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# Pension issues when people care about today

*The micro- and macroeconomic implications when many households are time-inconsistent due to myopia or procrastination*

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**Waterloo and Kent Project on Demography and Asset Prices,  
Canterbury, 17 July 2017**

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# Outline

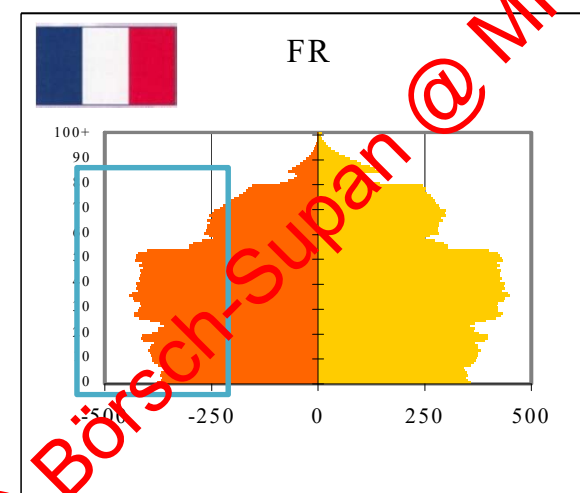
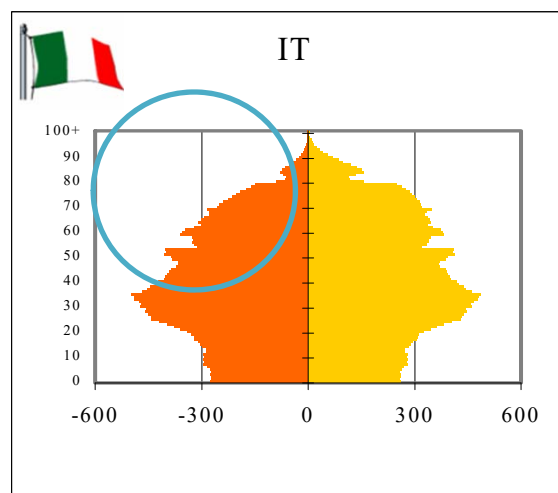
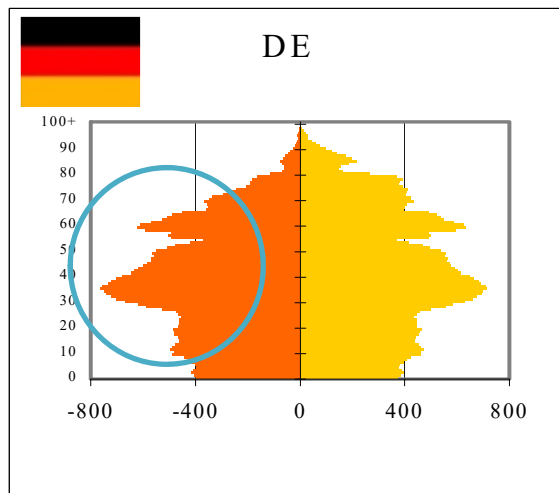
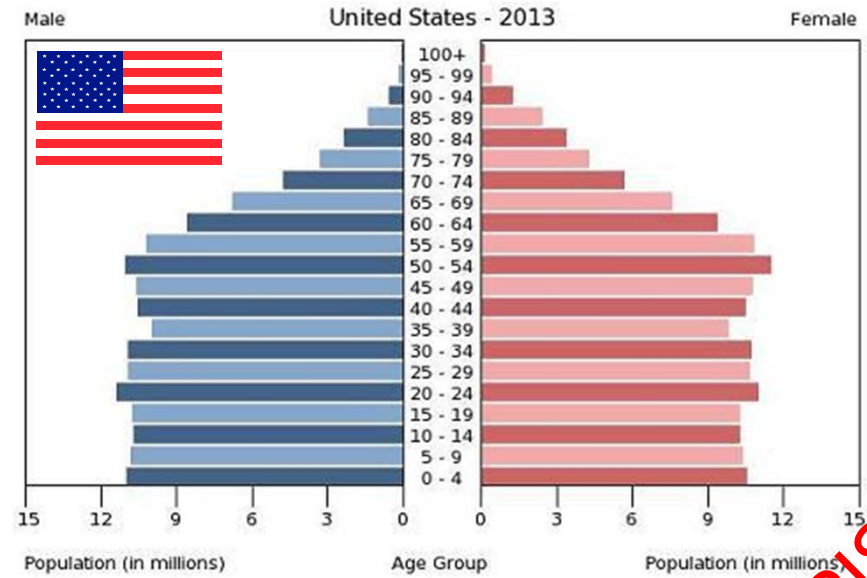
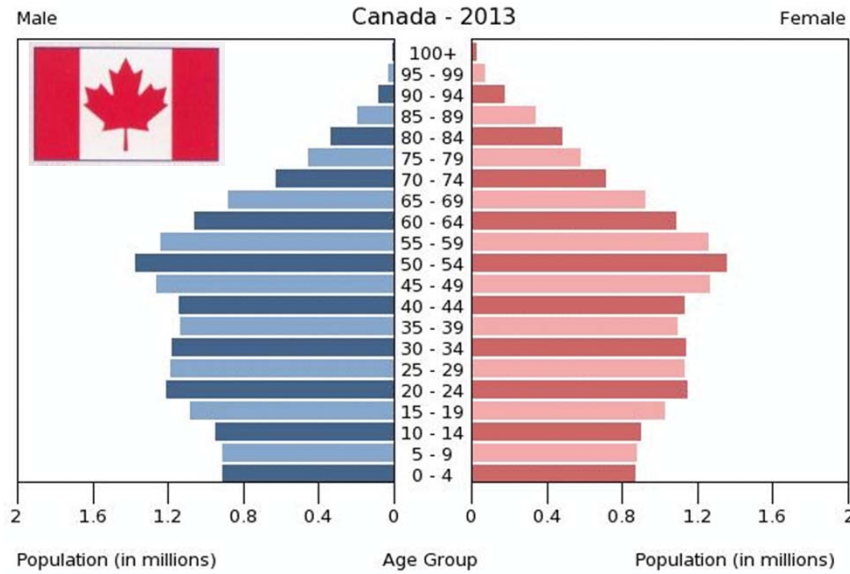
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- 2. Procrastination** – myopia – time inconsistency – hyperbolic discounting:  
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- 5. Conclusions**

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# International differences

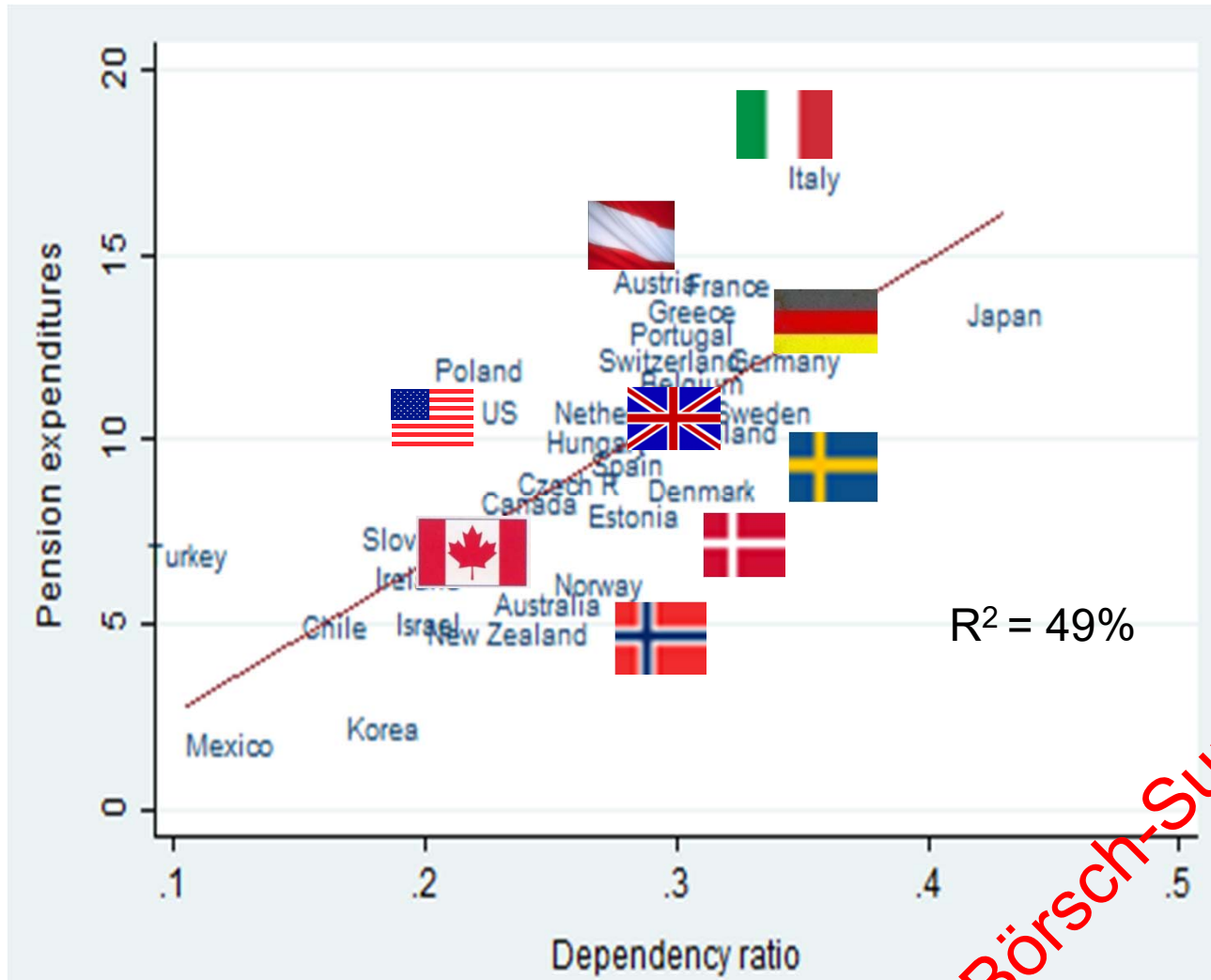


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# Demography is not all:



Worse



Design



Better

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Source: OECD





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# Pension reforms in response


## 1. Prevent poverty

*Means-tested base pension*

e.g.: 

## 2. Solve sustainability issues for the „normal“ worker

### *a. Pay-as-you-go pillar*

Retirement age	Replacement rate
Life expectancy	System dependency
	

NDC 

### *b. Fully-funded pillar*

## *Saving for old age*

Mandatory (occupational, state)      Voluntary (individual)



„Nudging“ 

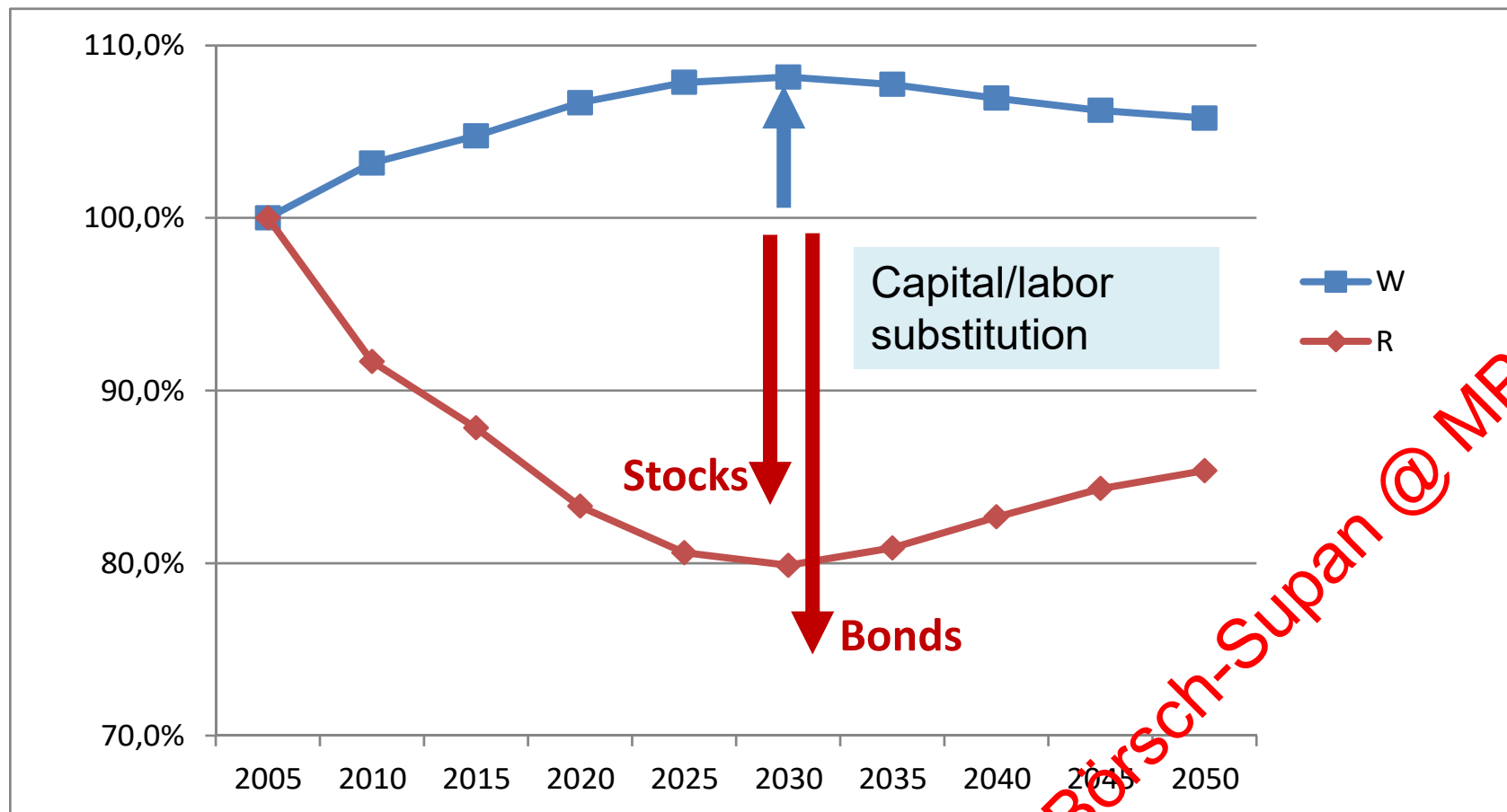
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# Macroeconomic adaptation 1: Domestic production

## Price signals: Wages and capital returns



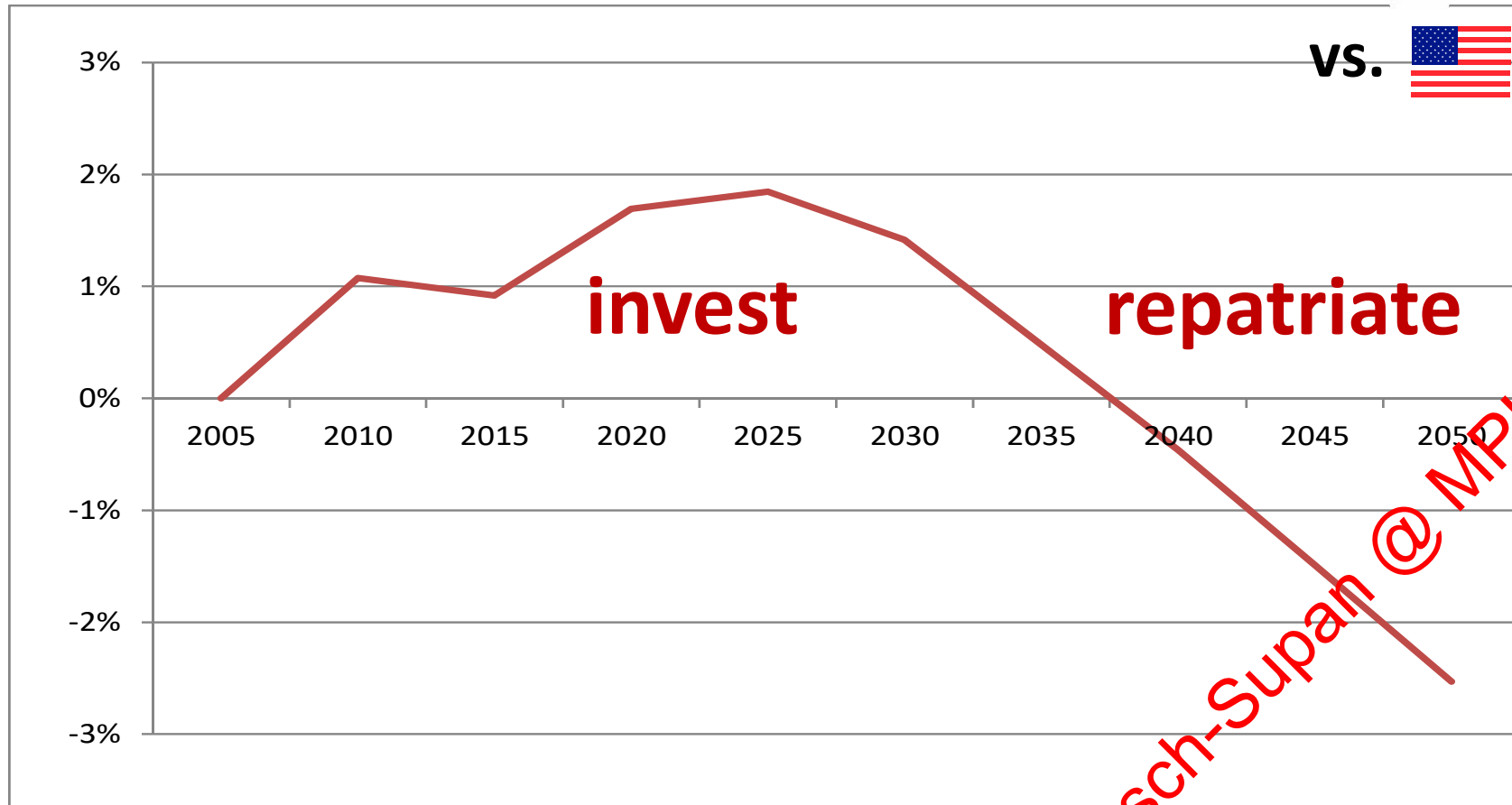
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# Macroeconomic adaptation 2: International diversification

## International capital flows [%GDP]



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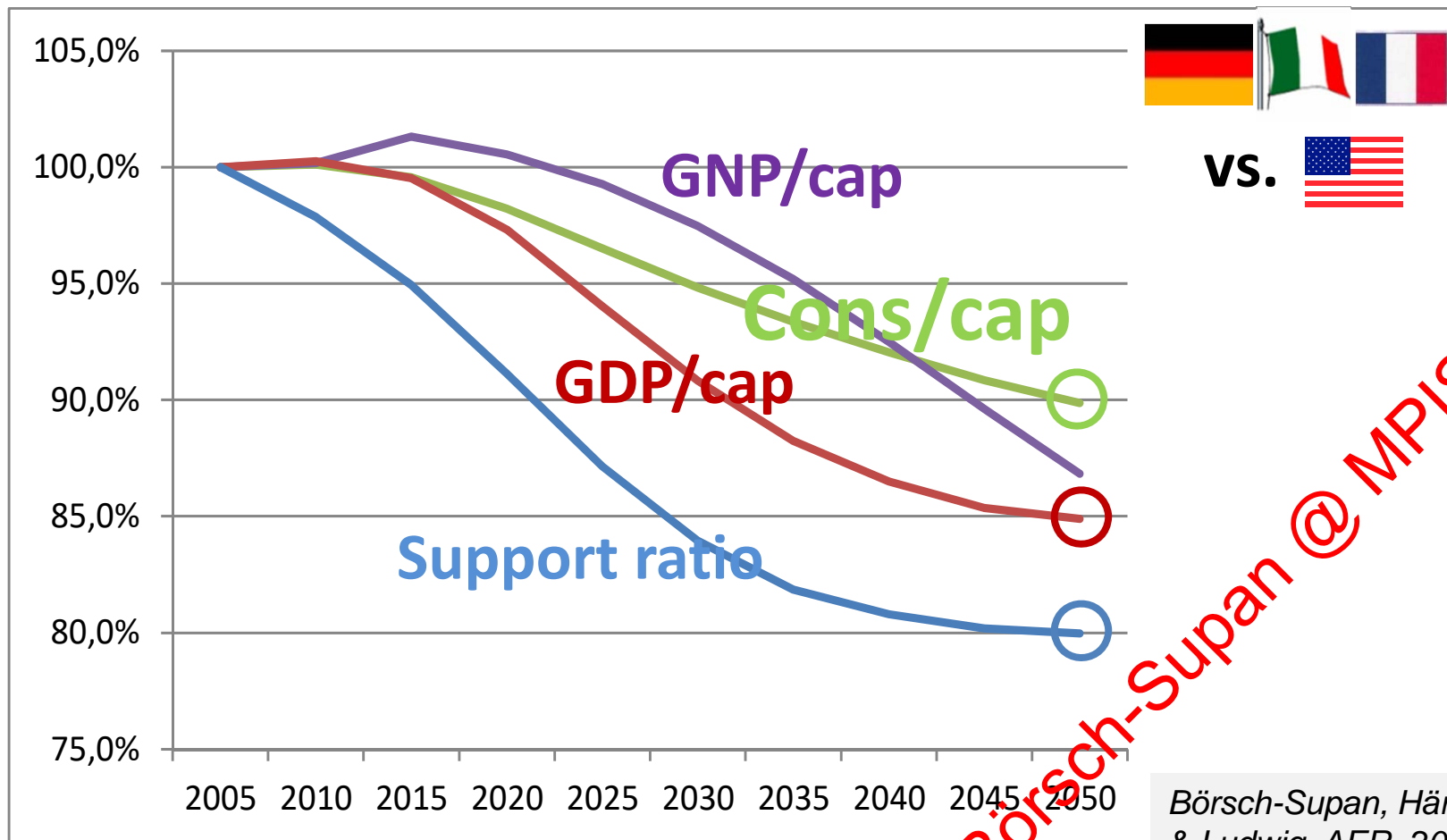




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# Macroeconomic adaptation: Endogenous vs. reforms

## Material living standards (2005=100%, detrended)



Börsch-Supan, Härtl & Ludwig, AER, 2014

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# Key (old) questions

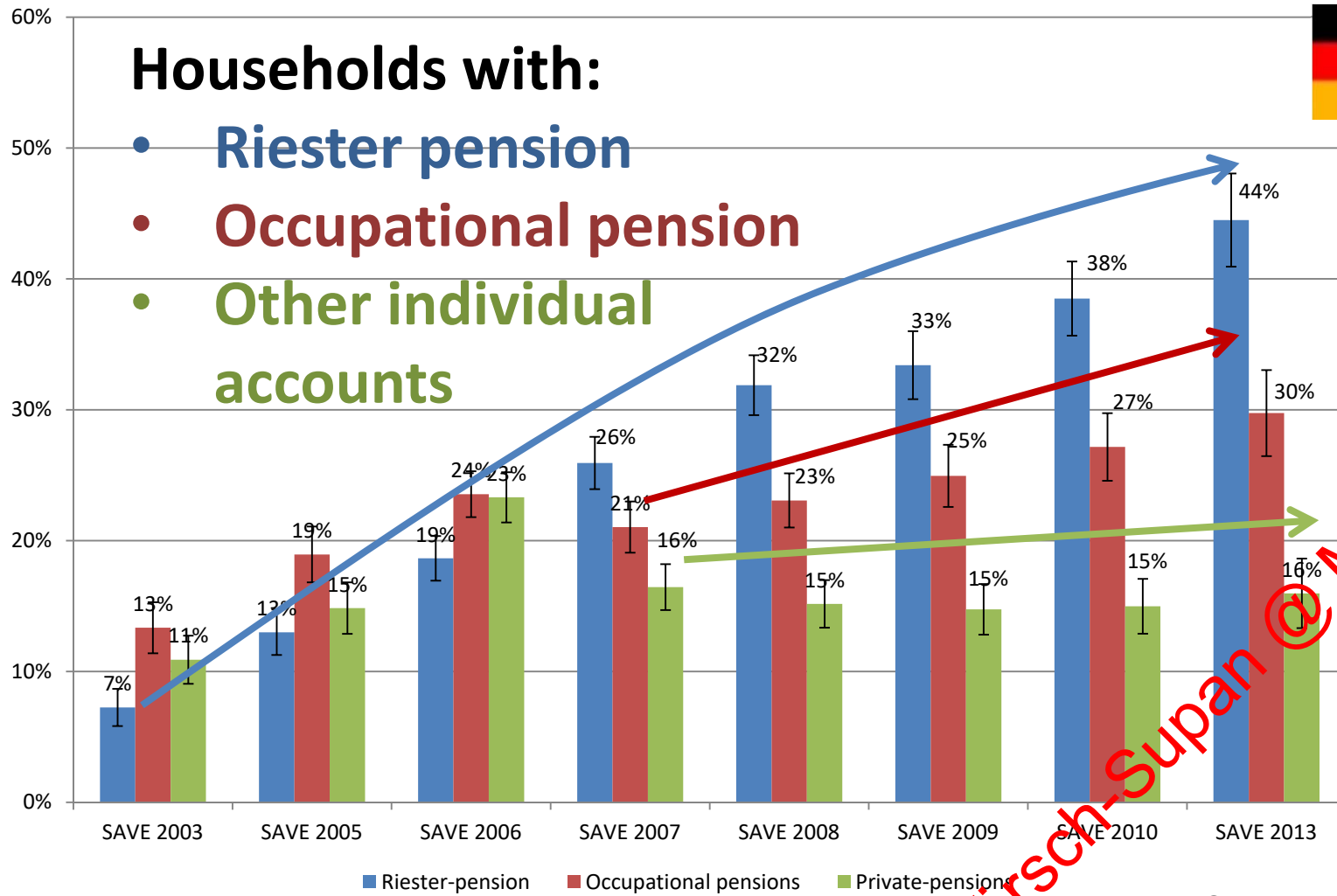
- **On which basis (=behavioral assumptions) do we make such policy decisions?**
- **If we use different behavioral assumptions, how do our traditional recommendations change:**
  - **PAYG vs. FF? DB vs. DC? If mixture of systems: which weights?**
  - **How to cope with heterogeneity?**
  - **Macroeconomic implications?**
  - **Domestic vs. international diversification?**
  - **Will it work (=do the people do what „we“ think is „best“ for them)?**

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# Voluntary multipillar system



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Source: Börsch-Supan et al 2015

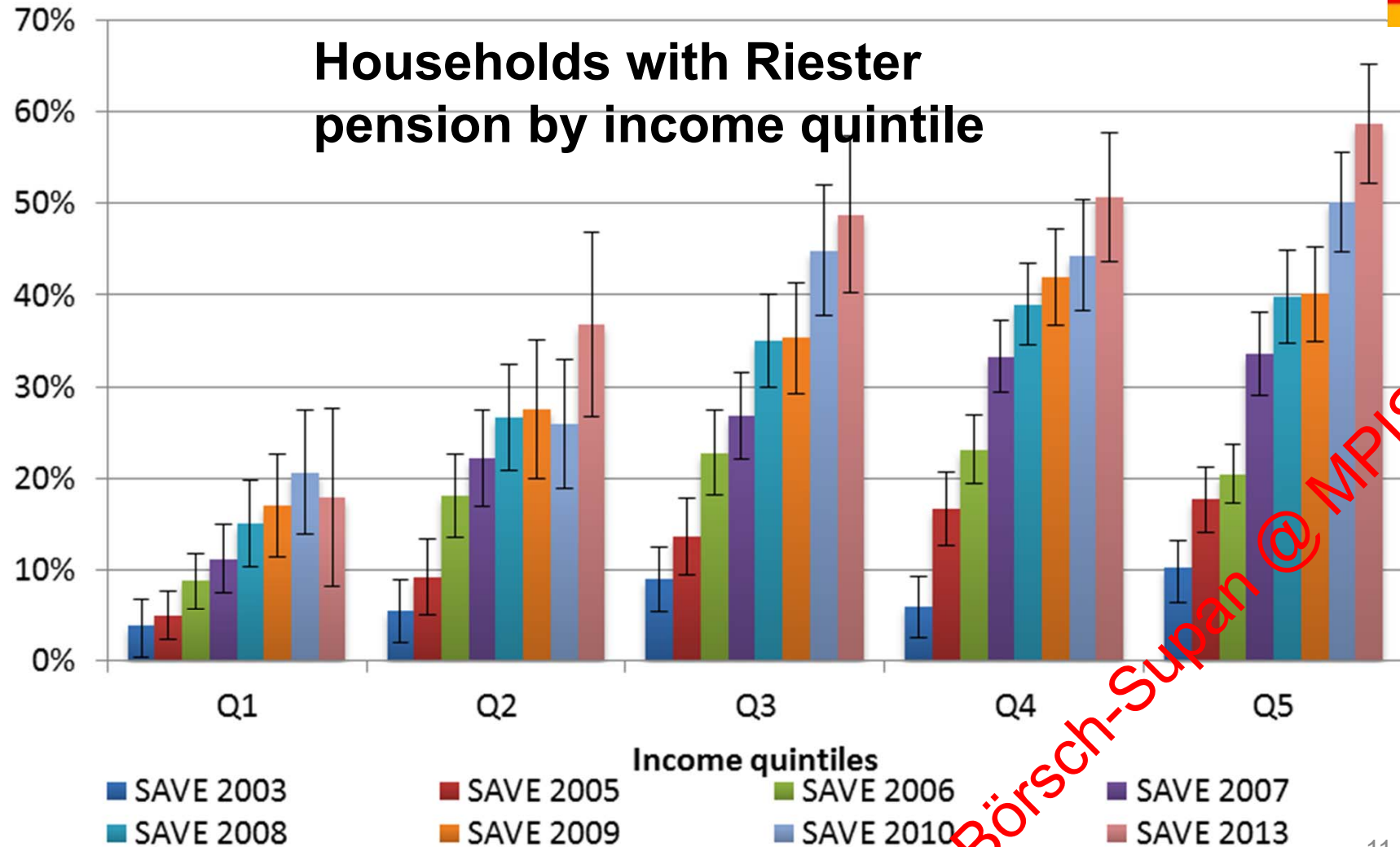


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# Undersaving in all quintiles!



## Households with Riester pension by income quintile



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# Saving for old age

## Do people undersave for old age?

- US: NBER Poterba et al., 2012; Repetto et al., 1998; Madrian and Shea, 2001; Stanford Center on Longevity, 2016
- EU “Pension gap”: Börsch-Supan et al. (2016) for DE; Knoef et al. (2016) for NL; Crawford and O’Dea (2012) for the UK

## Do people oversave for old age?

- Scholz et al. (2006): 80% save like augmented life-cycle model
- Health-related decline in consumption: Börsch-Supan and Stahl (1992)
- No dissaving in old age: Börsch-Supan et al. (2003) for DE, Brugiavini and Padula (2001) for IT and Kitamura et al. (2003) for JP

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1. **Background:** Aging and the general strategy of pension reforms in Europe, including more saving for old-age
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# Procrastination

- Example 1: Eating healthier, doing more exercises
- Example 2: Writing your dissertation chapter/paper...
- **Example 3: Saving for old age**
- **Myopia**
- **Time inconsistency: „Hyperbolic discounting“**
  - Richard Strotz (1956), Phelps and Pollak (1968)
  - Thaler and Shefrin (1981)
  - Laibson, Rabin, Madrian and Shea....

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# Behavior

Time consistent:

$$\max \sum_{j=0}^{\infty} \beta^j \sigma_{t,j} u(c_{t+j,j}, 1 - l_{t+j,j} - \xi_j) \quad (\text{with labor supply})$$

Myopic:

$$\max_c \left\{ u(c_{t,0}) + \sum_{j=1}^J \delta \beta^j \sigma_{t+j,j} u(c_{t+j,j}) \right\} \quad \delta = 0$$

Procrastinating:

$$\max \left\{ u(c_j) + \delta \beta \sigma_{j+1} \hat{V}(z_{j+1}) \right\} \quad (\text{Current self})$$

$$\max \left\{ u(\hat{c}_{j+1}) + \hat{\delta} \beta \sigma_{j+2} \hat{V}(z_{j+2}) \right\} \quad (\text{Future self})$$

*naive/sophisticated*

$$V(z_j) = u(c_j) + \beta \sigma_{j+1} V(z_{j+1}). \quad (\text{Welfare evaluation})$$

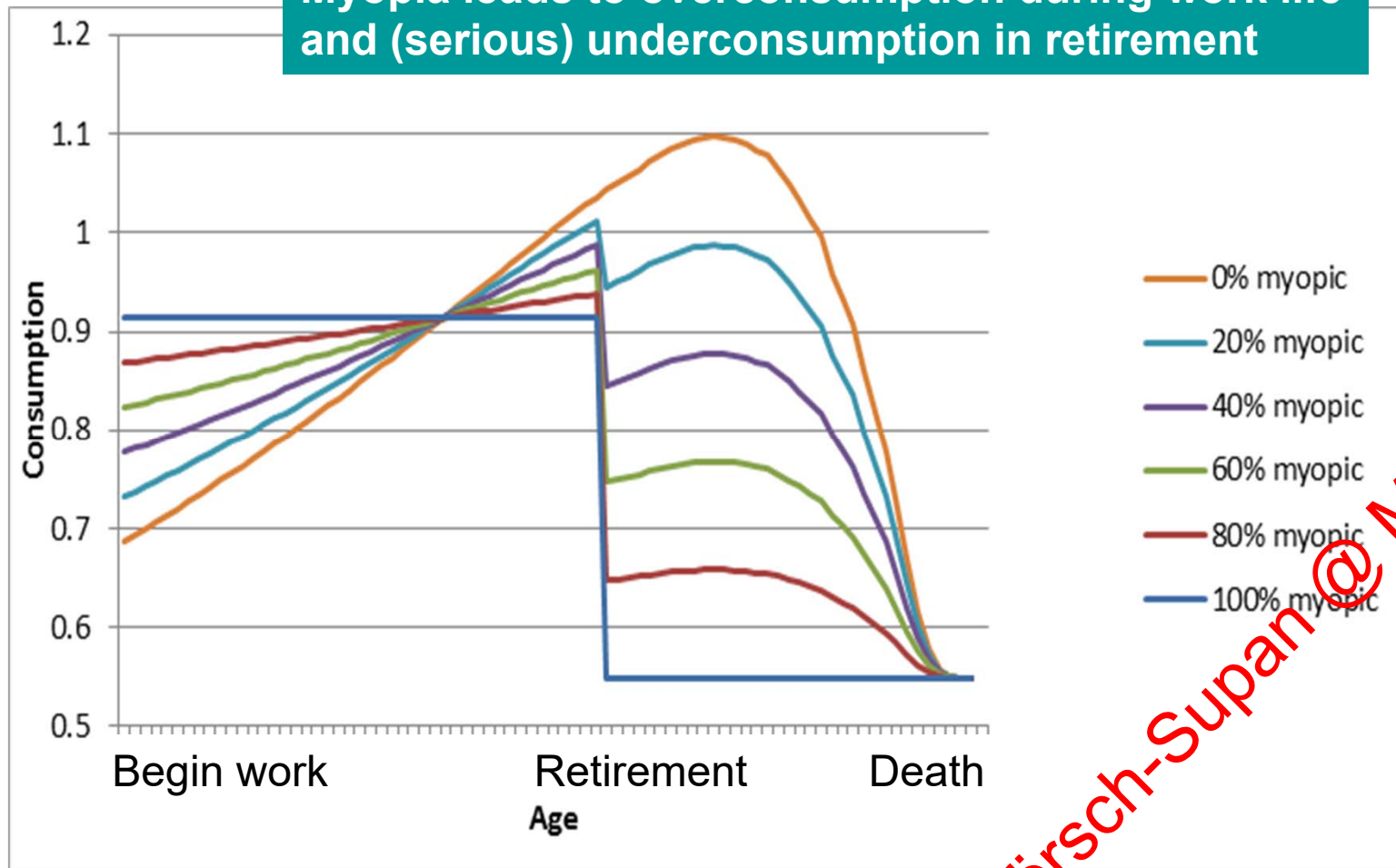
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# Myopia: Consumption

Myopia leads to overconsumption during work life and (serious) underconsumption in retirement



Source: Börsch-Supan/Härtl/Leite 2017

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# Myopia: Welfare



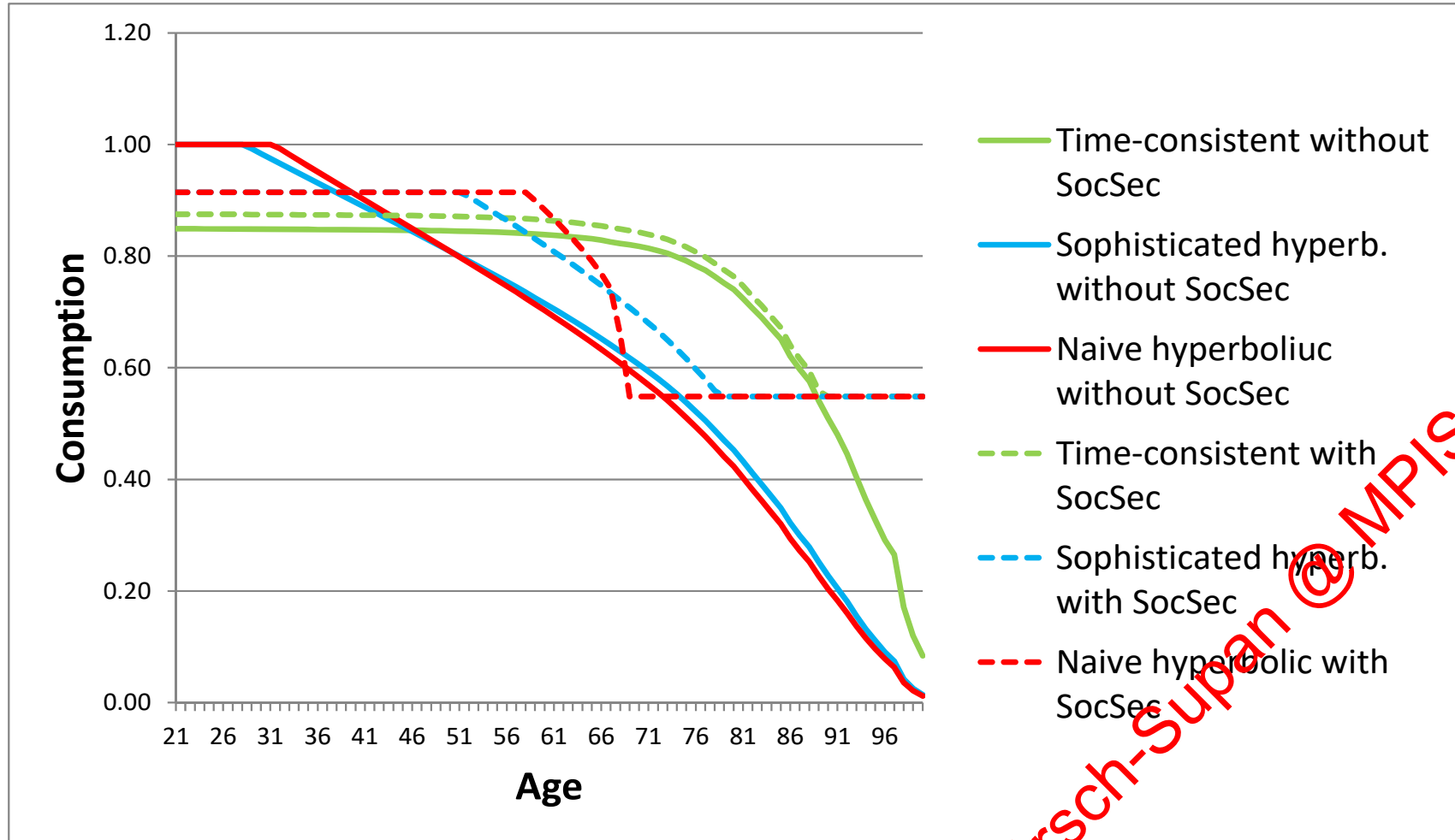
Fraction of myopic households	Saving only No PAYG $r=3\%$	PAYG-DB pension system with IRR=		
		1%	2%	3%
100%	-100.00%	-8.27%	-3.61%	Baseline
80%	-34.67%	-8.26%	-3.58%	Baseline
60%	-14.94%	-8.28%	-3.61%	Baseline
40%	-7.14%	-8.26%	-3.59%	Baseline
20%	-4.14%	-8.28%	-3.60%	Baseline
0%	-3.49%	-8.28%	-3.63%	Baseline

1. A basic PAYG system is a necessity for totally myopic people
2. Even in a strongly aging country, PAYG better than FUNDED if share of myopic people large
3. This switches when share of myopic people becomes small
4. Unless rate of return  $> 3\%$ , PAYG better even for time consistent people (b/o annuitization)



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# Procrastination: Consumption



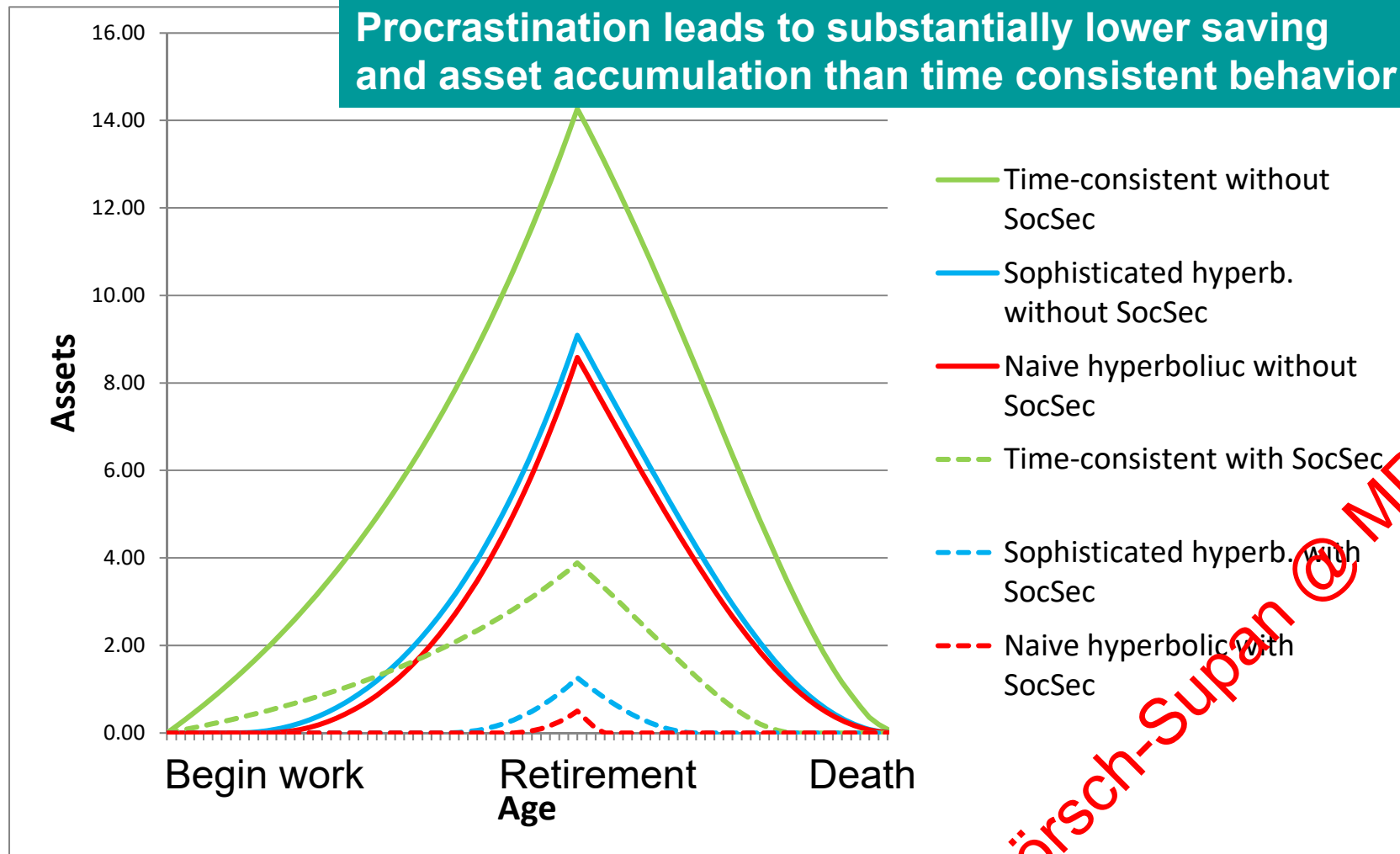
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# Procrastination: Assets

Procrastination leads to substantially lower saving and asset accumulation than time consistent behavior



Source: Börsch-Supan/Härtl/Leite 2017

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# Procrastination: Welfare



	<u>Saving only</u> r=3%	<u>PAYG-DB pension system with IRR=</u>			
		1%	2%	2.5%	3%
<b>Full Model – Present bias high = 0.1</b>					
<u>Naive hyperbolic</u>	-97.86%	-8.29%	-3.61%	-1.70%	Baseline
<u>Sophisticated hyp.</u>	-52.42%	-8.28%	-3.62%	-1.68%	Baseline
<u>Time consistent</u>	-3.44%	-8.26%	-3.60%	-1.68%	Baseline
<b>Full Model – Present bias = 0.6</b>					
<u>Naive hyperbolic</u>	-8.81%	-8.28%	-3.60%	-1.68%	Baseline
<u>Sophisticated hyp.</u>	-8.03%	-8.28%	-3.59%	-1.69%	Baseline
<u>Time consistent</u>	-3.44%	-8.26%	-3.60%	-1.68%	Baseline
<b>Full Model – Present bias low = 0.85</b>					
<u>Naive hyperbolic</u>	-3.61%	-8.27%	-3.58%	-1.67%	Baseline
<u>Sophisticated hyp.</u>	-3.75%	-8.28%	-3.62%	-1.70%	Baseline
<u>Time consistent</u>	-3.44%	-8.26%	-3.60%	-1.68%	Baseline

Parameters: rho=r=3%, theta=2, replacement rate=60%.

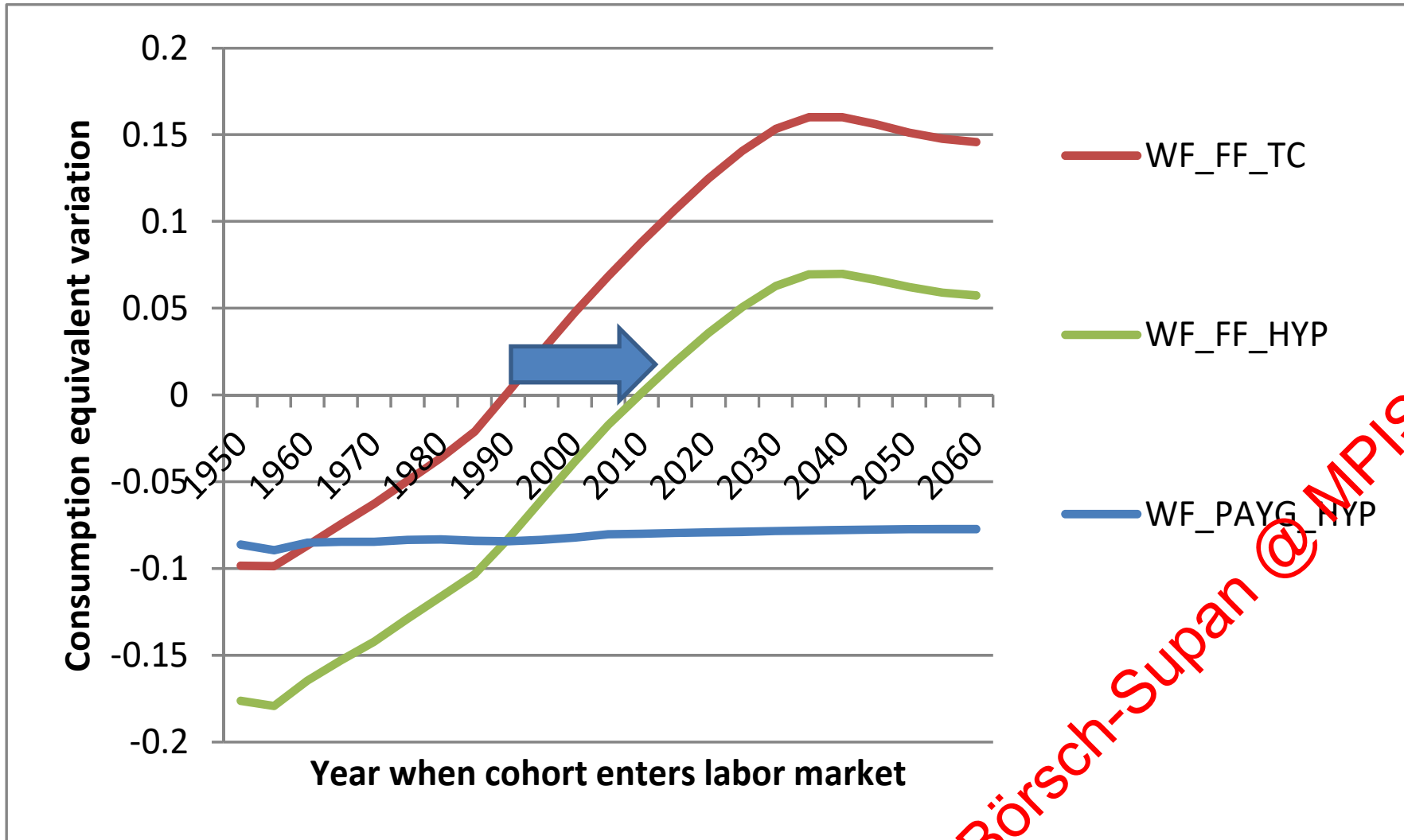
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# Generational view: welfare



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# Saving regret

- **Saving regret: In hindsight, regret over not having sufficiently saved (“I wish I had saved more”)**
- **Saving regret not a sufficient, but a necessary evidence for the need of nudging/paternalism**
- **Possible other mechanisms underlying saving regret:**
  - unanticipated shocks on the individual level (e.g. unemployment, health, divorce)
  - shocks at the macro level (e.g. the financial crisis)
  - knowledge (e.g. information about social security and pension benefits)
  - computational ability (e.g. cognition and numeracy).

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# RAND American Life Panel

**N=1,725 completed the Internet survey**

**Age 60+**, hence more females than males (53.7% vs 46.3%)

60% married

**Minorities:** 6.4% Hispanic, 6.7% black, <1% Asian

**Sample more highly educated than general population:**

16% HS or less; 36.8% some college or degree;

23% BA or BS; 24% MA to PhD

**Experienced respondents:** less “cheap talk” or social desirability

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# Key question

## Hindsight saving regret

Again please think back to when you were around 45 years old. Suppose you could re-do your spending and saving from then to now, would you...

[Version a:]

- Save more over the years?
- Save about the same over the years?
- Save less over the years?

[Version b:]

- Spend less and save over over the years?
- Spend and save about the same over the years?
- Spend more and save less over the years?

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# Prevalence

Wish to have...	Unframed		Framed	
	Spontaneous	Of those: revised	Spontaneous	Of those: revised
...saved more	65.1	6.7	58.0	7.9
...about same	33.9		40.3	
...saved less	1.0		1.7	

Source: Börsch-Supan/Hurd/Rohwedder2017

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# Probing and reversal

## Categories respondent *could* have cut spending

To save more you have to spend less. Which of these spending categories *could* you have possibly spent less on?

- Housing – Food – Clothing – Appliances – Car – Vacation
- Children's education or other child-related expenses
- Other (please specify\_\_\_\_\_)
- No way I could have cut spending. I could not have saved more.

## Categories respondent *wishes* had cut spending

Again thinking back, in order to save more, do you *wish* you had spent less on?

- Housing – Food – Clothing – Appliances – Car – Vacation
- Children's education or other child-related expenses
- Other (please specify\_\_\_\_\_)
- Thinking about it now, I could not have saved more when I was younger.

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# Face validity

Wish to have...	60-64	65-69	70-74	75-84	85+
...saved more	67.7	63.2	56.7	53.10	47.2

	Poorest quartile	2 <sup>nd</sup> quartile	3 <sup>rd</sup> quartile	Richest quartile	All	Number of observations
By HH income	71.9	67.8	59.0	47.0	61.6	1103
By HH wealth	79.7	72.5	61.1	36.0	62.3	887

	HS or less	Some college	BA, BS	MA, Ph.D.
Education	67.4	69.7	58.4	47.8

Source: Börsch-Supan/Hurd/Rohwedder2017

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# Shocks

## Only procrastination?

### Positive shocks:

	worked more than expected.	respondent salary/earnings more than expected.	spouse salary/earnings more than expected.		good investments.	saved more than expected.		received an inheritance.	other.	none.
<b>Fraction</b>	11.0	15.0	8.0		26.3	19.6		18.8	6.0	43.7
<b>Regret</b>	60.0	52.5	47.5		39.7	42.7		48.3	49.5	74.7

### Negative shocks:

	unemployment.	salary/earnings less than expected.	death in family.	divorce or separation.	bad investments.	saved less than expected.	health limited work.	large health expense.	large non-health expense.	other.	none.
<b>Fraction</b>	15.4	12.1	10.0	14.5	10.3	15.6	18.9	14.2	12.7	6.5	38.7
<b>Regret</b>	77.1	72.7	65.7	72.0	71.2	89.6	79.4	75.5	74.0	67.0	46.5

Source: Börsch-Supan/Hurd/Rohwedder 2017

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# Actual vs. expected situation

<b>Spending needs</b>		←-----					
		More than exp.	About same	Less than exp.	Total		
Fraction		37.43	43.35	19.21	100		
Regret		70.39	52.88	63.44	61.46		
<b>Income</b>		-----→					
		More than exp.	About same	Less than exp.	Total		
Fraction		32.13	31.73	36.14	100		
Regret		47.83	55.21	79.13	61.48		
<b>Financial situation</b>		-----→					
		Better than exp.	About same	Worse than exp.	Total		
Fraction		34.98	33.18	31.84	100		
Regret		43.95	59.79	82.51	61.48		
<b>Actual vs. expected Social Security income</b>		-----→					
		A lot more	A bit more	About same	A bit less	A lot less	Total
Fraction		2.56	7.31	59.12	19.68	11.33	100
Regret		56.25	54.95	57.34	71.84	73.05	61.77

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# Lessons

## Quite a bit of saving regret

### Plausibility:

- Question formats (incl. probing) show some but little **cheap talk**
- **Plausible patterns** with usual socio-demographics
- *Not* a phenomenon related to poverty: **many high income and educated individuals** and many do not run out of money
- Very plausible associations with **positive and negative shocks**

### Conclusions:

- Does not rule out **nudging** approaches, but procrastination is not the only reason for saving regret (**unexpected shocks**)
- Some motivation for more complex **behavioral models**

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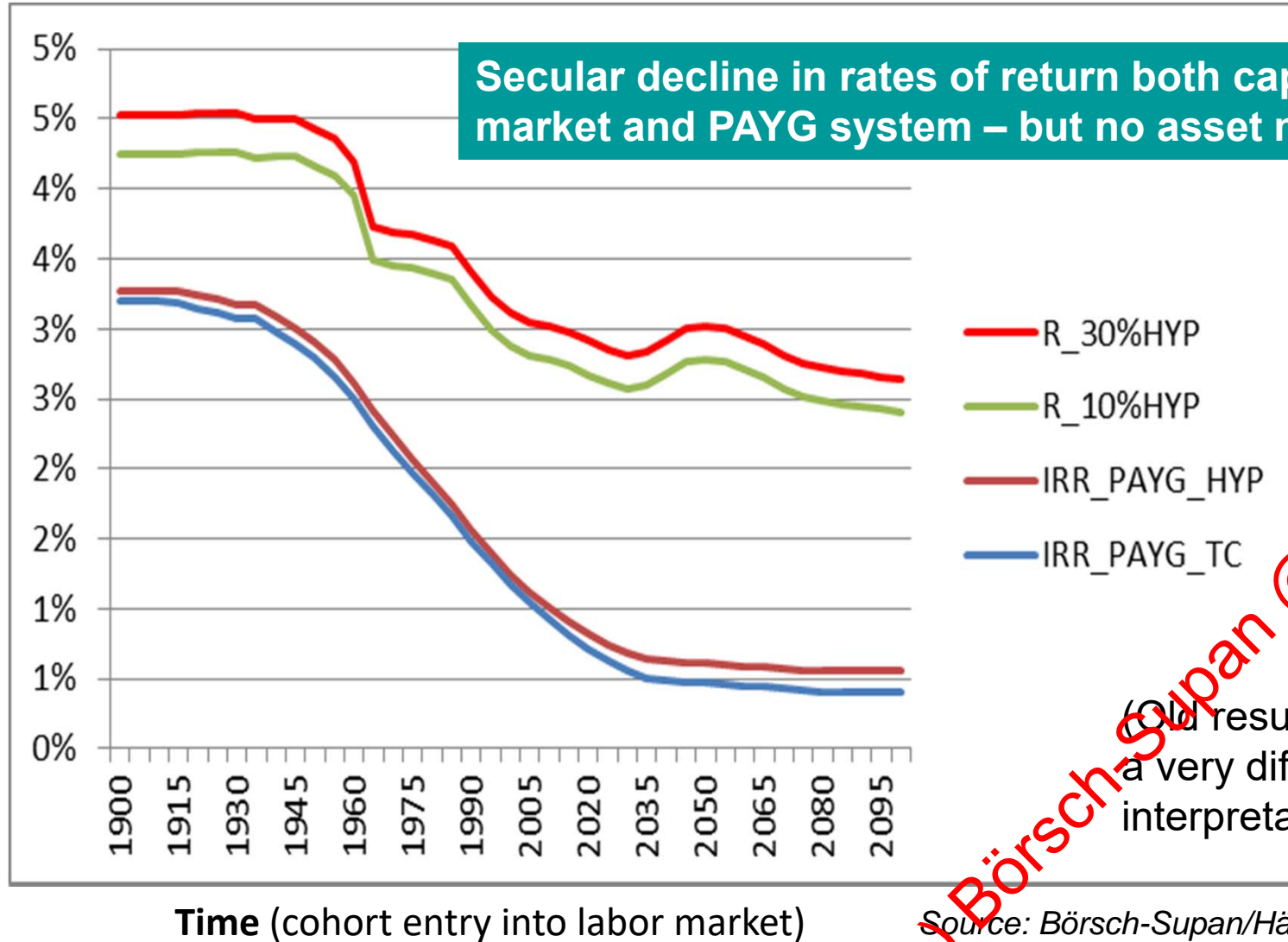
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# General equilibrium with procrastination: interest rate



(Old result with a very different interpretation)

Source: Börsch-Supan/Härtl/Leite 2017

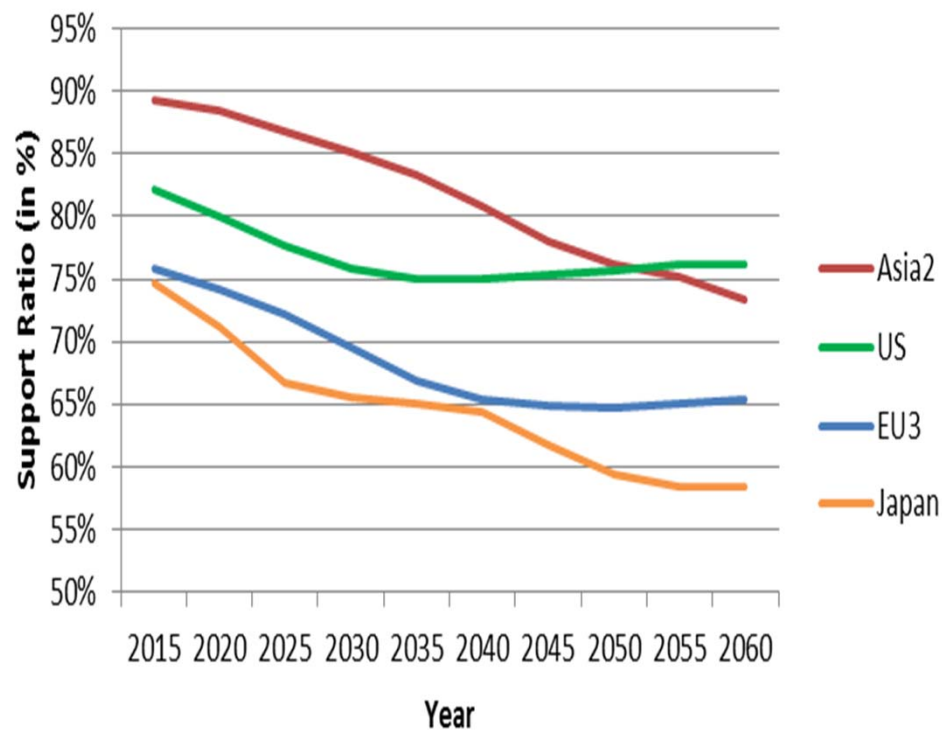
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# Demography

**Support Ratio**



**Replacement rate of PAYG-DB pension systems**

France	60%
Germany	60%
Italy	70%
Japan	60%
US	30%
China	10%
India	10%

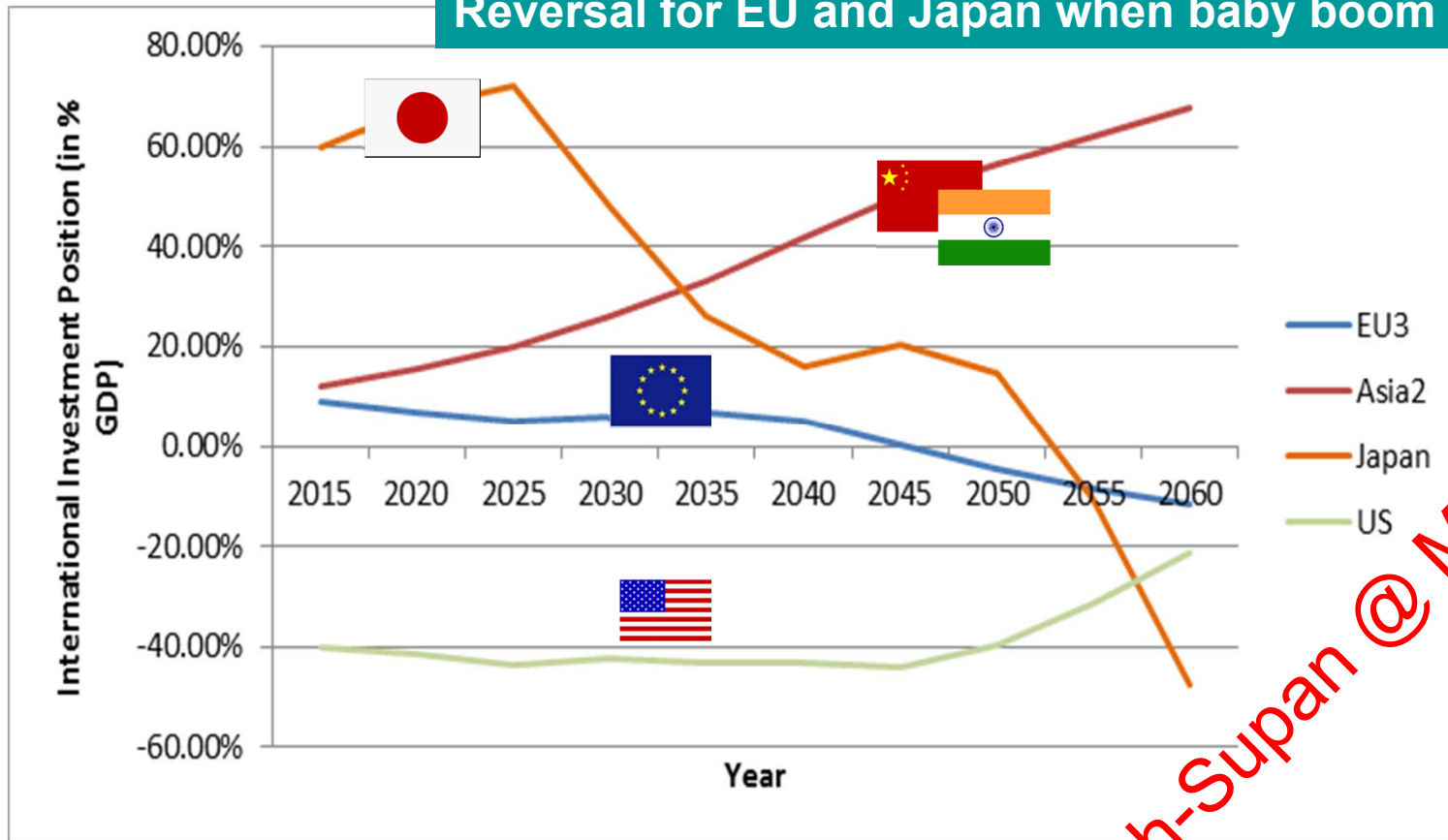
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# Net position

Currently: EU and Asia financing US.  
Reversal for EU and Japan when baby boom dies.



Note: Neoclassical time consistent behavior

Source: Börsch-Supan/Härtl/Leite 2017

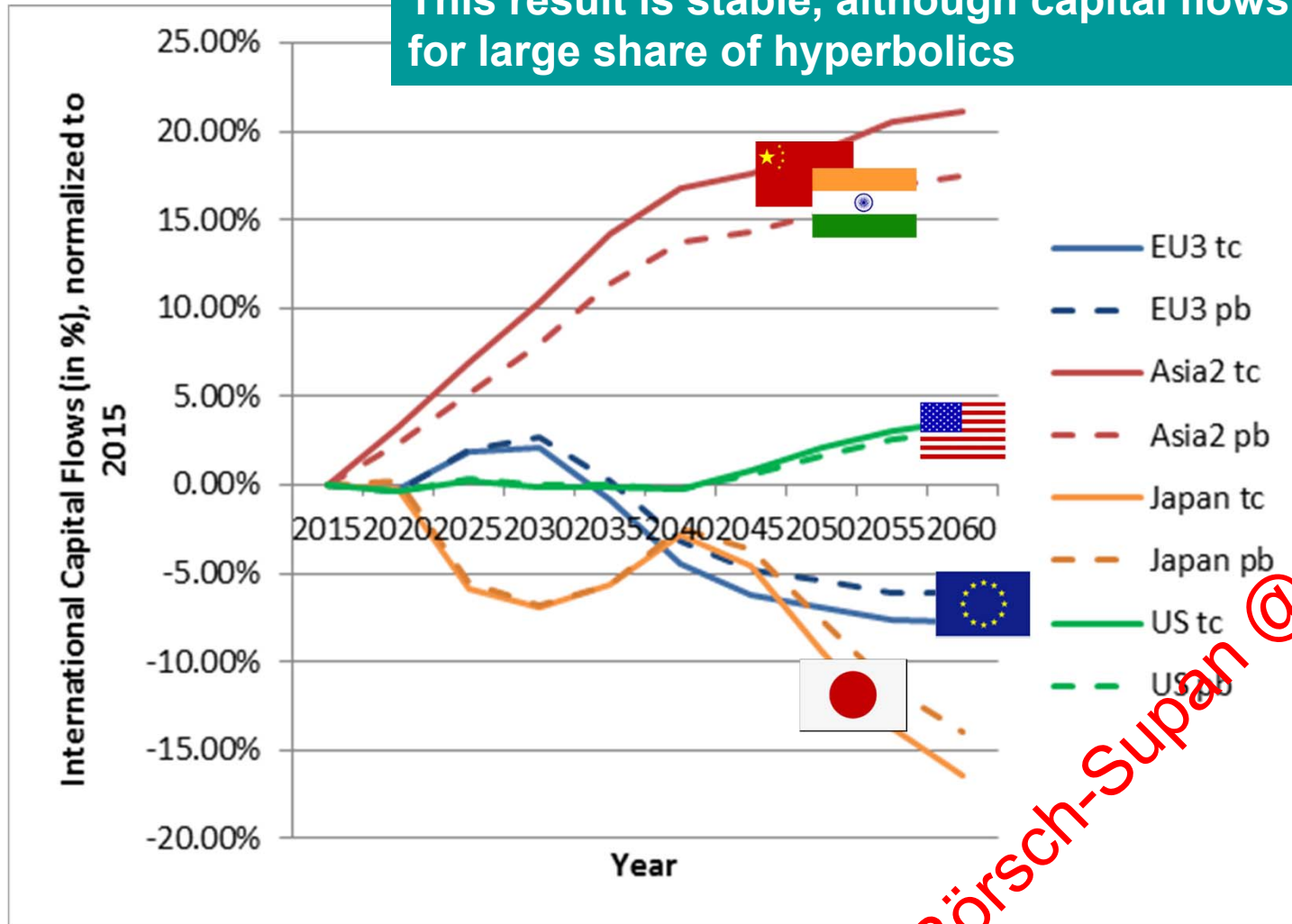
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# Difference in capital flows

This result is stable, although capital flows lower for large share of hyperbolics



Source: Börsch-Supan/Härtl/Leite 2017

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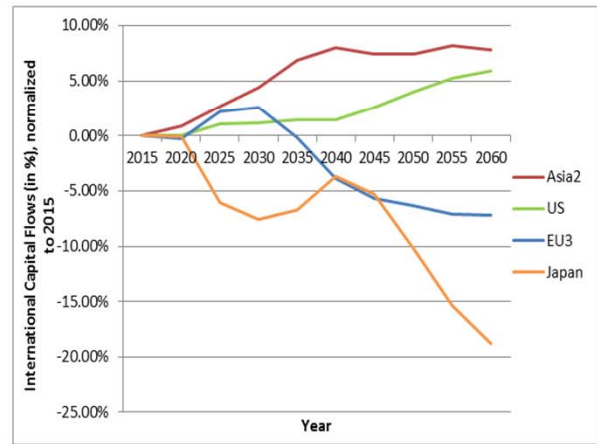




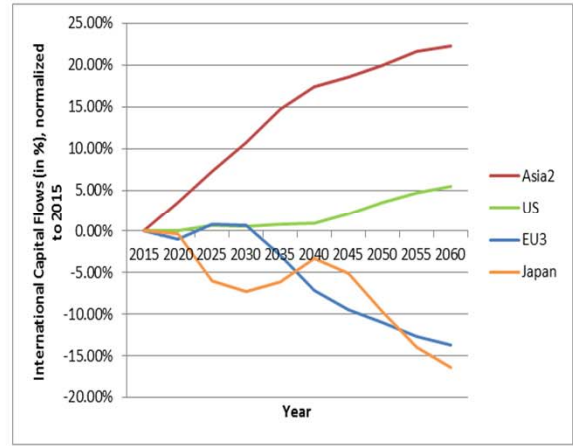
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# Differences in present bias

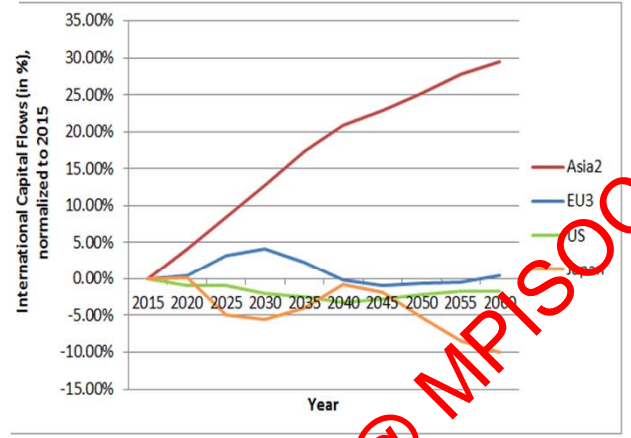
**Asia2**  
with higher present bias



**EU**  
with higher present bias



**US**  
with higher present bias



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# Conclusions:

- 1. Background:** Population aging, pension reforms, insufficient saving for old age (but **caveat:** saving very heterogeneous; observe **undersaving** and **oversaving** in all income quintiles)
- 2.** Convincing evidence **that people regret undersaving**; this may (!) be due to **procrastination** & thus justify **paternalistic nudging**
- 3. Myopia & procrastination** („hyperbolic discounting“, time-inconsistent behavior) **leads to:**
  - *Substantially lower savings for old age*
  - *Higher interest rates*
  - *Lower international capital flows*
  - *Similar decline in returns; no asset meltdown*
  - *PAYG-DB advantages versus funded pensions*

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