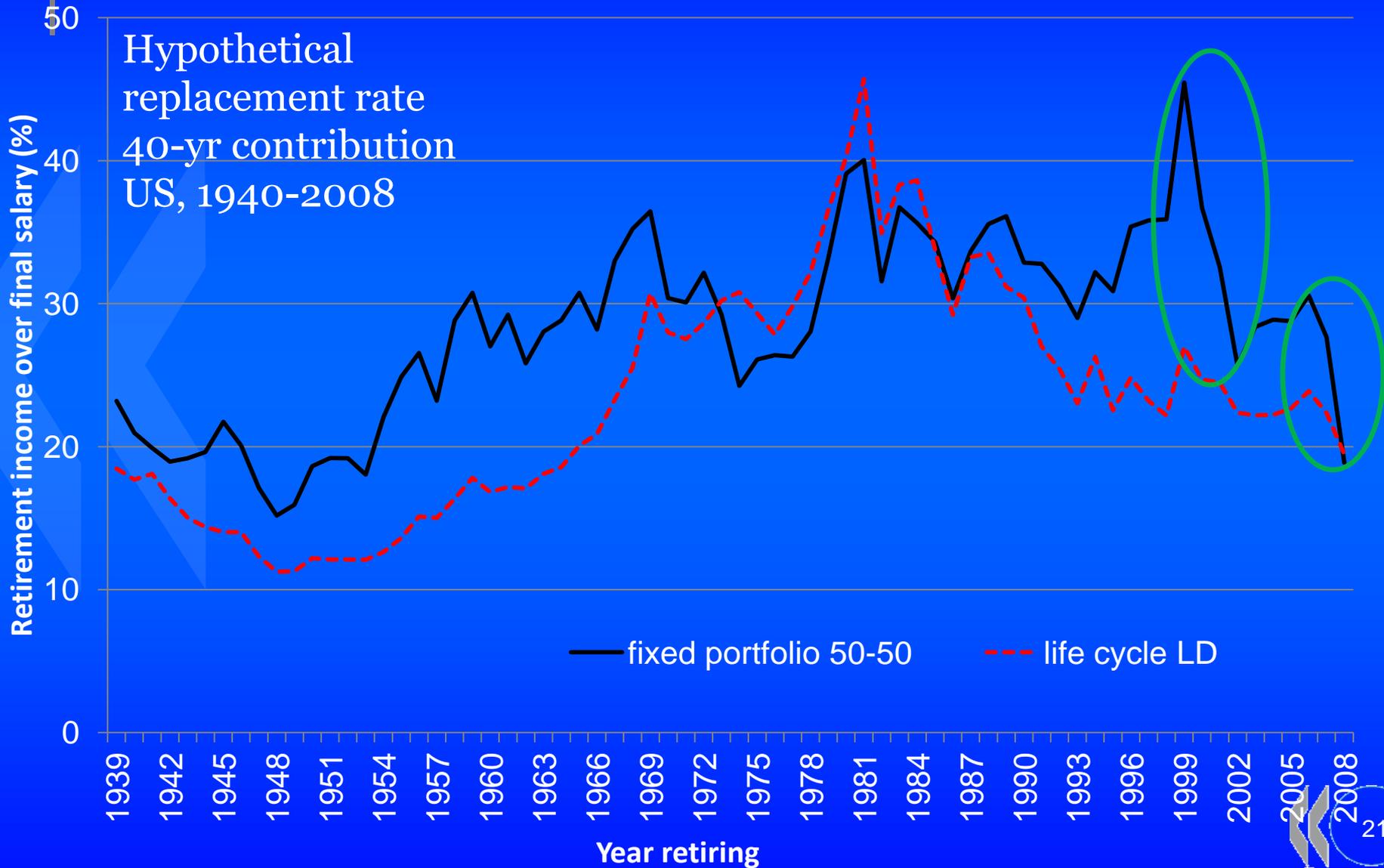
## DC design: Impact of guarantees

- Minimum return guarantees may reduce the volatility in replacement rates ...
- ... but at a cost.
- The level of those guarantees may be relatively high to be really meaningful;
- Only providers more risk adverse than the average would offer for them.
- Guarantees like capital guarantees may be worth considering as they may increase the attractiveness of saving in DC (money-back)

## DC design: Impact of LC

- LC default investment strategies attenuates the fall of replacement rates for those close to retirement when a large negative shock to equity markets occurs ...
- ... but at a cost.
- Median RR would be lower;
- People will lose out during the market up-swings.

# LC attenuates the fall in RR just before retirement





# What type of Default Investment Strategies?

## IV. Default investment strategies

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- Stochastic modelling of returns
- Different structures of the payout phase
- Different glide-path of life-cycle investment strategies and introduction of dynamic features

- *Investment strategies:*

- *Fixed portfolios*
- *Life cycle strategies:*
  - Linear decrease
  - Step-wise linear approach
  - Piece-wise linear approach
  - Dynamic multi-shaped
  - Average multi-shaped
- Dynamic risk budgeting

# Default investment strategies: Payout Phase

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- Life annuity
- Inflation-indexed life annuity
- Fixed programmed withdrawal
- Variable programmed withdrawal
- Combined arrangement mixing:
  - Variable programmed withdrawal
  - Deferred inflation-indexed life annuity that starts paying at age 80

# Default investment strategies: Results

- *The relative performance of investment strategies depends on the type of benefit during the payout phase.*

Payout Options	Default Investment Strategies
Life annuities at retirement	Step or piece-wise life cycle strategies with medium exposure to equities (50-60%)
Programmed withdrawals	Average multi-shaped and dynamic risk budgeting with medium exposure to equities
Combined arrangements	A mixed of investment strategies from the other two payout options

# Default investment strategies: Results

- *The introduction of dynamic management strategies can provide somewhat higher replacement rates for a given level of risk than the more deterministic strategies, at least in the case of pay-outs in the form of variable withdrawals*

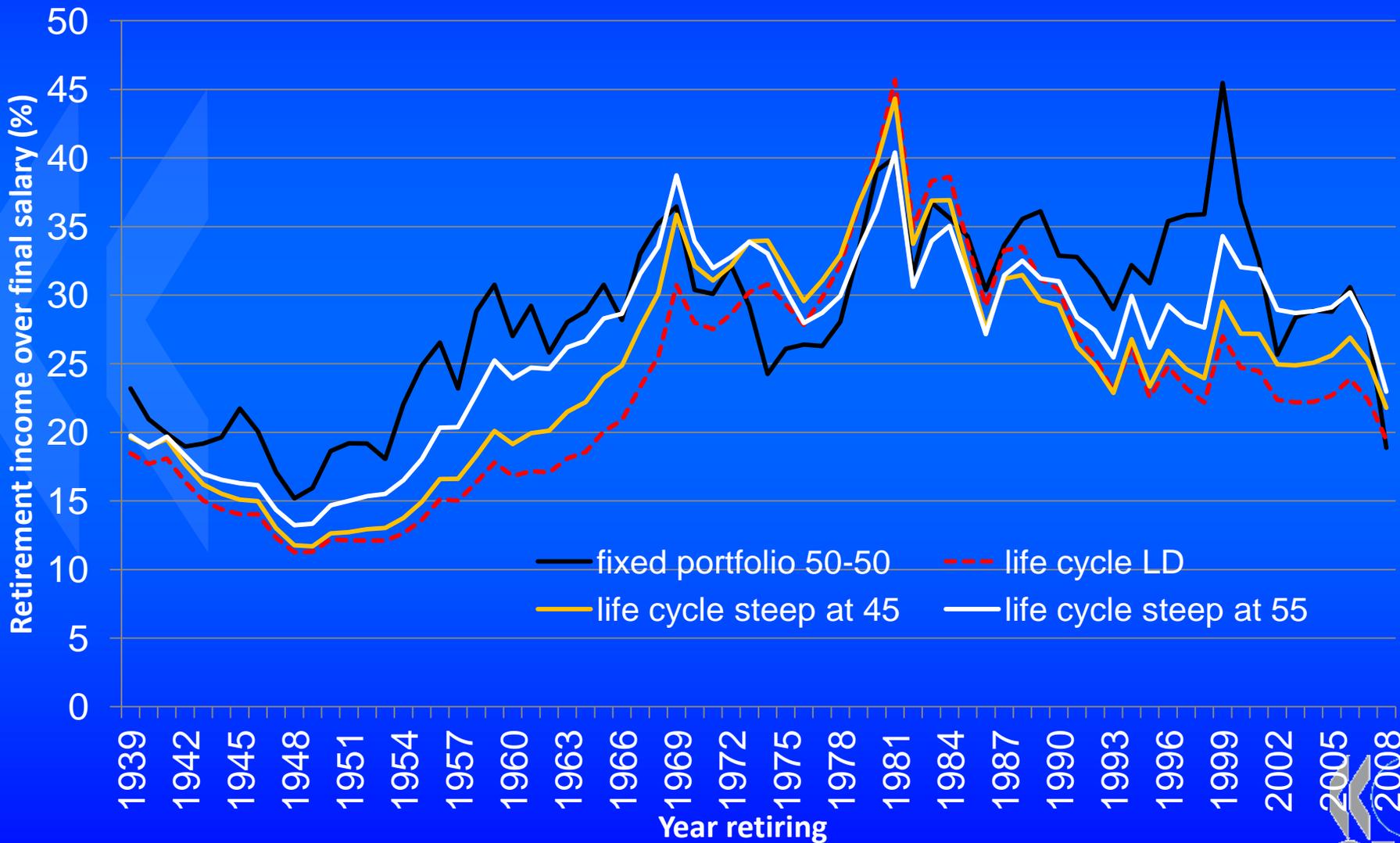
# Default investment strategies: Results

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- *Life cycle strategies that maintain a constant exposure to equities during most of the accumulation period, switching swiftly to bonds in the last decade before retirement seem to perform best.*

# LC switching just before ret. may perform best

Hypothetical replacement rate 40-yr contribution period for US, 1940-2008



## Two type of LC strategies

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- Multi-funds (e.g. Chile) and target date funds (e.g. US).
- Multi-funds: people is assigned to different funds according to age. Each fund has a decreasing exposure to risky assets. It consists of brackets with max. & min.
- Target data funds: people join investment strategy where equity exposure falls as people ages until a certain retirement age.

# Multi-funds

- Multi-funds provides flexibility.
- People within each bracket can have different exposures to risk depending on their risk tolerance parameter.
- One can (after negative equity shock) increase exposure to equities and thus take advantage of a possible rebound (active management).

## Multi-funds

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- Although this flexibility sounds like a good idea, the reason of a default is exactly to avoid people make those kind of active management decisions that they are not prepared or willing to do.
- Hence, a more automated life cycle approach as a default may be advisable.
- Each fund in the multi-fund approach have a default (the middle point of the bracket)

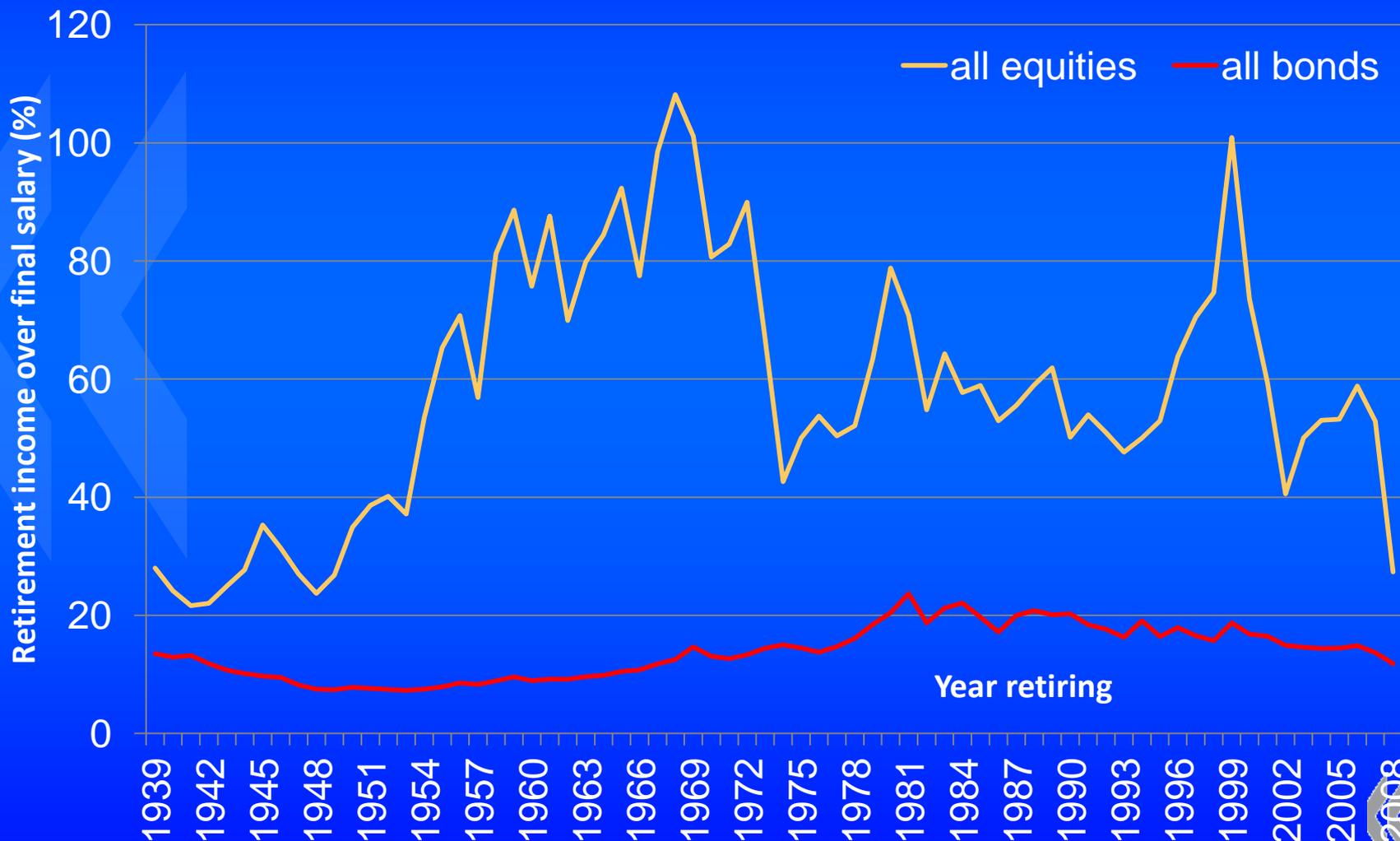
# Default investment strategies: Results

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- *The length of the contribution period affects the ranking of the different investment strategies*

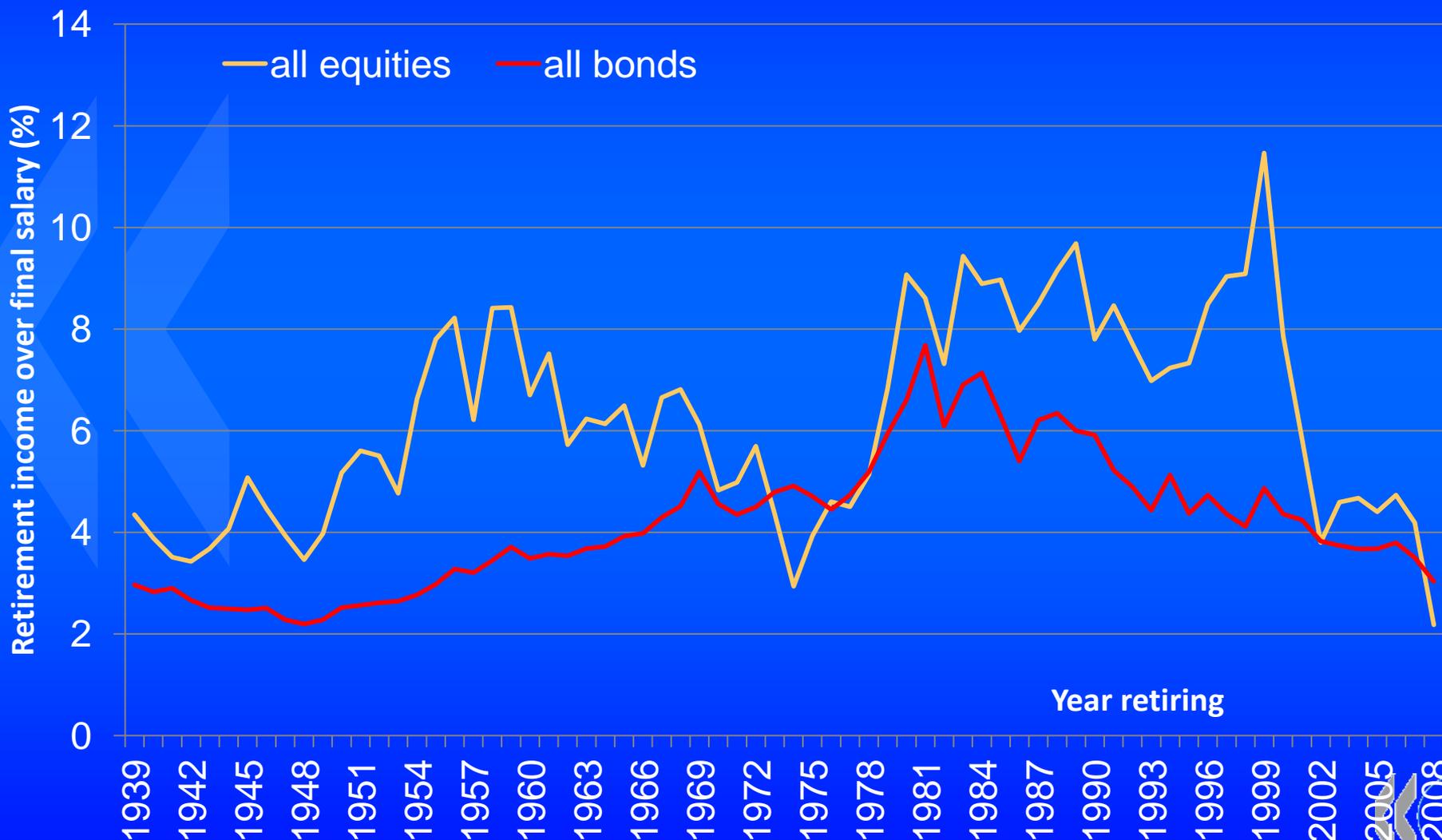
# Length contribution period important

Hypothetical replacement rate in the US, 1940-2008, 40yr



# Length contribution period important

Hypothetical replacement rate in the US, 1940-2008, 10-yr



# Qualifying the use of life cycle strategies

- It is unclear whether a fixed portfolio or relatively straightforward life-cycle strategies perform better in terms of the probability distribution of replacement rates.

Investment strategies	Percentile of distribution								
	1	5	10	25	50	75	90	95	99
<i>Contribution period equal to 40 years</i>									
Fixed portfolio <sup>1</sup>	6.9	10.2	12.5	17.3	24.7	35.8	49.6	60.8	91.7
Life-cycle <sup>2,3</sup>	6.8	9.5	11.5	15.3	21.1	29.2	39.7	48.3	70.2
Life-cycle <sup>2,4</sup>	7.0	9.9	12.1	16.5	23.4	33.3	46.2	56.7	86.3
<i>Contribution period equal to 20 years</i>									
Fixed portfolio <sup>1</sup>	3.3	4.7	5.6	7.5	10.0	13.4	17.3	20.5	27.5
Life-cycle <sup>2,3</sup>	3.3	4.7	5.6	7.7	10.7	14.8	19.8	23.6	34.4
Life-cycle <sup>2,4</sup>	3.3	4.6	5.4	7.2	9.6	12.5	16.1	18.6	25.2

## Qualifying the use of life cycle strategies

- When the main concern is the replacement rate of people close to retirement when a **negative shock to the stock market occurs**, as the one experienced in 2008, life-cycle strategies provide higher replacement rates than fixed portfolio strategies.
- In particular, life-cycle strategies with constant exposure to equities during most of the accumulation period that reduces it to zero during the last 10 years before retirement.

# Qualifying the use of life cycle strategies

	Entire random sample (10,000 obs)		Negative stock market shock (16% of cases) <sup>1</sup>	
	Contribution period		Contribution period	
	20 years	40 years	20 years	40 years
<i>Life cycle investment strategies</i>				
Linear decrease with age <sup>2</sup>	28.6	24.1	67.0	48.0
Steep decrease after age 55 <sup>3</sup>	34.7	35.2	77.9	73.0

## Positive impact of LC investment strategies

- Introducing default investment LC strategy would be one of the main policy options.
- LC investment strategies can partially offset the impact on retirement income resulting from a negative shock to equity markets just before retirement, in particular for individuals who have medium to low growth in income, and who experience unemployment.

## Positive impact of LC investment strategies

- The chances that the LC strategy provides a higher retirement income than a fixed portfolio with the same average exposure to equities are higher than 50%

	LC 60% sharp decrease last decade		
	Last year	Last 2 years	Last 5 years
	Full career		
Low real wage growth	81.6	72.8	57.4
Medium real wage growth	78.8	70.3	54.4
High real wage growth	75.8	67.0	50.4
	Spells of unemployment		
High real wage growth	77.0	68.0	51.5

# Life Cycle Strategies

- LC strategies appropriate default investment strategies:
  - provide protection for those close to retirement in the case of a negative shock to the stock market, and
  - they are relatively easy to understand public than other investment strategies s.a. dynamic strategies
- LC strategies also seems to provide protection when contribution periods are short.
- Warning: LC strategies do not remove the volatility of retirement income as a result of market fluctuations.

# Conclusions

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- To protect and ensure adequate RR from DC in a world of uncertainty, policy recommendations need to focus primarily on the amount of contrib. and the length of the contribution period.
- LC address the problem of lower RRs for people close to retirement when a negative shock to stock market occurs, but whether it addresses the problem of volatility is less clear cut, and it definitively does not address the problem of adequate ret. income.
- Therefore, the main policy recommendation to policymakers and regulators is:

# Conclusions

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- *First, set up your target replacement rate from your DC pension given the overall structure of the pension system in your country.*
- *Then set contributions and the length of the contribution period accordingly keeping in mind that to reach adequate replacement rates people needs to “contribute and contribute for long periods”.*

# Conclusions

- *Afterwards, focus on asset allocation strategies. In particular, if contribution periods are short or intermittent, or concerns about replacement rates falling sharply for people close to retirement when a negative stock market occurs is a main policy issue, establish default life-cycle investment strategies that reduce exposure to equities in the last decade before retirement.*



# The payout phase

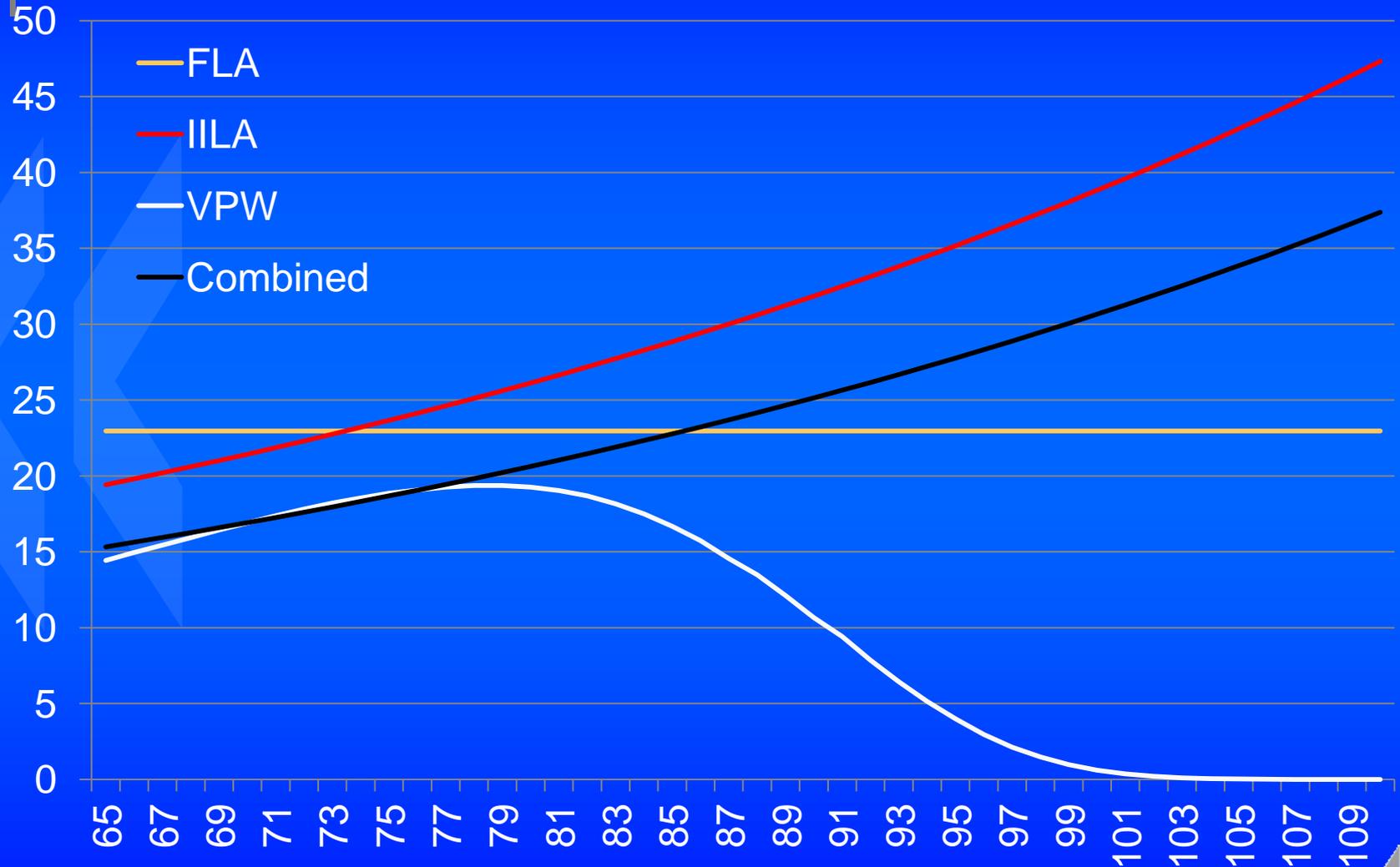
# How can the payout phase be protected?

- It assesses the design of the payout phase and its impact on retirement income examining how to protect against both inflation and longevity risk.
- There is a need to strike a balance between the need for flexibility and liquidity (PW) and protection from LR (annuities).
- Need for coherence with the overall pension system and btw the accumulation and payout phases

# How can the payout phase be protected?

- The lack of inflation indexation could reduce the purchasing power of retirement income as much as one-third in 20 years.
- Protection from inflation: Inflation indexed life annuities.
- Combining life annuities with programmed withdrawals allows for a balance between flexibility, liquidity and bequest motives and protection from longevity risk.

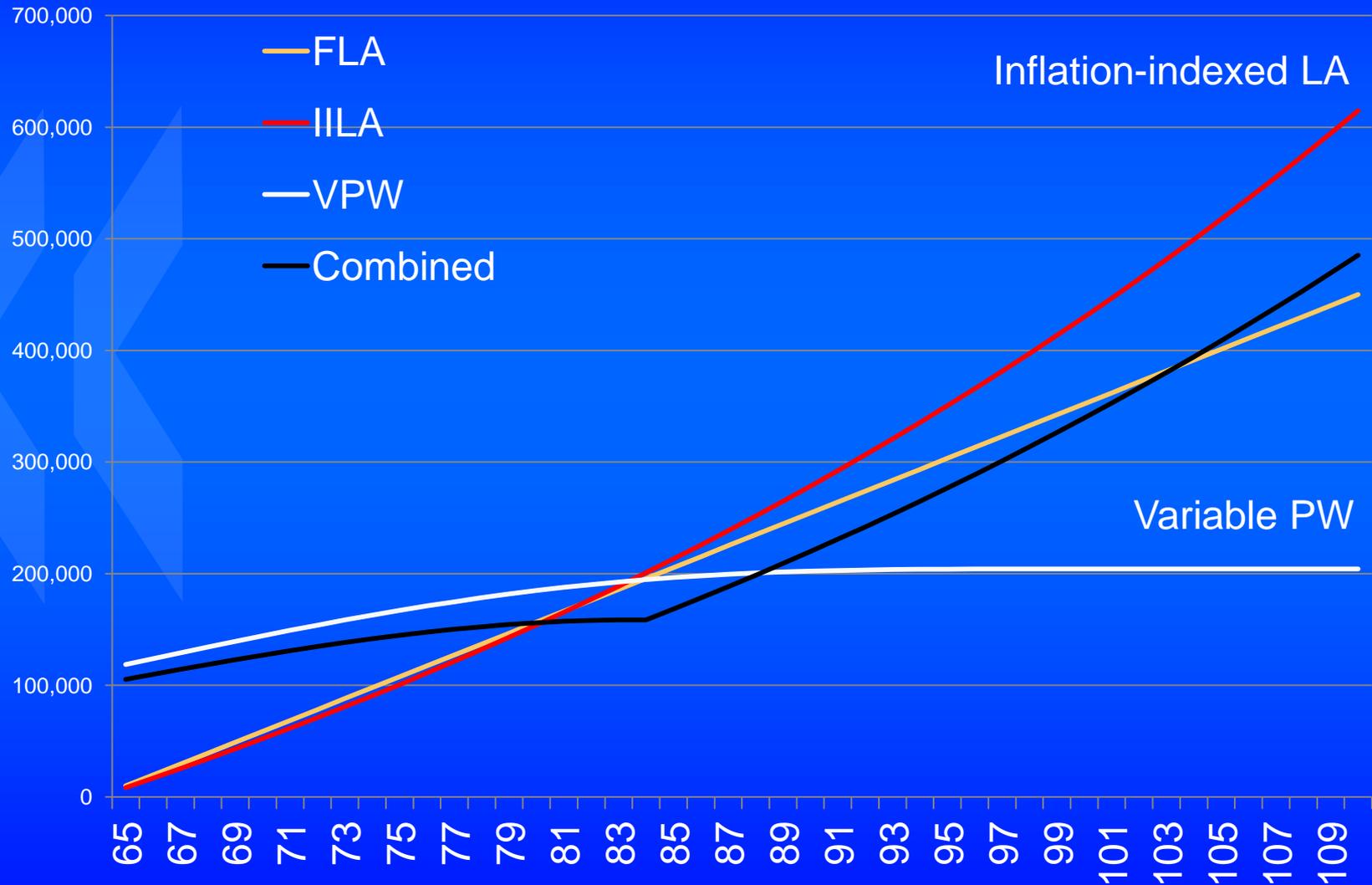
# RR given different Payout Arrangements



# How can the payout phase be protected?

- Inflation indexed life annuities → cost: 1-2.6%
- But, annuity puzzle? Look at the amount of pension payments accumulated in each year after retirement under each payout phase.
- PW allow for remaining balances when passing away to go to family members (bequests), becoming part of accumulated payments. With LA no payment goes to family member
- In this context, up to a certain cut-off age (average LE) PW seem to be better value because of bequests

# Accumulated Retirement Payments - Payout



## Main features

- VPW provide
  - Access to portfolio investment returns
  - No insurance premium of LA (protection LR)
  - Annuities assume bond only portfolio instead of bond-equity portfolio of VPW
- LA provide protection from LR
- Variable LA grant access to portfolio investment returns
- However, recommending VLA as defaults may not work as in extreme market outcomes (portfolio losses)

## Main recommendation

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- Combining deferred LA bought at the time of retirement that starts paying at later ages (e.g. at age 85) with PW provide flexibility, liquidity and bequests during the first years in retirement and protection from longevity risk thereafter.

# Conclusions

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- Annuities are needed to protect people from longevity risk.
- Balance btw flexibility/liquidity (PW) and protection from LR (annuities)
- How much assets accumulated in DC needed to annuitize depends on the overall structure of the pension system in each country: large part retirement income from DC → annuitize.
- Unfortunately, the lack of or insufficient financial instruments available for annuity providers to hedge LR hinders annuity market

# Solutions to LR

- Mortality and life tables should include stochastic forecasts of future improvements in mortality and life expectancy.
- Government should encourage the development of a market for longevity hedging products by developing a reliable longevity index. Countries with small liabilities from PAYG, governments should consider issuing longevity-indexed bonds.



# Main tentative recommendations

# Main tentative recommendations

- Contribute and contribute for long periods.
- Increase the length of the contribution period by postponing retirement.
- Attenuate the volatility in retirement income from DC plans brought about by financial market, labour market and demographic risks
  - MRG: money-back, contributions are saved
  - Introduce default LC investment strategies. Remember: no panacea. Useful to partially offset negative impact of stock market shocks just before retirement

## Main tentative recommendations

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- Annuitize part of the balances accumulated in DC plans, depending on the overall pension arrangements in the country.
- Combine VPW with deferred life annuities (inflation-indexed): protection from LR and flexibility, liquidity and possibility of bequests.



# THANK YOU!

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