UNIVERSITÀ DEGLI STUDI FIRENZE

DiSIA
DIPARTIMENTO DI STATISTICA, INFORMATICA, APPLICAZIONI
"GIUSEPPE PARENTI"

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(The Almost Ideal way of) Reconciling social and actuarial equity in pension systems

Health, Education and Retirement

over the Prolonged Life Cycle

Vienna, 27–29 November 2013

Excerpts from the "Call for papers"

... unprecedented **increase in healthy life expectancy** (and) **consequences of a prolonged life cycle** at both the micro and macro levels.

... **challenges for social security** and the **cohesion of society** posed by **differential** (**levels** of and) **increase** in survival.

Empirical and **theoretical** papers welcome.

Topics of interest include the following:

- Enabling a longer working life
- Inter- and intra-generational transfers with prolonged life and the sustainability of social security: retirement
- Dealing with inequality in the expansion of life cycles

Questions and Answers

Questions	Answers
• Why do we want pension systems?	•Bismarck & Beveridge (but the more of the former ...)
• Is Funding preferable to PAYG?	•No (well, depends on the PAYG)
• How many PAYG pensions systems?	•Several (and theory and practice never go hand in hand)
• What is **AIPS** (Almost Ideal Pension System)?	•(Resilient, keeps its promises, key variables defined ex ante)
• How many AIPS can we get? Which one is better?	•Innumerable (parametric choices). Pick your favourite
• AIPS and demo-economic change (incl. survival)	•Easy and **automatic** adjustment (no forecast needed)
• AIPS and inequality in earnings	•One can check and adjust
• AIPS and inequality in survival	•One can check and adjust

How many PAYG pension systems?

PAYG

Theory ≠ Practice

- **AIPS (Almost Ideal P.S.)**
- **NDC (notional defined contr.)**
- **Risk sharing**
- **Def. benefit/contribution**

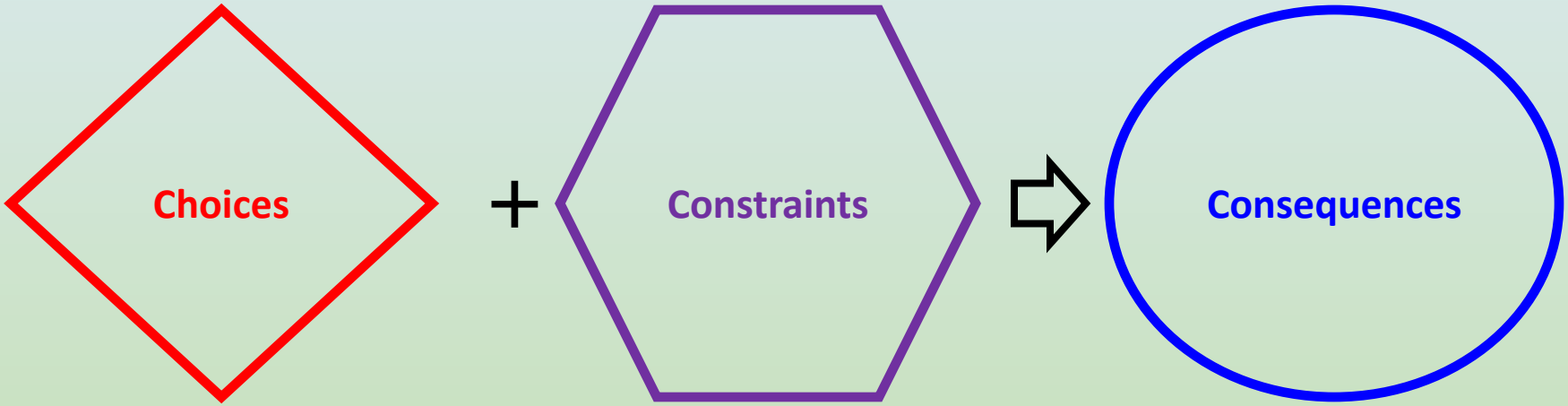
Budget balance - theory: always
practice: never

Pension benefits - theory: average
practice: individual

Exceptions - theory: never
practice: always

What is AIPS (Almost Ideal Pension System)?

A system in which there are policy choices (=parameters), constraints (=exogenous variables), and consequences (=outcomes)



How many variables? 23, of which

(7) (6) (10)

(roughly: depends on detail)

Policy choices (7)

#	Label	Symbol	Ex.	Notes
1.	# of systems		1	i.e. All equal!
2.	Budget imbalance (%)			0%
3.	Target share of Young (%)	Y*	21%	(share of life as Y)
4.	Target share of Old (%)	O*	22%	(share of life as O)
5.	Relative Child benefits (%)	χ	0%	Re to net adult wage
6.	Relative Pension benefits (%)	π	60%	Same; average
7.	Degree of actuarial equity (%)	Q	80%	(=>20% Beveridgean)

Remarks

- Policy choices are parameters (max of transparency)
- Choices **must** be made, and are free policy decisions (here: examples)
- **All values are relative**. But relative to what? Two **novelties** here:
  - **Y*** and **O*** are shares (%) of average life spent as young and old
  - χ and π are **%** of average **net adult wage** (new concept)
- **Child benefits** χ can (but need not) be introduced in the system
- **0 ≤ Q ≤ 1** (explicit choice between redistribution and actuarial equity)
  - when **Q=0** all pension benefits are equal (redistribution; Beveridgean);
  - when **Q=1** benefits depend on past contributions (equity; Bismarckian)

Constraints/ Exogenous variables (6)

#	Label	Symbol	Ex.	Notes
1.	Survival conditions (current life table)	e_0	~82	years
2.	Population total and structure		60	million
3.	No. of employed	E	23	million
4.	Average gross wage of the employed	G_e	30	€/year (.000)
5.	Total contributions paid by each old	K_i	0 to 2K	€, total
6.	Total contributions of the average old	K		€, total

Remarks

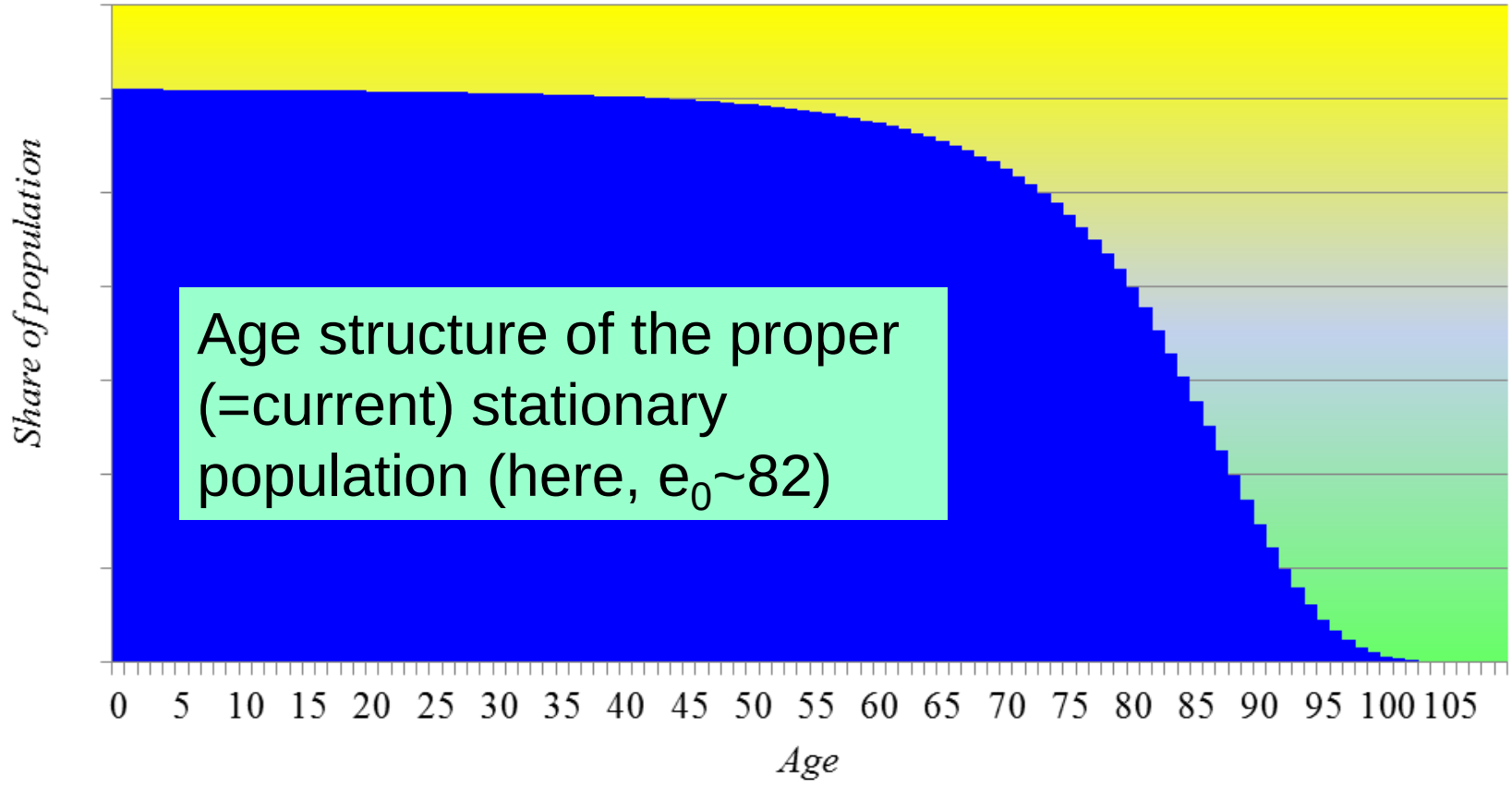
- Examples refer to Italy
- Average gross wage of the employed is just a rough approximation (taken from *Pensions at a Glance 2011*, which in turn derives it from an OECD paper by D'Addio and Immervoll. Only dependent, full time workers are included).
- **K** are cumulative (total) contributions paid in life, in current value
- Three examples of old persons here: with contributions that are, respectively, zero, average, and twice the average

Consequences (10)

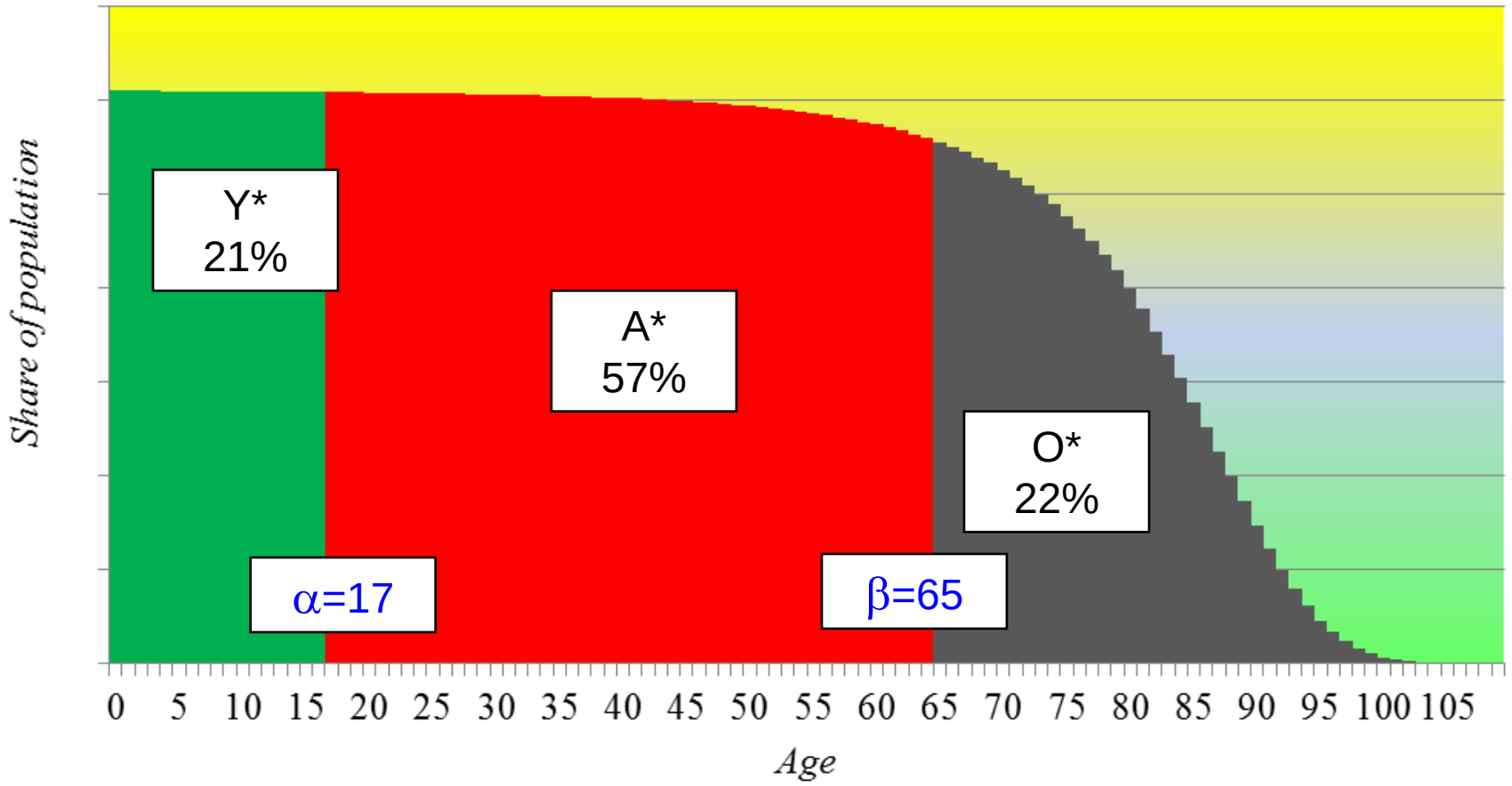
#	Label	Symbol	Ex.	Notes
1.	Threshold ages	α,β	17; 65	years
2.	Actual shares of population	Y,O	16; 20	% (targets: 21, 22)
3.	Contribution rate	c (c*)	15.8% (18.8%)	
4.	Employment rate	E/A	64	%
5.	Gross wage of the adults	G	19.2	€/year (.000)
6.	Net wage of the adults	W	15.5	€/year (.000)
7.	Child benefits	B	0.0	€/year (.000)
8.	Average pension benefits	P	9.3	€/year (.000)
9.	Individual pension (rich=2C)	P_{2C}	16.7	€/year (.000)
10.	Individual pension (poor=0)	P_0	1.9	€/year (.000)

Demographic Bonus = 3.0%

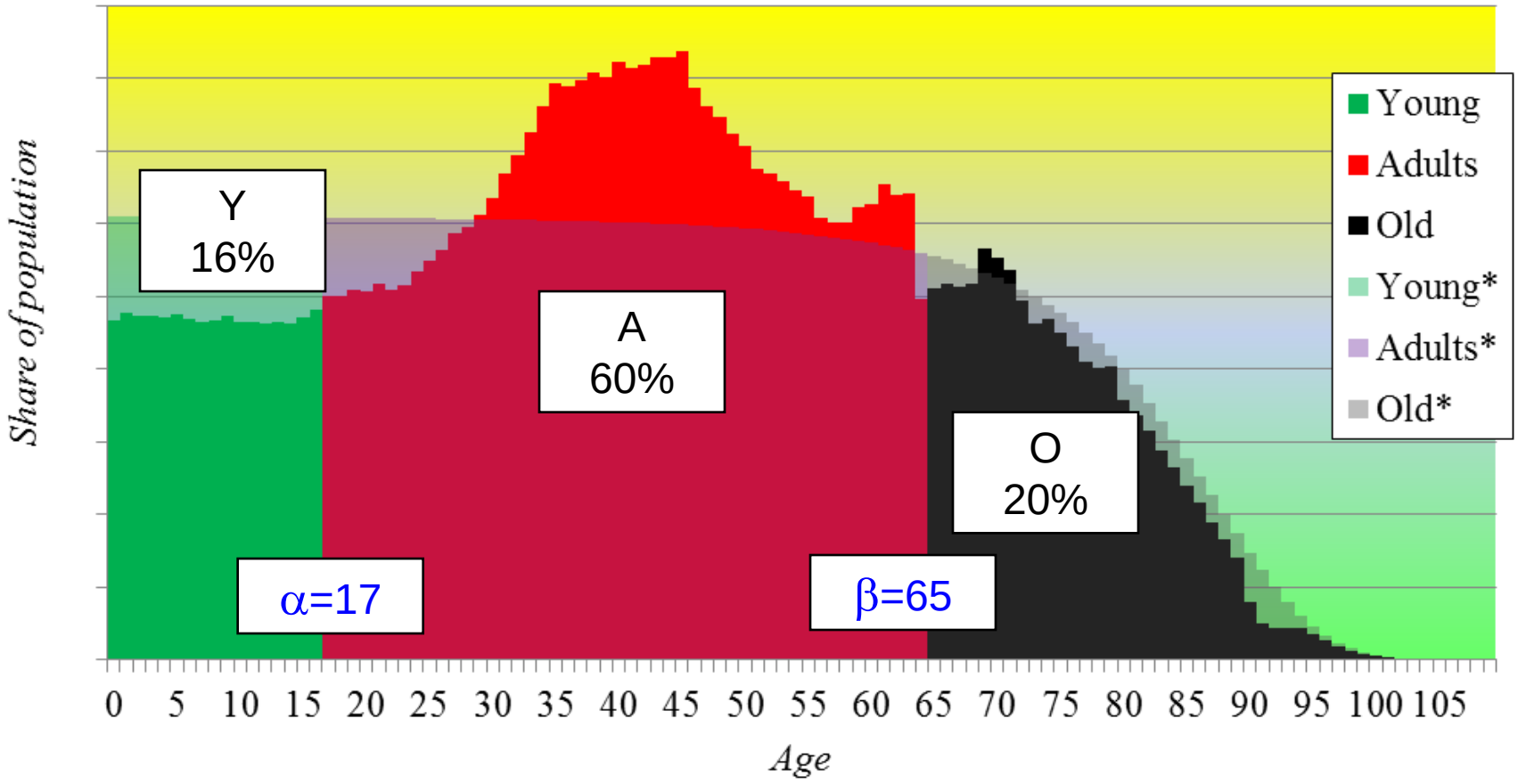
Demographic choices (1)
From the life table ...



Demographic choices (2): ... to life shares (*) and threshold ages...



Demographic choices (3): ... to actual shares



Economic choices:
Contribution rate c and average benefits (B, P)

If, relative to net adult wage,

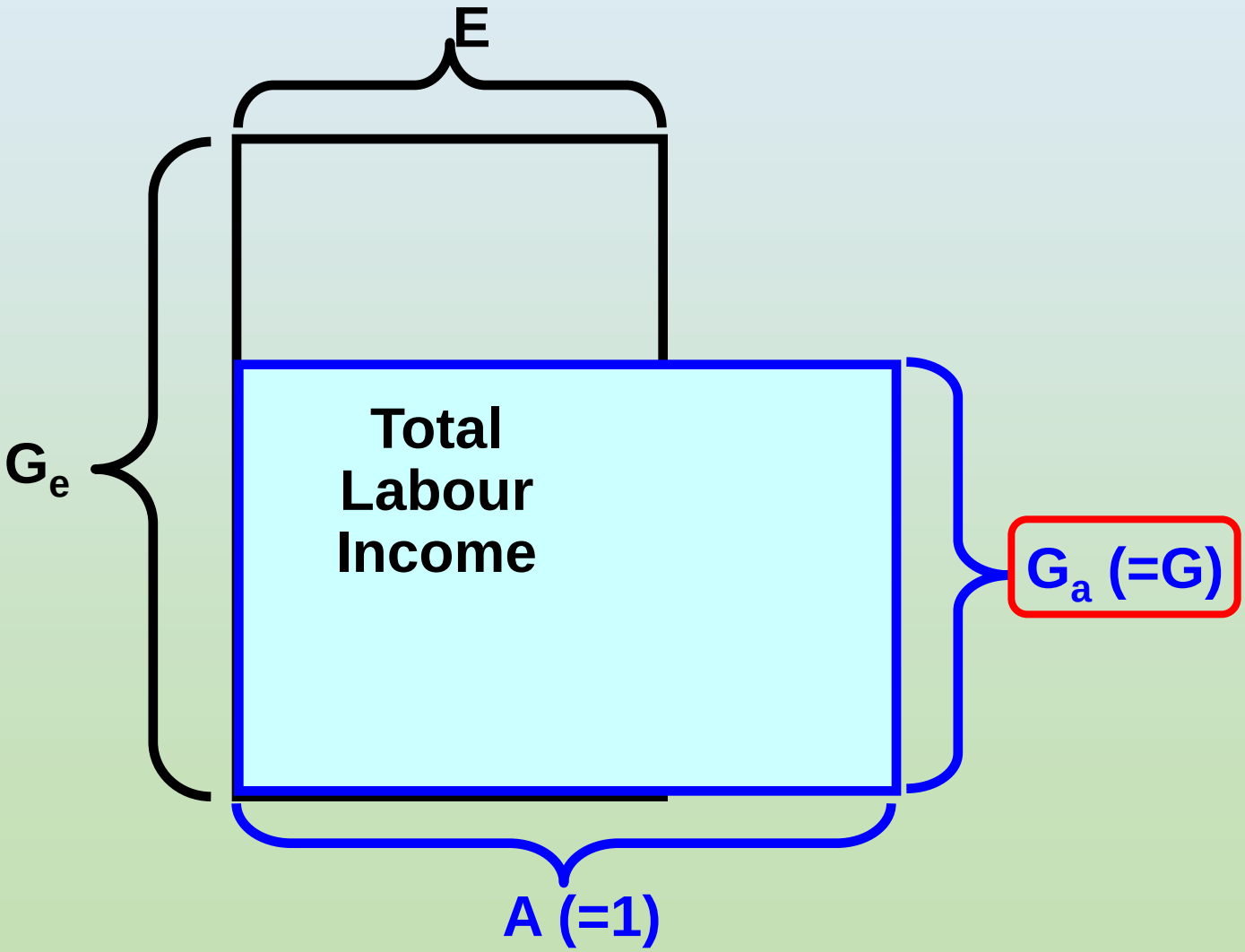
π = pension benefit and

χ = child benefit

$$c = \frac{O\pi + Y\chi}{A + O\pi + Y\chi}$$

=> $G=G_e\,(E/A)$ Adults' Gross wage (€)

What [on earth] is G (Gross wage of the adults)?



Economic choices:
Contribution rate c and average benefits (B, P)

If, relative to net adult wage,

π = pension benefit and

χ = child benefit

$$c = \frac{O\pi + Y\chi}{A + O\pi + Y\chi}$$

=> G = G_e(E/A) Adults' Gross wage (€)

W = G (1-c) Adults' Net wage (€)

B = W χ Child benefits (€)

P = W π Pension benefits (€)

Economic choices:

Individual pension benefits (P_i)

$$P_i = (1-Q)P + QP(K_i/K)$$

where (K_i/K) = Cumulative contributions of "i" relative to average

Minimum pension $P_{min} = (1-Q)P$

If $Q=1$, $P_i = P(C_i/C)$ (Bismarck: actuarial equity)

If $Q=0$, $P_i = P$ (Beveridge: all pensions are equal).

Individual pension benefits P_i are defined as deviation from the mean P. This is why budget balance is always granted. No matter what.

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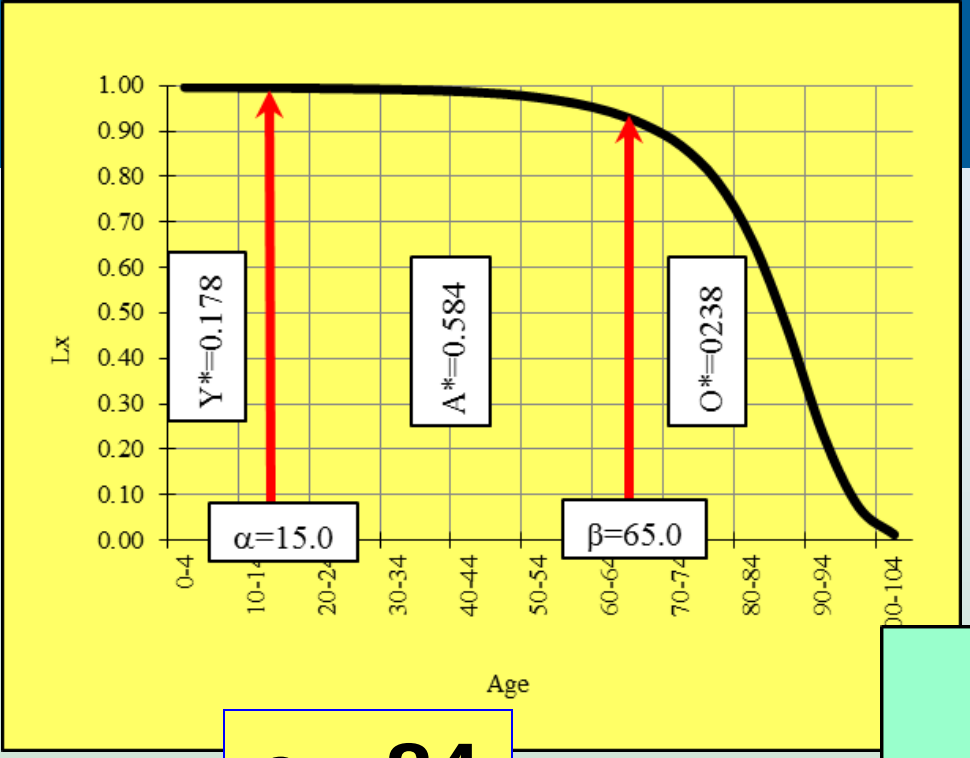
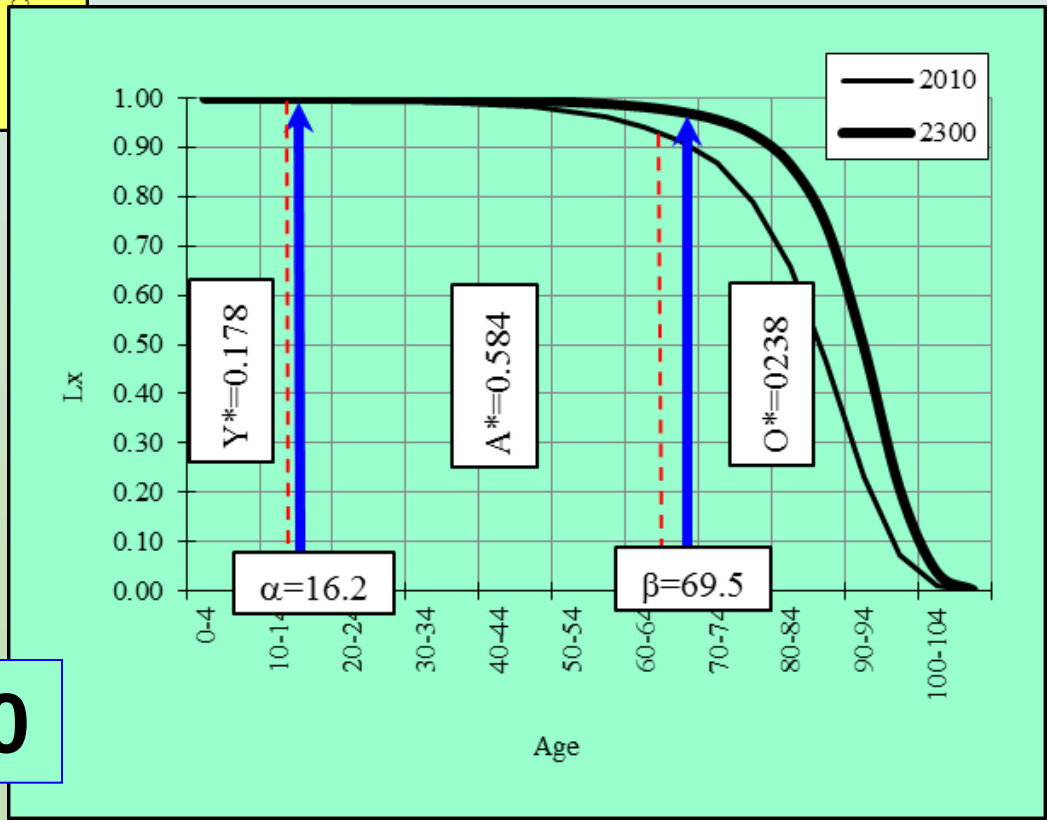
Sensitivity analysis (1): longer life



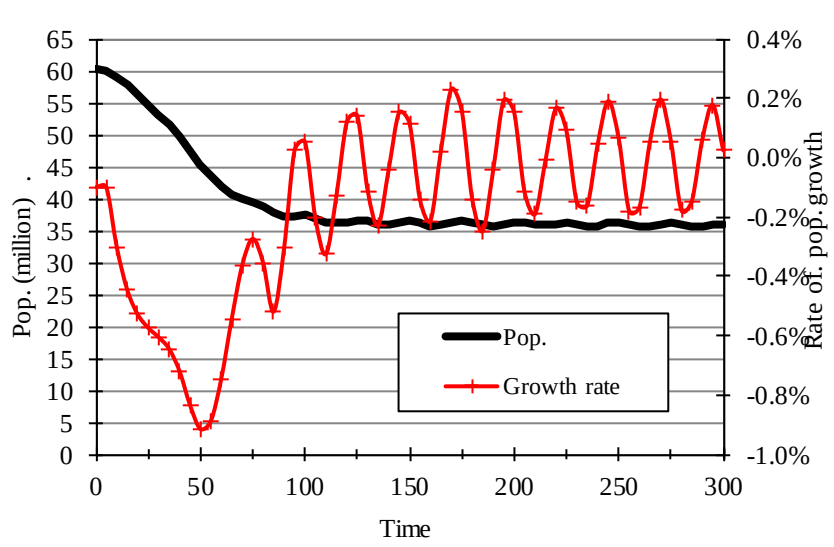
e_0=84

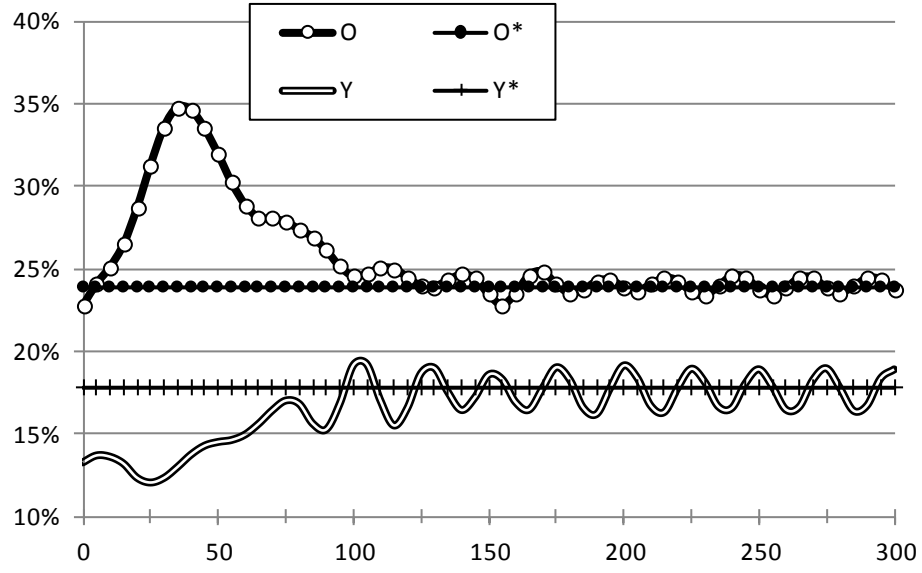
NB **NO forecasts** are ever needed: **AIPS** uses only observed values

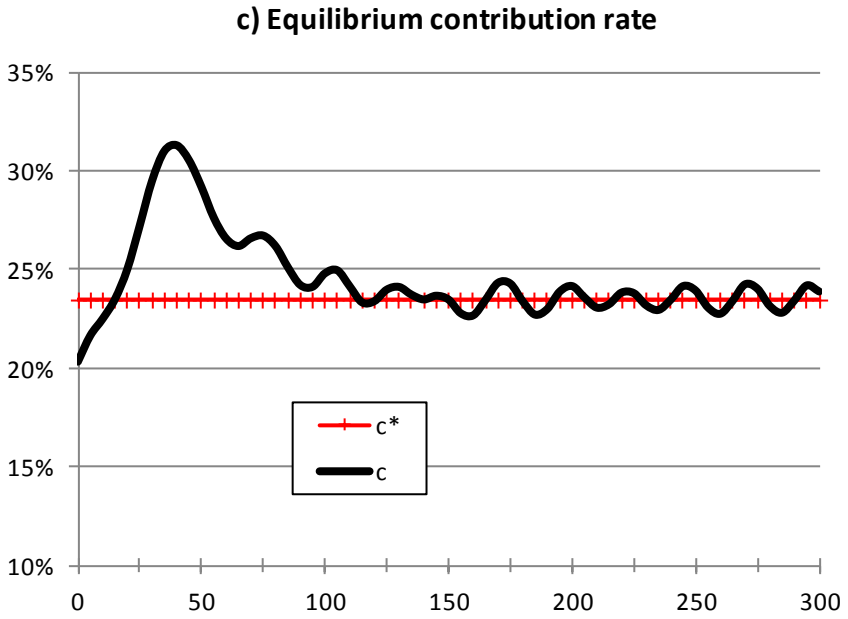


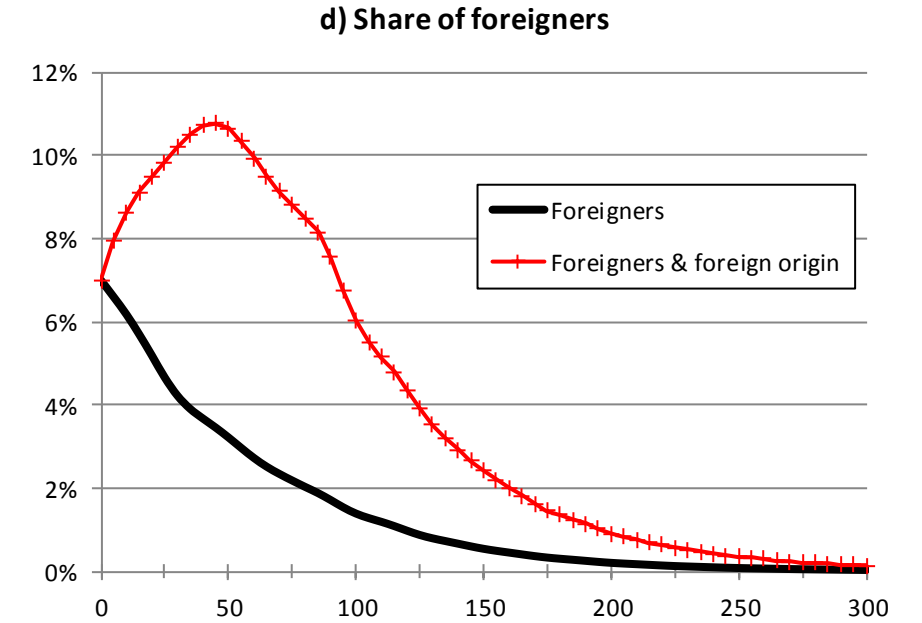
e_0=90

Sensitivity analysis (2) – No immigration









Sensitivity analysis (3) – Declining immigration

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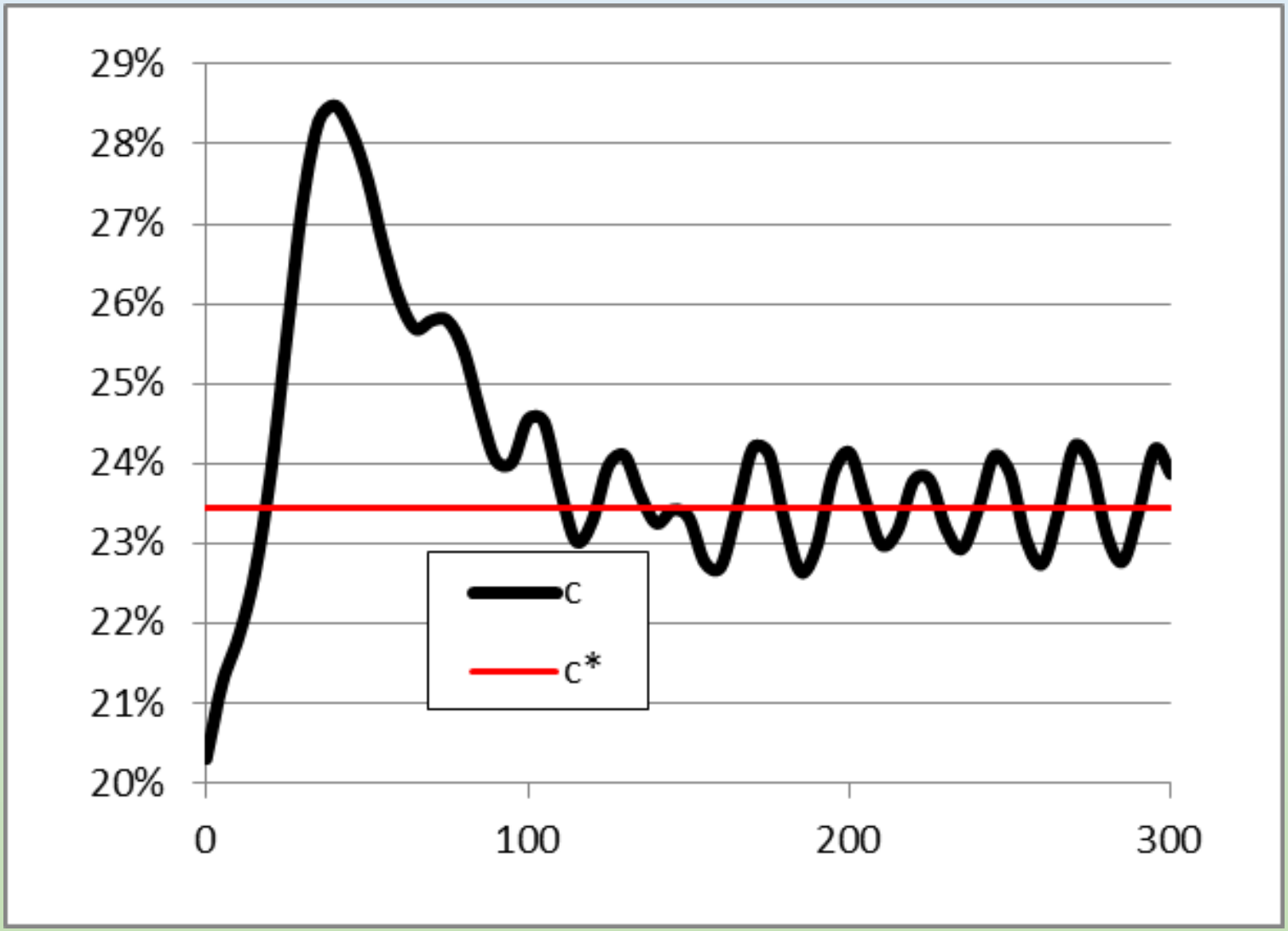
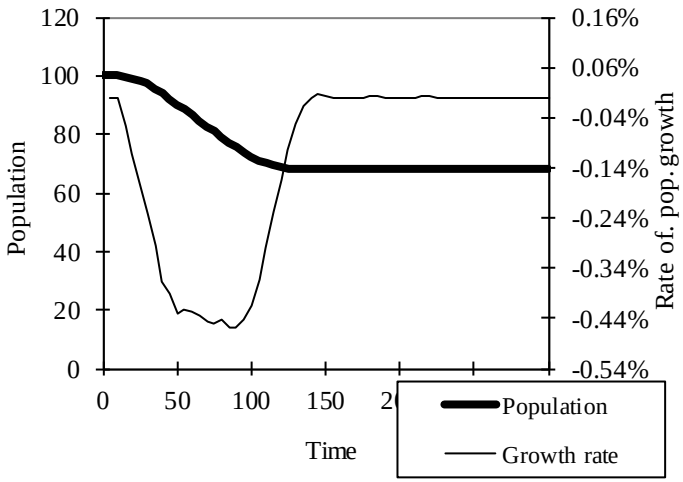
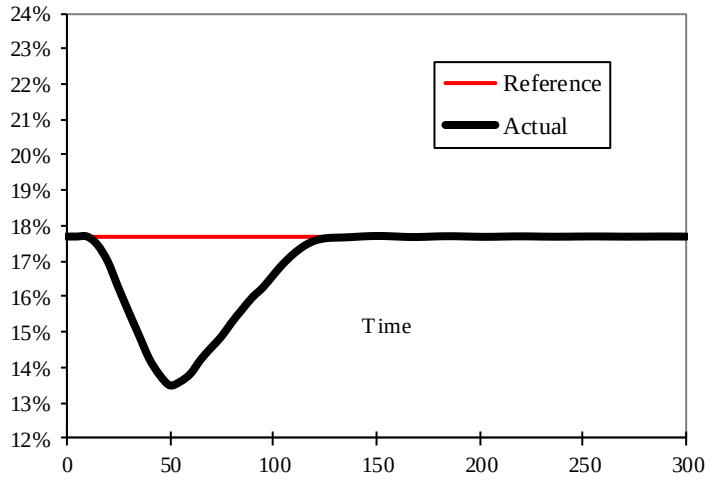


Actual and equilibrium contribution rate, Italy. Simulations for the next 300 years, declining migration

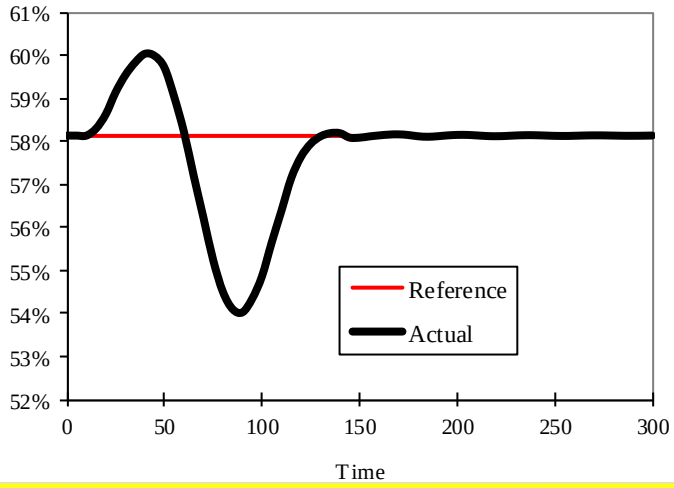
c) Population: level and rate of increase



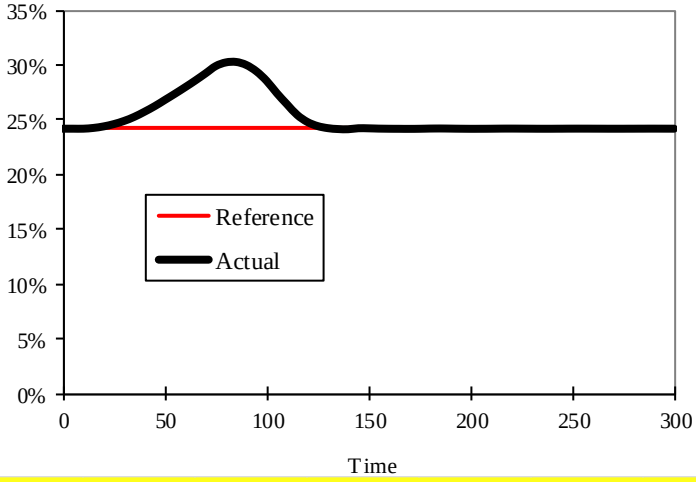
d) Proportion young



e) Proportion adult



f) Proportion old



Another simulation. 300 years. e_0=84.4 TFR 2.1 to 1.5 to 2.1. No migration. Pop. down by 30% in 100 years

Figure 3 - Payroll contribution rate (%)

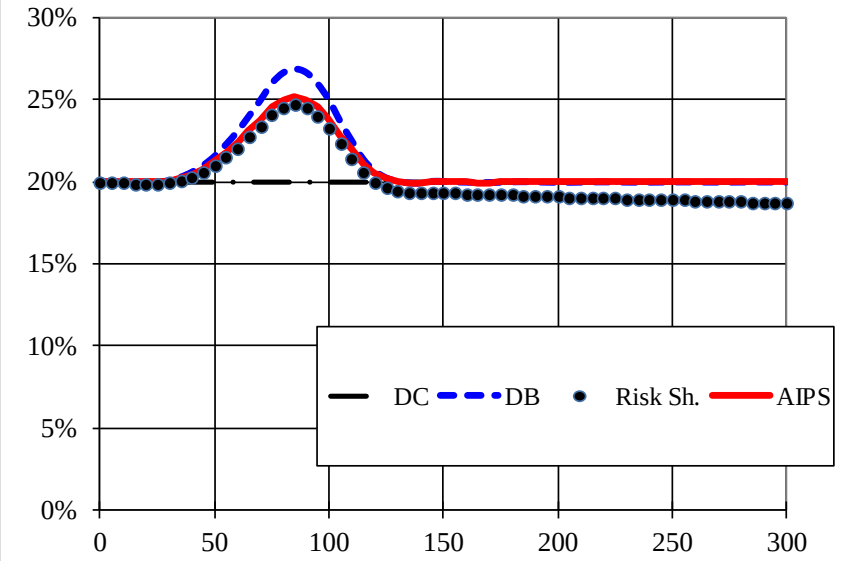


Figure 4 - Cross-sectional "equity"

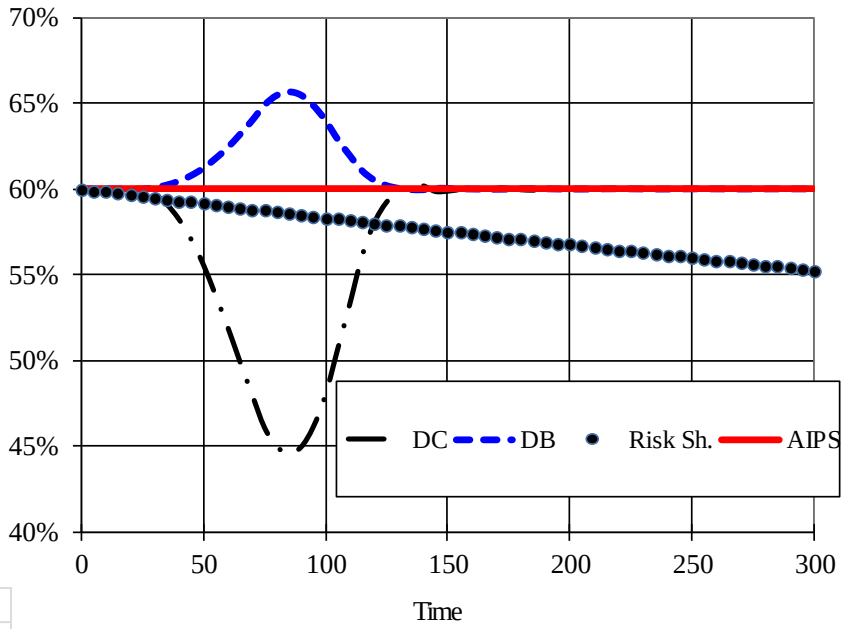
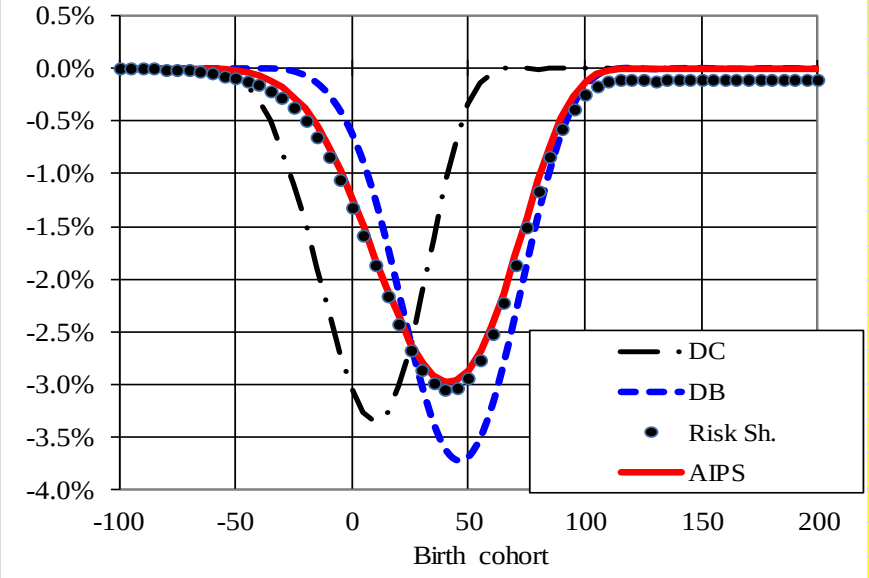


Figure 5 - Intergenerational equity
(if negative, the cohorts considered lose resources)



Another simulation. 300 years. e_0=84.4. TFR 2.1 to 1.5 to 2.1. No migration. Pop, down by 30% in 100 years. Employment rate (E/A) up from 70% to 76%

Comparing AIPS with DC, DB and Risk Sharing

Another look at benefits (not only in AIPS)

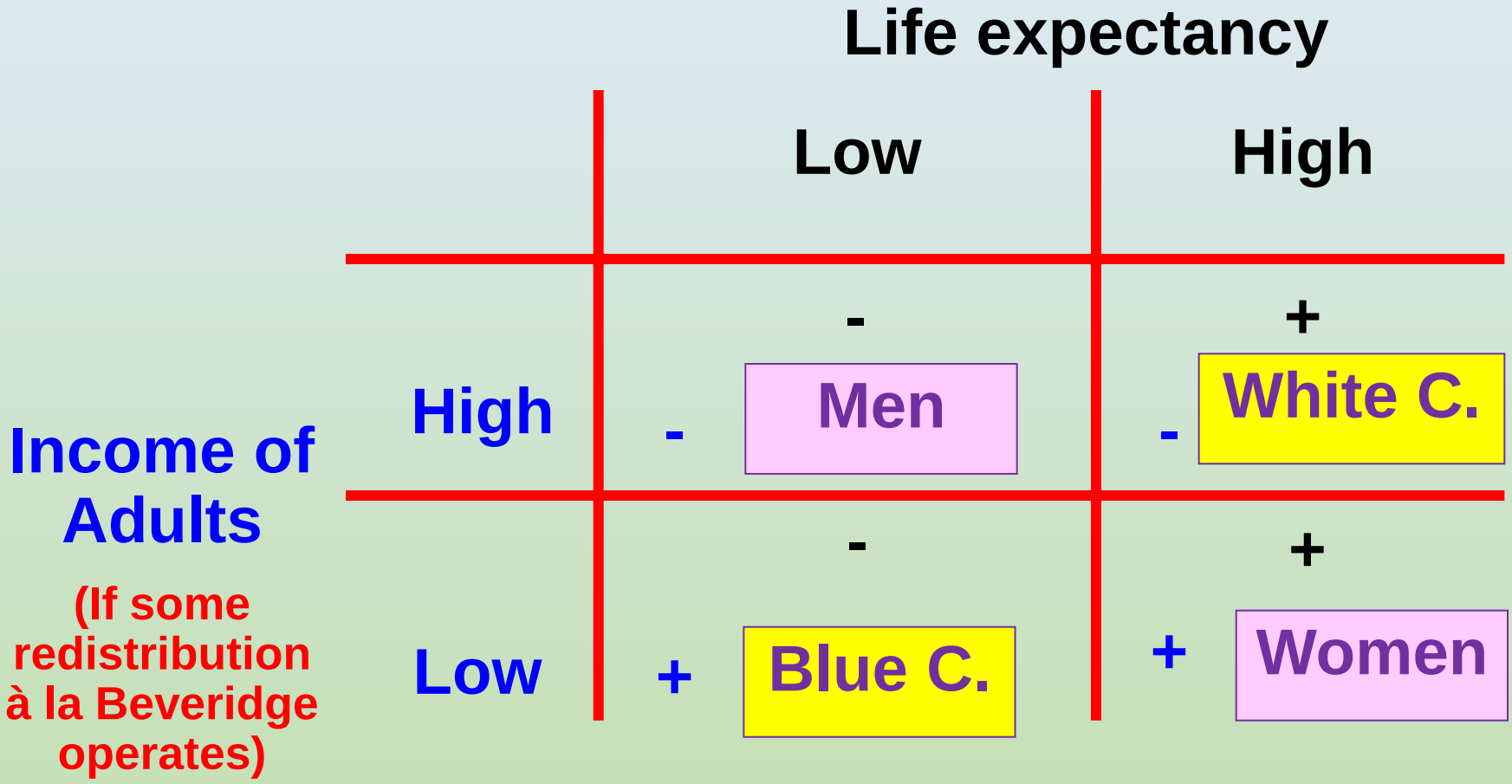
Beveridge **Bismarck**

$$\text{Benefits} = B_{\text{Child benefits}} + P_{\text{Beveridge}} + P_{\text{Bismarck}}$$

(AIPS parameters)	χ	(1-Q)	Q

Let us assume that at least some (Beveridgean) redistribution operates ...

Who gains and who loses in the pension game?



By how much (1)? White vs. Blue collars

Hard to say, in general. Examples:

with $\mathbf{e_0(B)=78.8}$ and $\mathbf{e_0(W)=84.4}$ (diff.=5.6 years)

with $\mathbf{W_a(W)}$ twice as high as $\mathbf{W_a(B)}$ **(α=20; β=65)**

with χ=0% and **Q**=1 (no Beveridge!)

Blue collars lose about 15% of their contributions, White collars gain about 7% of theirs.

But already with χ=10% and **Q**=0.9 (**mild Beveridge!**) Blue and White collars get even.

By how much (2)? Men vs. Women

Very clear conclusions. Examples:

with $\mathbf{e_0(M)=78.8}$ and $\mathbf{e_0(W)=84.4}$ (diff.=5.6 years)

with $\mathbf{W_a(M)}$ twice as high as $\mathbf{W_a(W)}$ $\mathbf{(\alpha=20;\ \beta=65)}$

with χ=0% and **Q**=1 (no Beveridge!)

Men lose about 8% of their contributions,

Women gain about 16% of theirs.

And with χ=10% and **Q**=0.9 (**mild Beveridge!**) things are markedly worse: Men lose about 13% Women gain 25%.

And yet ...

And yet I am personally in favour of a **unique (AIPS) pension system** for any given country, even if women gain (a lot) and man lose (a lot).

Not because women must be compensated for other “disadvantages” (surely not through the pension system), but because having something in common is symbolically **very** important. Besides, the imbalance will get lower when women “produce” more for the market (more employment and higher pay).

So, to conclude ...

- Longer life spans are frequently a problem for pensions systems. Not for **AIPS**, though, where the best solution is a shift of both threshold ages (α and β), such that life **shares** remain unchanged.
- Especially with improving health, retirement should never be mandatory: its "reference" age (β) should closely follow $\mathbf{e_0}$, and increase without discontinuities.
- Differential survival is an issue in all pension systems: short lived subgroups transfer resources to others. However, unless there is a genetic basis for this, the remedy should **never** go through the pension system (which an attempt at transferring costs to the next generation). A taint of Beveridgean redistribution in the system will normally suffice to offset the bias against lower classes.
- Gender issues ... remain an issue

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The End

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