A measure for the indexation quality of pension entitlements

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Set-up this presentation

- Brief explanation Dutch DB pension contracts
- Transparency and choice options
  - Can participants understand the contracts ?
  - Which choice options are available ?
  - The new indexation label
- Some first numerical results on indexation quality
  - The stylized contract
  - The financial market assumptions
  - Indexation quality as function of funding ratio, asset mix and age
- Extensions to DC and to pension quality

The main characteristics of the Dutch pension contract

The traditional Dutch contract

- Obligatory annual contribution
- Build up 1.75% of (final) salary per working year (70% after 40 years in service)
- Increase in entitlements in case of career steps (final wage) and also if wage adjustment due to inflation
- Defined Benefit in real terms: real annuity was (perceived to be) offered, residual risks were covered by sponsor and/or the current active population

Average wage schemes

- Final wage schemes have strong disincentives for demotion or working part-time at older ages.
- Current schemes are based on average wage (say 2.25% of average wage per working year)
- Indexation cuts now affect the workers as well, not just the retirees.

Conditional indexation

- Legally indexation (i.e. adjusting nominal rights for inflation) has always been a target, not a binding right.
- Due to low funding ratios around 2002 most funds implemented partial indexation only.
- Explicit conditional indexation rules have been set.

Conditional indexation rules

- *Funding ratio: market value of the assets over the market value of the liabilities*
- Typical example of a conditional indexation rule:
  - Full indexation is given if the nominal funding ratio exceeds 140
  - No indexation is given if the nominal funding ratio is less than 110
  - Partial indexation is given in intermediate cases. Funding ratio 130 would give 67% indexation.
- Catching up of indexation missed in previous years is typically offered if fund recovered.

Indexation given and full indexation for five Dutch sector funds (source: web-site VB)

	2005 Indexation given	2005 Full indexation		2006 Indexation given	2006 Full indexation
ABP	0.15%	0.18%		0.17%	0.38%
PGGM				0.36%	0.75%
Railways	1.08%	1.08%		0.89%	0.89%
Metal workers	0.49%	0.65%		3.77%	3.22%
Metalelektro	0.39%	0.65%		1.41%	1.76%

Transparency and choice options

Transparency

- Current Dutch contract much harder to understand than final wage real annuity.
- What will retirement income be relative to current wage ?
- Annual uniform statement specifies nominal rights and projects nominal value if current position continued until retirement
- Purchasing power of annuity stream (is the contract real or nominal ?) in particular hard to derive.

Choice options

- Transparency is important for “political” support of the system, but also because individuals have (more and more) choice options:
  - Set additional funds aside e.g. in third pillar
  - Transfer value in case of change of employer
  - Transfer value to partner at retirement
  - Is pension income sufficient to retire ?
  - ….

The new Dutch pension law

- Dutch parliament has recently decided that a new indexation label will be added to the annual uniform pension statement
- Likewise a pension register will be introduced: a web-site that provides overview on all pension entitlements of the individual (first, second and third pillar, covers all past employers and insurance policies). Exists in e.g. Sweden and Denmark.

The indexation label

- The continuity analysis requires the fund to specify their (intended) decisions in future states of the world.
- Asset Liability Models can be used to generate N equally likely future scenario's for stock prices, interest rates, inflation rates, ..
- For every scenario one can determine the cumulated inflation as well as the cumulated indexation given, i.e. simulate the purchasing power of the pay-out.

The indexation label II

- Information is to be summarized for participants, e.g. by
  - Expected purchasing power
  - Quantiles for purchasing power
  - Expected purchasing power in p% worst scenarios (Average Real Pay-out in Extreme Scenarios, ARPES)

The indexation label III

A possible classification for “indexation quality”

- 🟢 : 10% ARPES >90% current and expected real value >99% current
- 🟢 : 10% ARPES >80% current and expected real value > 95% current
- 🟡 : 10% ARPES >70% current and expected real value >90% current
- 🟠 : 10% ARPES >50% current and expected real value >80% current
- 🔴 : all other cases

Relevance of market values for participants

- Market valuation dominant view in the industry
- If agents adjust their portfolios optimally in a frictionless world the market value of the entitlements is the only relevant variable
- Assumption less realistic for individual participants
- Here aim to characterize distribution of future purchasing power rather than market values

Towards numerical results

Set-up numerical results

- Financial market assumptions made in line with
  - Brennan – Xia (2002)
  - Campbell – Viceira (2003)
  - Etc.
- Two factor model of real and nominal term structure
- Excess stock returns i.i.d. normal

Contracts to be analyzed

- Collective conditionally indexed DB
  - with or without catch-up indexation
  - indexation of price or wage inflation
- Individual contracts with guarantees
  - nominal annuity
  - with profit (deferred) annuity with guaranteed g% nominal return,
- Contracts without guarantees
  - Investment risk in accumulation phase
  - Investment risk in accumulation and pay-out phase (draw-down plans)
- Impact of cost differentials

Purchasing power

- Purchasing power of retirement income approximated by assuming that all income is received at age 75.
- Indexation quality of current entitlements determined, future contributions ignored
- Impact of first pillar and “franchise” ignored (otherwise level dependent and assumption or indexation quality AOW required)

Purchasing power II

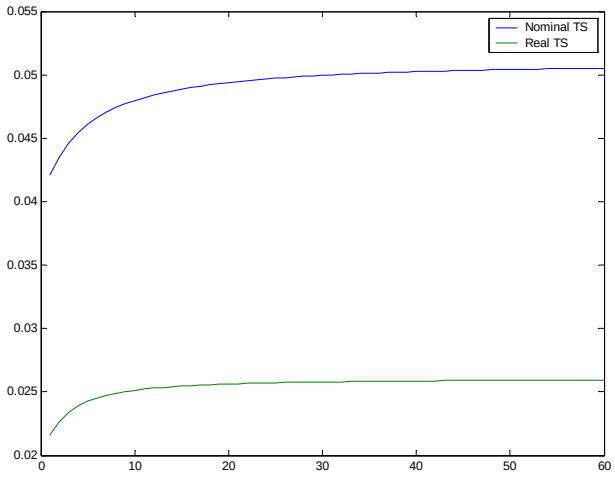
- Nominal entitlement year t X_t
- Price index in year t Π_t
- Real entitlement year t $Y_t = X_t / \Pi_t$
- Three characteristics of distribution Y_t:
  - $E[Y_t]$ (expectation)
  - $\xi_p(Y)$ (quantiles)
  - $E[Y_t \mid Y_t < \xi_{.10}(Y)]$ (ARPES)
- Note that

$$E[Y_t \mid Y_t < \xi_{0.10}(Y)] \sim 0.31\, \xi_{.10}(Y) + 0.44\, \xi_{.05}(Y) + 0.25\, \xi_{.01}(Y)$$

Base case parameter set

• Equity premium	3%
• Long term real rate	2%
• Long term expected inflation	2%
• Volatility stocks	20%
• Volatility real rate	1.5%
• Volatility expected inflation	1.0%
• ….	
• Initial real rate	2%
• Initial expected inflation	2%

Initial termstructures base case



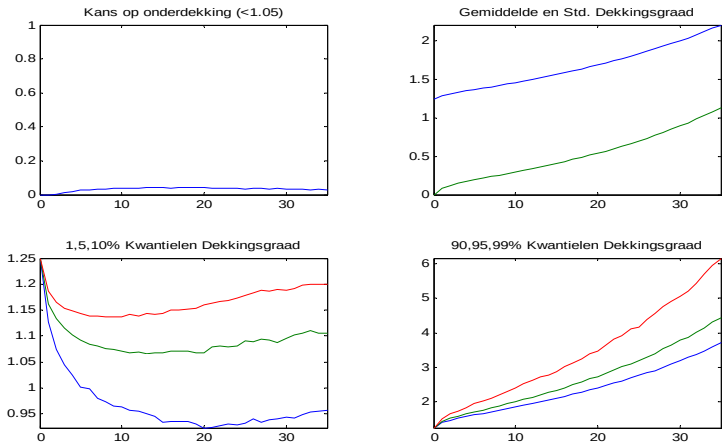
Asset mixes

Asset Mixes			
	"Bonds"	"Mix"	"Stocks"
Assets:			
Stocks	30%	50%	70%
5yr Bonds	50%	30%	20%
20 yr Bonds	20%	20%	10%

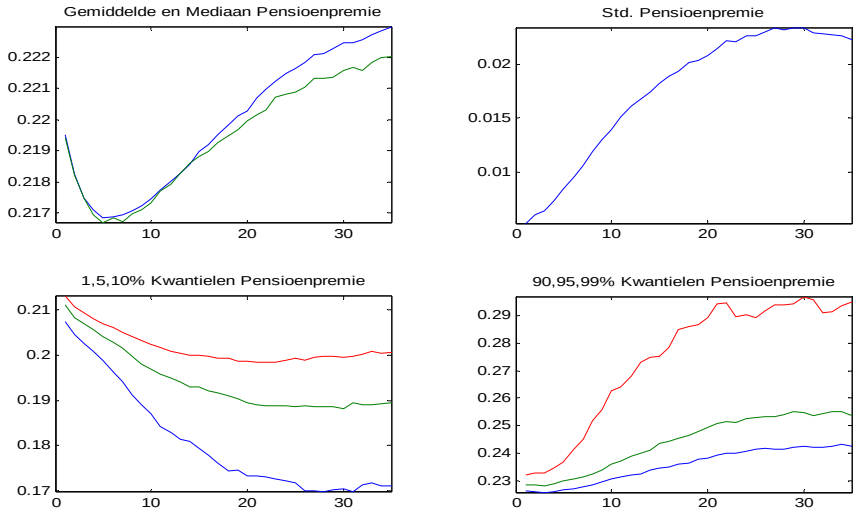
Base case collective contract

- Initial funding ratio 125%
- Asset Mix “Bonds”
- Indexation target price inflation
- No indexation if funding ratio less then: 105%
- Full indexation if funding ratio exceeds: 140%
- Catch up indexation if fr exceeds: 145%
- Recovery premium if funding ratio below 105%
- Horizon recovery period: 15 yrs
- Age distribution fund: flat
- Duration of liabilities of fund: 11.4yrs

Funding ratio distribution (base case collective contract)



Pension premium distribution (base case collective contract)



Relative purchasing power incl. catch-up (base collective)

Expected Purchasing Power and ARPES conditionally indexed DB contract
50 year old participant

Asset Mix	FR = 105% Expected	FR = 105% ARPES	FR = 125% Expected	FR = 125% ARPES	FR = 145% Expected	FR = 145% ARPES
"Bonds"	86.8%	55.5%	94.4%	69.0%	97.9%	81.2%
"Mix"	87.9%	52.8%	92.8%	61.0%	96.0%	70.3%
"Stocks"	88.0%	51.9%	91.9%	58.4%	94.4%	64.4%

Expected Purchasing Power and ARPES conditionally indexed DB contract
65 year old participant

Asset Mix	FR = 105% Expected	FR = 105% ARPES	FR = 125% Expected	FR = 125% ARPES	FR = 145% Expected	FR = 145% ARPES
"Bonds"	89.6%	74.5%	96.3%	84.2%	99.2%	93.3%
"Mix"	91.1%	73.6%	95.5%	79.7%	98.2%	87.4%
"Stocks"	91.9%	73.7%	95.2%	78.7%	97.3%	83.5%

Relative purchasing power excl. catch-up (base collective)

Expected Purchasing Power and ARPES conditionally indexed DB contract (no catch up) 50 year old participant						
	FR = 105%		FR = 125%		FR = 145%	
Asset Mix	Expected	ARPES	Expected	ARPES	Expected	ARPES
"Bonds"	81.4%	55.2%	91.3%	67.9%	97.0%	79.6%
"Mix"	81.2%	51.8%	88.3%	59.1%	93.8%	67.9%
"Stocks"	80.8%	50.0%	86.7%	55.9%	91.1%	61.5%

Expected Purchasing Power and ARPES conditionally indexed DB contract (no catch up) 65 year old participant						
	FR = 105%		FR = 125%		FR = 145%	
Asset Mix	Expected	ARPES	Expected	ARPES	Expected	ARPES
"Bonds"	88.7%	74.5%	95.4%	84.1%	99.0%	93.0%
"Mix"	89.4%	73.5%	94.2%	79.5%	97.7%	87.0%
"Stocks"	89.8%	73.5%	93.7%	78.3%	96.5%	83.1%

Indexation label (base collective)

Expected Purchasing Power and ARPES base case conditionally indexed DB contract 50 year old participant						
	FR = 105%		FR = 125%		FR = 145%	
Asset Mix	Expected	ARPES	Expected	ARPES	Expected	ARPES
"Bonds"						
"Mix"						
"Stocks"						

Expected Purchasing Power and ARPES base case conditionally indexed DB contract 65 year old participant						
	FR = 105%		FR = 125%		FR = 145%	
Asset Mix	Expected	ARPES	Expected	ARPES	Expected	ARPES
"Bonds"						
"Mix"						
"Stocks"						

Some first impressions of results

- Strong impact of current funding ratio both on expected purchasing power and on ARPES component of indexation quality
- Non-negligible age effect in these first results (also after recovery periods substantial probability of funding ratios that do not yield full / catch-up indexation)
- Catch-up indexation is numerically not too important (unless horizon is long and current funding ratio low)
- More risk taking seems to hurt indexation quality in almost all cases (no bonus indexation over price inflation !)

Subsequent analysis collective contracts

- Impact of wage indexation rather than price indexation
- Note: in case of just price indexation there is a sizeable probability of excessive funding ratios (the more in case of more risky investments) that are not reflected in the indexation quality
- Impact of initial state variables, parameter assumptions, steepness and thresholds in conditioning rule etc.

Indexation quality of individual contracts with guarantee

- Individual contracts with (nominal) guarantee
  - nominal annuity
  - with profit (deferred) annuity with guaranteed g% nominal return,
- Empirical results to be obtained under same assumptions

Indexation quality contracts without guarantees

- Examples: DC in accumulation phase with subsequent annuitization, draw down plans, ..
- Information on future purchasing power equally relevant
- Main challenge that purchasing power can no longer be expressed relative to a (nominal) guarantee

Reference level choice

Label type	*Relative to*	*Notes:*
Financial information leaflet	Initial investment	Nominal risks only
Indexation quality label	Nominal guarantee	Nominal guarantee required
Pension risk label	Expected purchasing power	Too much emphasis on expected value
Pension quality label	Current wage	Incorporates information on “pension gap”

Conclusions

- More transparency on future purchasing power of pension entitlements is essential
- Indexation label can be useful instrument
- Sensitivity analysis required to determine adequate thresholds for five categories
- Idea can be extended to other products and can be extended to a pension quality relative to current wage measure