CENTER FOR ECONOMIC BEHAVIOR & INEQUALITY

A presentation of CEBI
by Claus Thustrup Kreiner
at Nationalbanken
11th of September 2017

UNIVERSITY OF COPENHAGEN
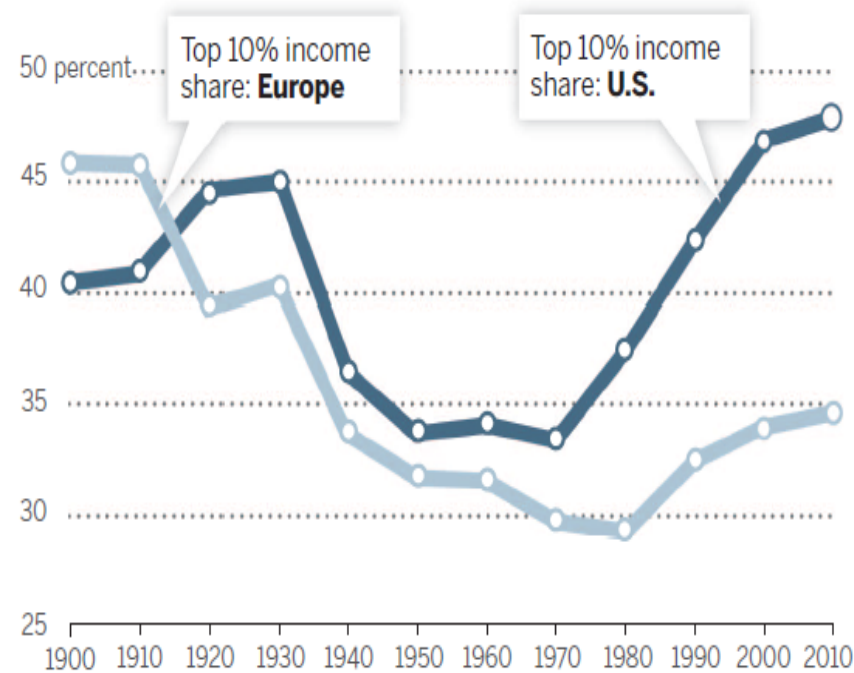
Inequality:
Often in focus in public debate and practical policy

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Inequality:
Long run evolution of income and wealth

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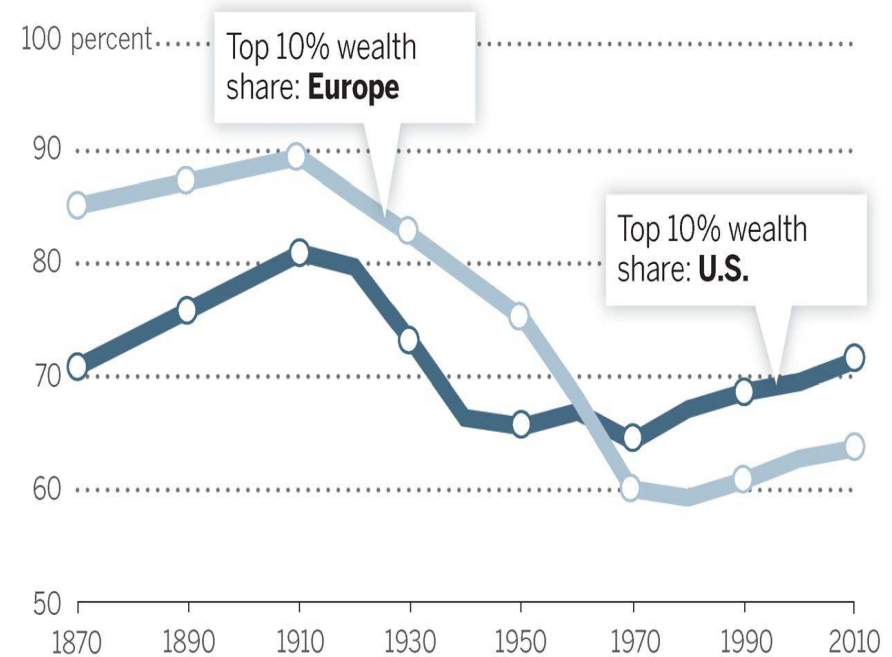B EHAVIOR &
I NEQUALITY

Income inequality in Europe and the United States, 1900–2010

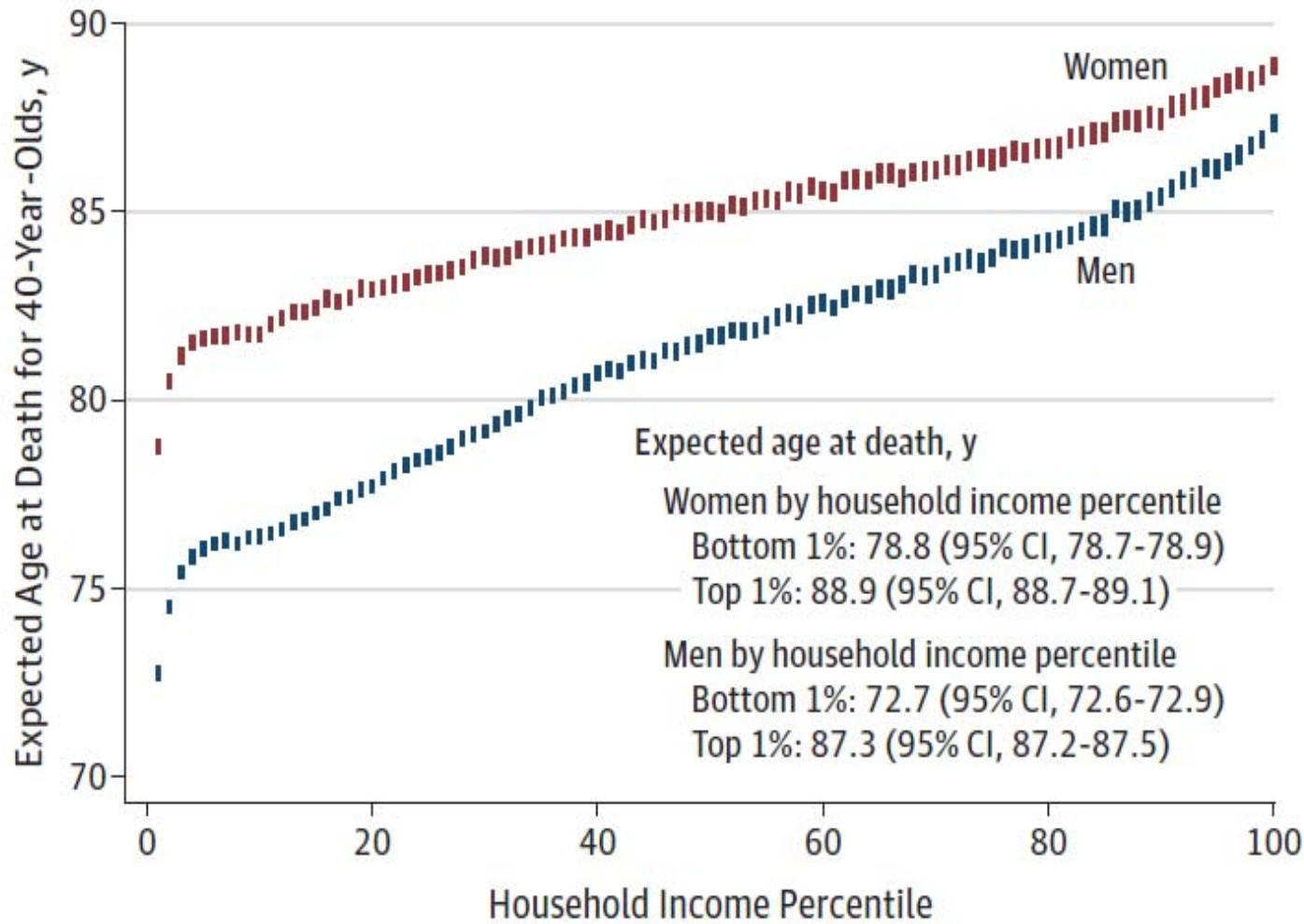Share of top income decile in total pretax income

Wealth inequality in Europe and the United States, 1870–2010
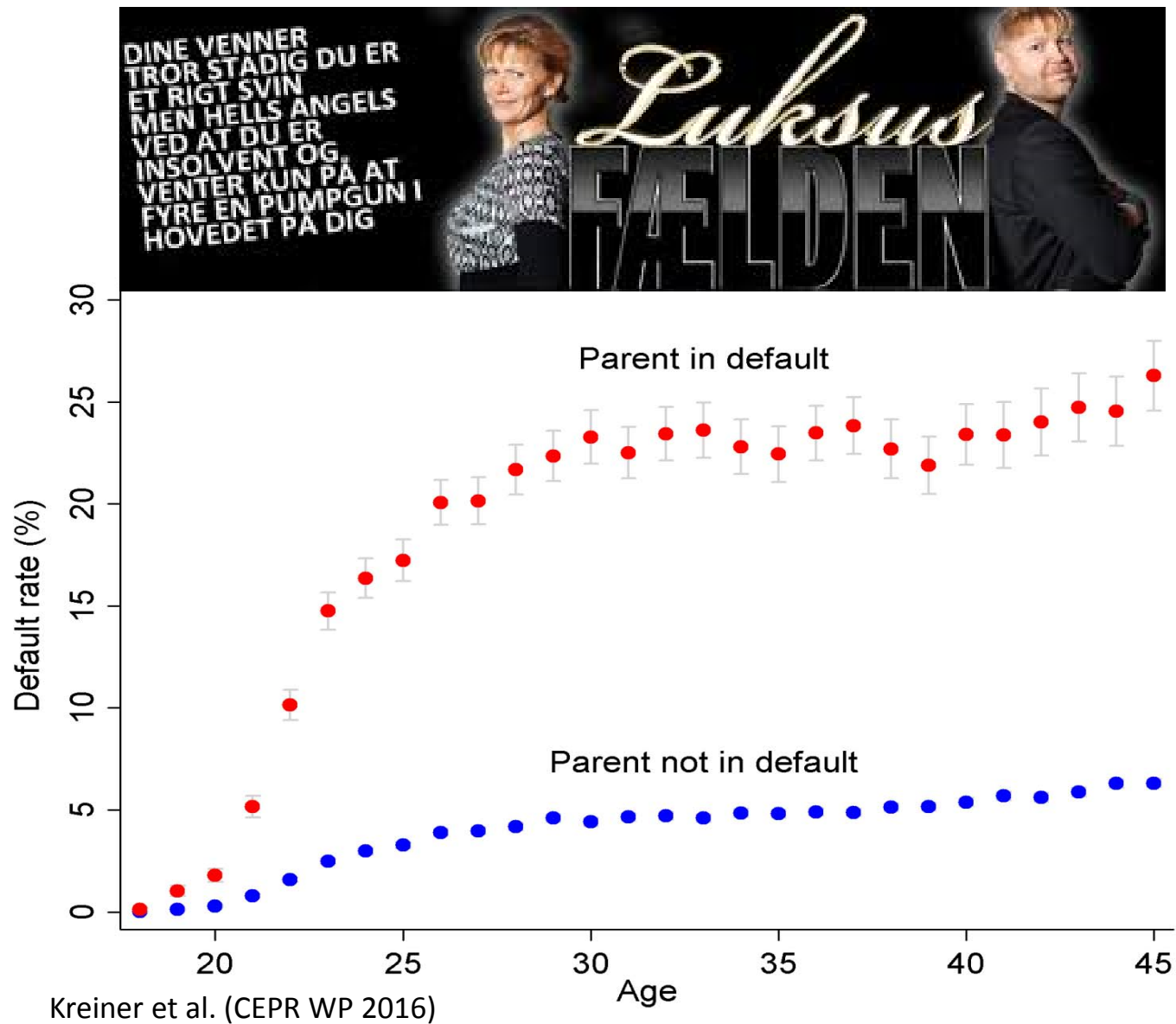
Share of top wealth decile in total net wealth

Piketty & Saez (Science 2014)

Inequality:
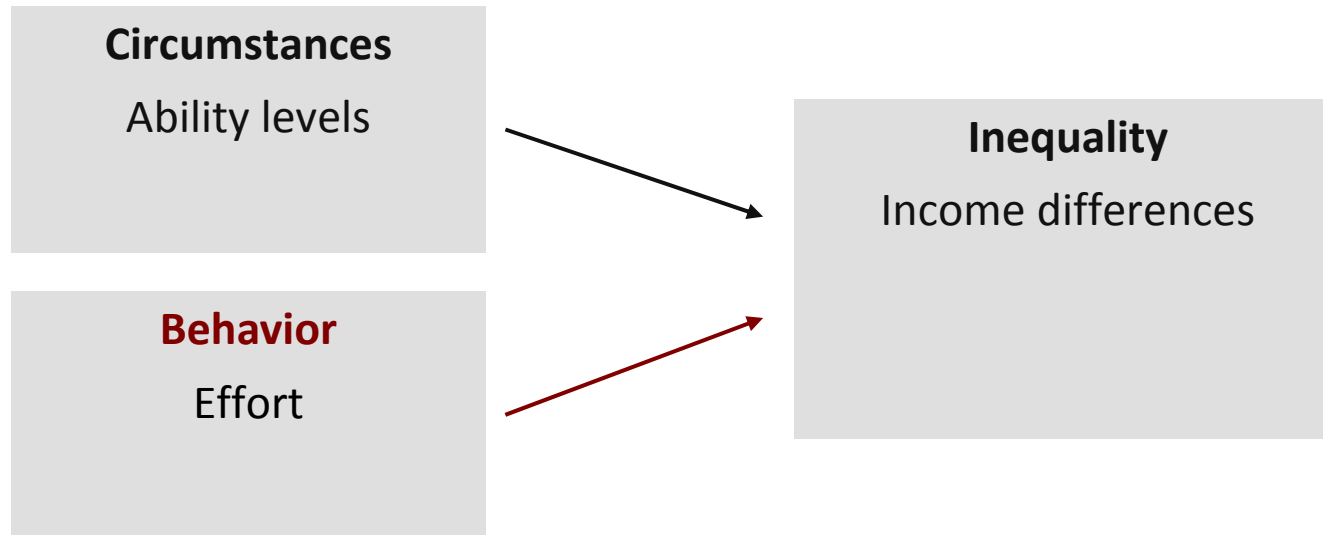# Social gradient in health outcomes

Chetty et al. (JAMA 2016)

Inequality:
Financial trouble

Kreiner et al. (CEPR WP 2016)

Role of behavior?
Example #1

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Role of behavior?
Example #1

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Circumstances

Ability levels

Heterogeneity

Behavior

Effort

Identical preferences

Inequality

Income differences

Policy trade-off between
equality and efficiency
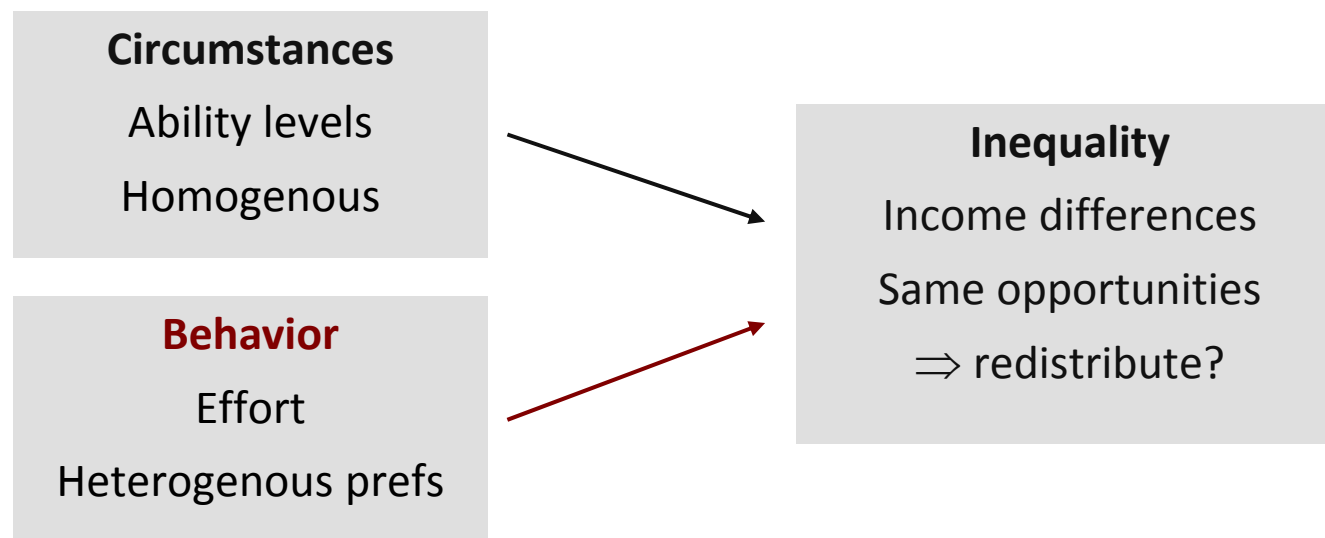
Standard theory of inequality and redistribution policy (e.g. Mirrlees):

- Assumes heterogeneity in innate ability levels and homogenous behavior/preferences

- **Behavioral responses** crucial for the size of the trade-off between equality and efficiency in redistribution policy

Role of behavior?
Example #2

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Circumstances

Ability levels

Homogenous

Behavior

Effort

Heterogenous prefs

Inequality

Income differences

Same opportunities

$\Rightarrow$ redistribute?

Traditional view on behavior (e.g. Stigler and Becker 1977): Differences in preferences leave too many degrees of freedom to be economically interesting BUT…

Behavioral heterogeneity may generate inequality

$\Rightarrow$ normative view on inequality may be very different

Role of behavior?
Example #2

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Liberal Alliance: Den økonomiske ulighed i Danmark er selvforskyldt

Der er politisk strid om roden til ulighed. Imens undersøger økonomer forholdet mellem adfærd og ulighed.

JESPER HVASS

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Selv om der rigtignok er store forskelle i størrelsen på danskernes formuer og indkomster, er den ulighed på ingen måde »uretfærdig«.

Økonomisk ulighed i Danmark er nemlig et udtryk for personlige valg, lyder det fra Liberal Alliances finansordfører, Joachim B. Olsen.

»Det mest udslagsgivende i forhold til økonomisk ulighed er folks egne valg. F. eks. hvor meget de arbejder, og hvordan de bruger deres penge,« siger han.

»Derfor er meget ulighed i Danmark selvforskyldt og ikke et problem. Nogle vælger at købe et hus, og det kan give en større formue på sigt.

Andre investerer og køber aktier frem for at tage på ferie,« fortsætter Joachim B. Olsen.

Folks valg af uddannelse er et andet eksempel, der er afgørende for ens løn- og formueforhold, lyder det fra LA.

Men de liberale glemmer de strukturer i samfundet, der skaber ulighed, lyder det fra den anden front i striden.

»Ulighed er ikke bare et resultat af, hvordan hver enkelt vælger. Arv har f. eks. en stor betydning for ens formue, og du kan altså ikke

vælge, hvilken familie du vil fødes ind i,« siger finansordfører Pelle Dragsted (EL).

»Der er elementer af både struktur og egne valg i ulighed, men det er meget svært at fastslå, hvad der kommer først. Er det hønen eller ægget?« spørger han.

Enhedslisten advarer derfor om, at debatten om ulighed forskydes fra en klassisk økonomisk omfordeling til personlige valg og adfærd.

Men netop relationen mellem adfærd og ulighed er em-

net for et kommende grundforskningscenter ved Københavns Universitet, Center for Økonomisk Adfærd og Ulighed.

Af et endnu ikke publiceret studie fra folkene bag kan man eksempelvis se, at ulighed i formuer i høj grad afhænger af folks evne til at udvise tålmodighed.

»Vores hypotese er, at dybe adfærdsforskelle imellem mennesker spiller en stor rolle for uligheden,« siger Claus Thustrup Kreiner, professor i
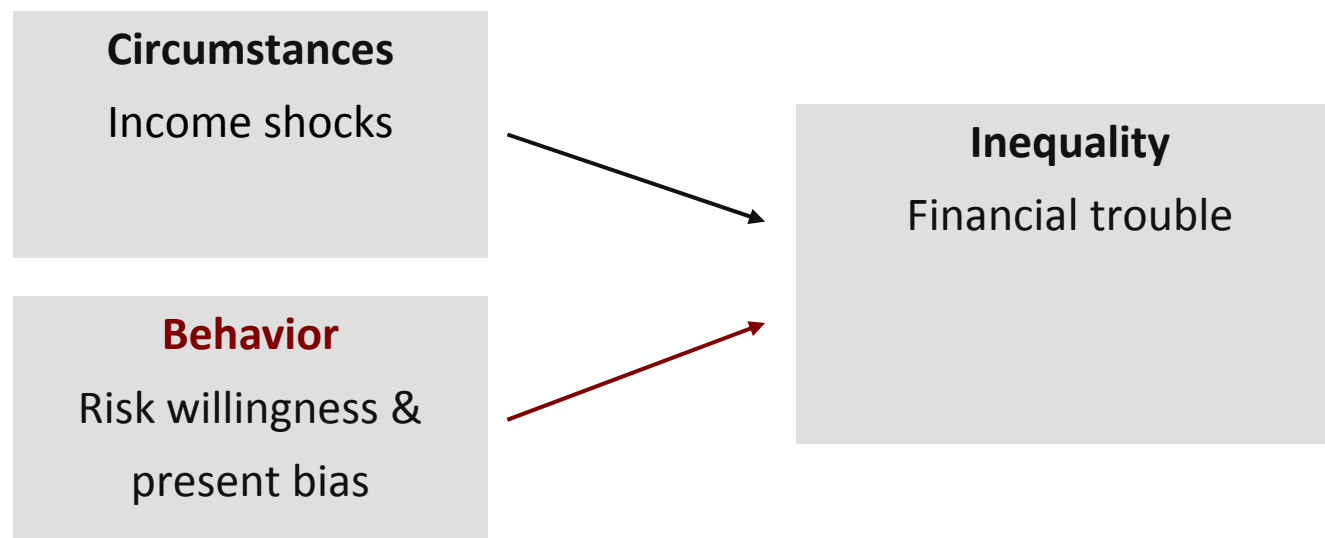
økonomi ved Københavns Universitet og kommende leder af centret.

»Ulighed skyldes ikke blot forskelle i evner og tilfældige hændelser som f.eks. sygdom eller arbejdsløshed,« siger han.

INDBLIK, side 8-9

Role of behavior?
Example #3

Circumstances Income shocks	
Behavior Risk willingness & present bias	**Inequality** Financial trouble

If some people get into financial trouble because of large shocks then social insurance is typically optimal

If some people get into financial trouble because of excessive risk-taking then other instruments such as loan restrictions, teaching etc. are preferred

$\Rightarrow$ **Behavioral heterogeneity** may call for other types of policy instruments, and also for *more* regulation/policy intervention

Behavioral responses and heterogeneity important

Applied Microeconometrics over two decades reveals massive, unexplained cross-sectional variation across households (Heckman, Nobel Lecture 2001) $\Rightarrow$ might be due to behavioral heterogeneity

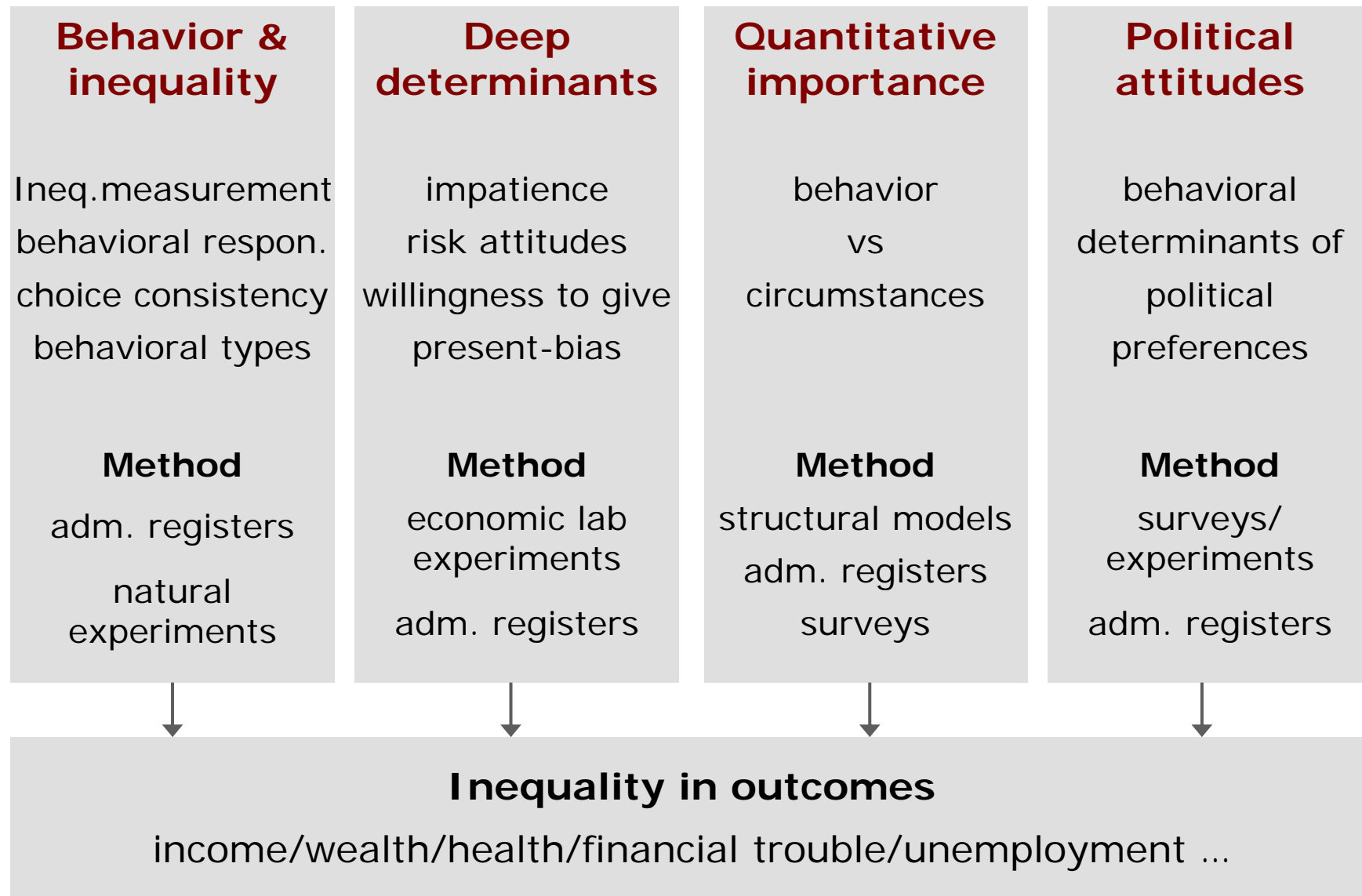Pervasive heterogeneity in elicited preference parameters (e.g. Mischel et al. Science 1989)

Allowing for preference heterogeneity $\Rightarrow$ can better match differences in consumption levels (Alan, Browning, and Ejernæs, JPE forthcoming) and wealth inequality (Krusell & Smith JPE 1998, Carroll et al. QE 2007)

Behavioral heterogeneity may have large effects on inequality (Chetty et al. QJE 2014)

A hypothesis: **There exist fundamental differences in behavior that generate significant inequality in major outcomes**

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Behavior & inequality	**Deep determinants**	**Quantitative importance**	**Political attitudes**
Ineq.measurement behavioral respon. choice consistency behavioral types	impatience risk attitudes willingness to give present-bias	behavior vs circumstances	behavioral determinants of political preferences
Method adm. registers natural experiments	**Method** economic lab experiments adm. registers	**Method** structural models adm. registers surveys	**Method** surveys/ experiments adm. registers

Inequality in outcomes

income/wealth/health/financial trouble/unemployment ...

People and competencies

Management: Claus Thustrup Kreiner, David Dreyer Lassen, Søren Leth-Petersen

Senior faculty: Mette Ejrnæs, Niels Johannesen, Mette Gørtz, Marco Piovesan, Alexander Sebald + 1-2 **NN**

Junior faculty: Asger Lau Andersen, Torben Heien Nielsen, Thomas H. Jørgensen, Miriam Gensowski, Simon H. Boserup, Gregers Nytoft Rasmussen, Jeppe Druedahl + 4-5 **NN**

PhD students: Benjamin Ly Serena, Katrine Marie Tofthøj Jakobsen, Kristoffer Balle Hvidberg, Emil Bjerre Jensen, Daniel Mahler, Felix Døssing, Adam Sheridan, Nick Fabrin + **Mia Renee Herløv Jørgensen** + **7 NN**

External members: Henrik Kleven & Giovanni Violante & Andrew Caplin (Princeton, NYU), Ernst Fehr & Helga Fehr-Duda & Thomas Epper (Zürich, St. Gallen)

Data manager: **TBA**

Center administrator: Tine Ceccardi

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An Introduction to CEBI
Claus Thustrup Kreiner
at Nationalbanken
11th of September 2017

UNIVERSITY OF COPENHAGEN

Heterogenous discounting behavior and wealth inequality (work-in-progress)

Thomas Epper (St. Gallen)
Ernst Fehr (Zürich)
Helga Fehr-Duda (Zürich)
Claus Thustrup Kreiner (UCPH)
David Dreyer Lassen (UCPH)
Søren Leth-Petersen (UCPH)
Gregers Nytoft Rasmussen (UCPH)

Research agenda and motivation:
Existing knowledge

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B E H A V I O R &
I N E Q U A L I T Y

Wealth inequality may be due to differences across people in income processes, innate abilities, wealth transfers, saving propensities, capital returns and public policy (Heathcote et al. 2009, Piketty 2014, Hubmer et al. 2016, Boserup et al 2016a,b, De Nardi and Fella 2017...)

But knowledge still limited and some predictions not tested:

Standard textbook theory $\Rightarrow$

Hypothesis: **Differences in how much people discount the future $\Rightarrow$ differences in savings behavior $\Rightarrow$ wealth inequality**

Experimental evidence: pervasive heterogeneity in discounting behaviour (e.g. Mischel et al. 1989, Andreoni and Sprenger 2012)

Macro models: heterogeneity in discounting behaviour may have significant effects on wealth inequality (Krusell and Smith 1998, Carroll et al. 2017), propagation of business cycle shocks and the effects of stimulus policy (Carroll et al. 2014, Krueger et al. 2015)

Research agenda and motivation:
Existing knowledge

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Hypothesis: **Differences in how much people discount the future $\Rightarrow$ differences in savings behavior $\Rightarrow$ wealth inequality**

This study: The first to test the hypothesis by relating discounting behaviour of individuals to their actual position in the wealth distribution

Requires combining experimental data (elicit discounting behavior) and administrative data (measure wealth in real life + education, income etc.)

Data collection strategy only possible in few countries, including Denmark

Unique combination of data, but nothing is perfect:

- Clean identification strategy not possible for this type of research
- Measurement of cross-sectional variation in discounting behavior and in wealth is a challenge

**Basic neoclassical model of lifecycle savings:
Maximization problem**

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$$\max U = \int_0^T e^{-\rho a} u\big(c(a)\big) da$$

s.t.

$$u\big(c(a)\big) = \frac{c(a)^{1-\theta}}{1-\theta}$$

$$\dot{w} = rw(a) + y(a) - c(a)$$

U: utility
ρ: subjective discount factor
θ: risk aversion
a: age

w: wealth
y: income
c: consumption

Basic neoclassical model of lifecycle savings:
Formula for wealth inequality

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Wealth at age a:

$$w(a) = Y\left(\gamma(a) - \frac{1 - e^{\frac{r(1-\theta)-\rho}{\theta}a}}{1 - e^{\frac{r(1-\theta)-\rho}{\theta}T}} \right) e^{ra},$$

where Y is permanent income and $\gamma(a)$ is share of lifetime resources received up to age a:

$$Y \equiv \int_0^T y(a) e^{-ra}\, da + w(0), \quad \gamma(a) \equiv \frac{\int_0^a y(\tau) e^{-r\tau}\, d\tau + w(0)}{Y}.$$

**Basic neoclassical model of lifecycle savings:
Main predictions**

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Predictions

- Differences in patience $\Rightarrow$ differences in savings behavior $\Rightarrow$ wealth inequality

- Patient individuals hold more wealth *at all points* in the life cycle conditional on $(Y, \gamma(a), T, r, \theta)$

- Correlation between patience and wealth may occur because of other channels than savings, i.e. because $Y, \gamma(a), T, r$ or θ are correlated with patience

Note that

- changes in the CRRA parameter θ have ambiguous effects on wealth

- no clear relationship between differences in patience and the cross-sectional variation in consumption levels

Basic neoclassical model of lifecycle savings:
Extensions and additional predictions

- Income shocks

- Endogenous income and human capital formation

- Wealth transfers

- Borrowing constraints

**Data construction:
Overview**

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Experimental data

Administrative data

Online Experiment 2015

- Choice tasks
- Patience
- Risk aversion

3634 respondents

CPR

2000-2014

- Income
- Wealth
- Demographics

- Also non-respondents and 10% random sample

Data construction:
Experiment

- Experiment conducted in February 2015

- Everyone born in Copenhagen 1973-1983

- Invitation by hard copy letter

- Join by logging on to www

- Fill in questionnaire

- Go through series of choice tasks

- One choice task selected to be paid out – typical payout: 245 DKK

- Pay-out transferred directly to bank account (NEM konto)

- Total time spent: about 45 minutes

Data construction:
Experiment

Note: a) five savings choice tasks were presented; b) 100 points = 25DKK

Data construction:
Distribution of patience measure

Data construction:
Administrative data and inequality measurement

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Administrative wealth and income data

- Income tax register includes information on annual income + values of assets and liabilities at the end of each year

- Assets: assessed property value, market value of stocks, bonds and mortgage deeds in deposit, bank deposits

- Liabilities: all debt except debt to private persons.

- All register data is third-party reported by employers, government institutions, financial institutions etc.

Inequality measurement

- Within-cohort percentile rank (e.g. like Chetty et al. 2014)

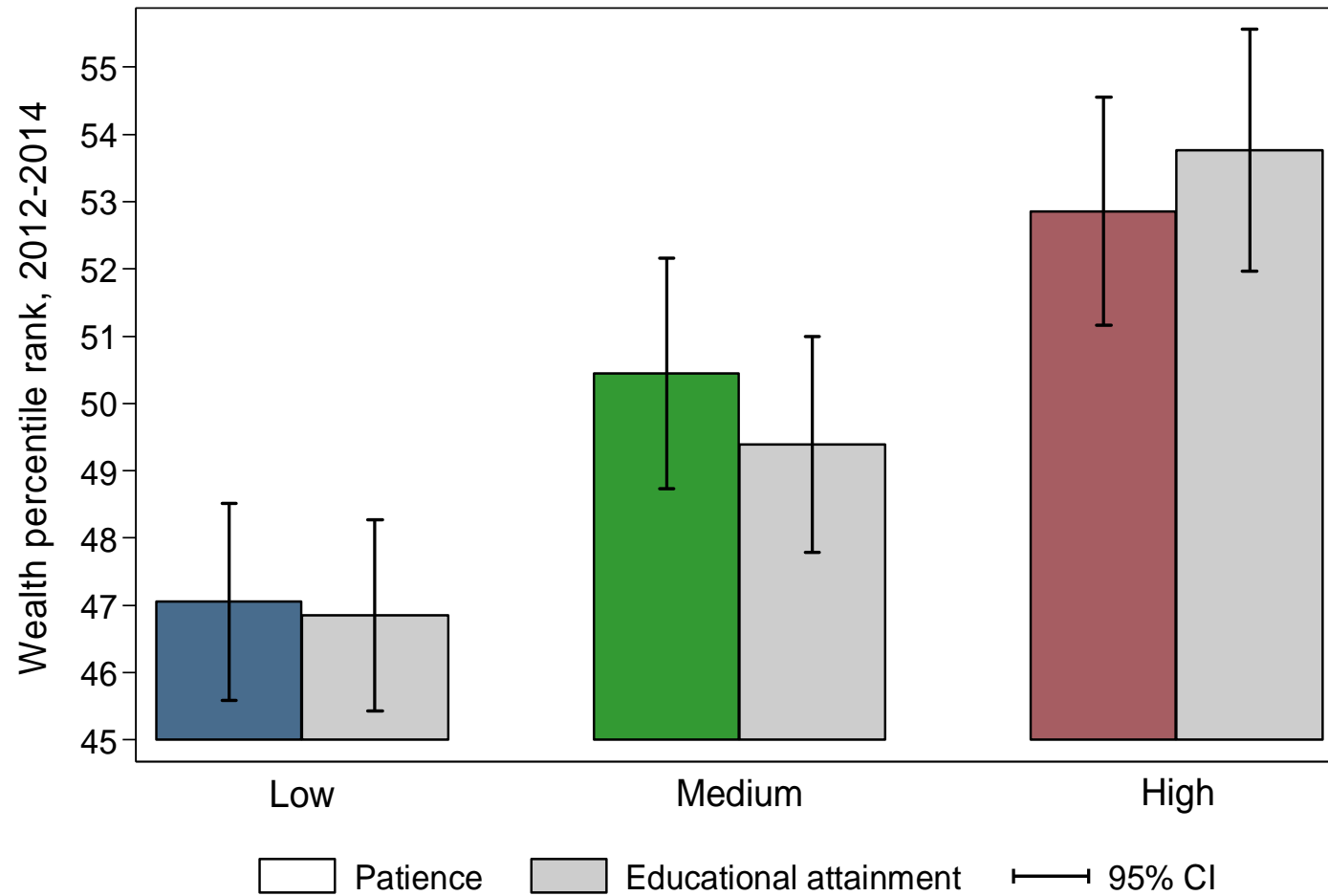**Results:**
Subjective discounting and wealth inequality

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Patience and position in the wealth distribution

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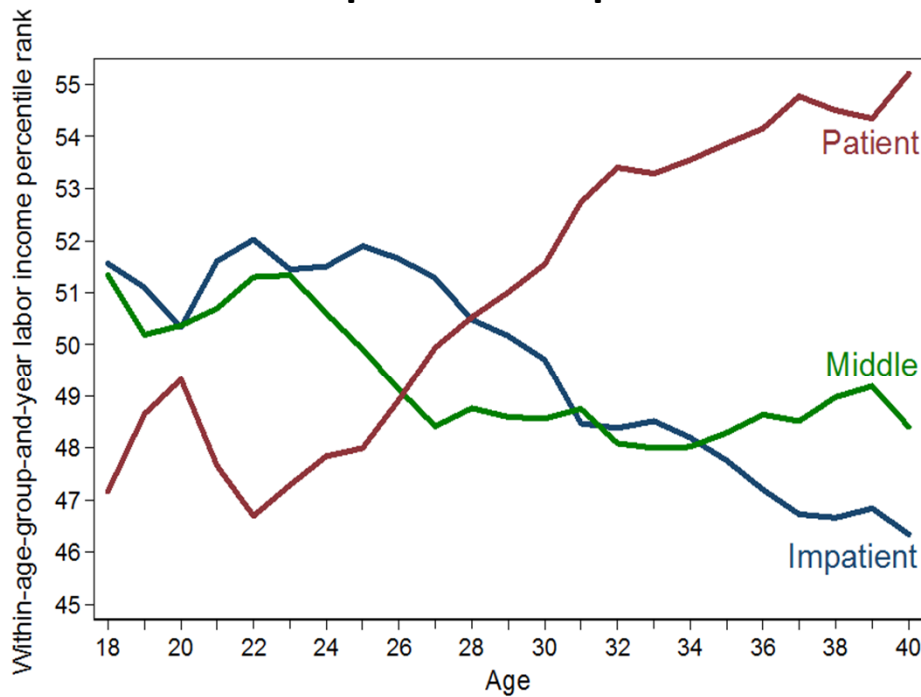Comparison with education

Results:
Still large effect in multivariate setting

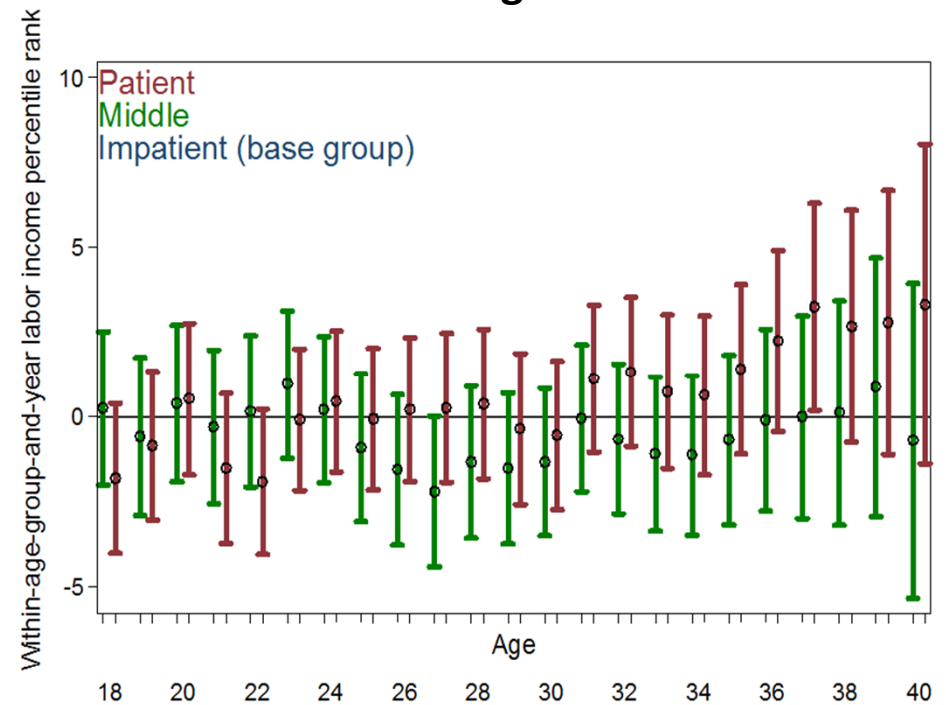Within-cohort average net asset percentile rank (2012-2014) regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Patience	8.14 ***	6.62 ***	6.45 ***	6.88 ***	6.46 ***	5.89 ***	6.09 ***	6.35 ***
	(1.44)	(1.46)	(1.47)	(1.54)	(1.51)	(1.50)	(1.51)	(1.49)
Risk aversion							2.99	3.13
							(1.92)	(1.91)
Year dummies for educational attainment	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Within-cohort non-capital income decile dummies, 2012-2014	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Self-reported school grades decile dummies	No	No	No	Yes	Yes	Yes	Yes	Yes
Within-cohort net assets at age 18 decile dummies	No	No	No	No	Yes	Yes	Yes	Yes
Within-cohort parental net asset decile dummies	No	No	No	No	No	Yes	Yes	Yes
Additional controls	No	No	No	No	No	No	No	Yes
Constant	44.68 ***	42.86 ***	43.93 ***	43.09 ***	37.26 ***	35.31 ***	33.70 ***	33.07 ***
	(1.03)	(1.67)	(1.97)	(2.47)	(2.66)	(3.09)	(3.26)	(3.37)
Observations	3634	3634	3634	3360	3360	3360	3360	3360
Adj. R-squared	0.01	0.02	0.03	0.02	0.05	0.07	0.07	0.09

Results:
Correlation btw. discounting and income

Income profiles and patience
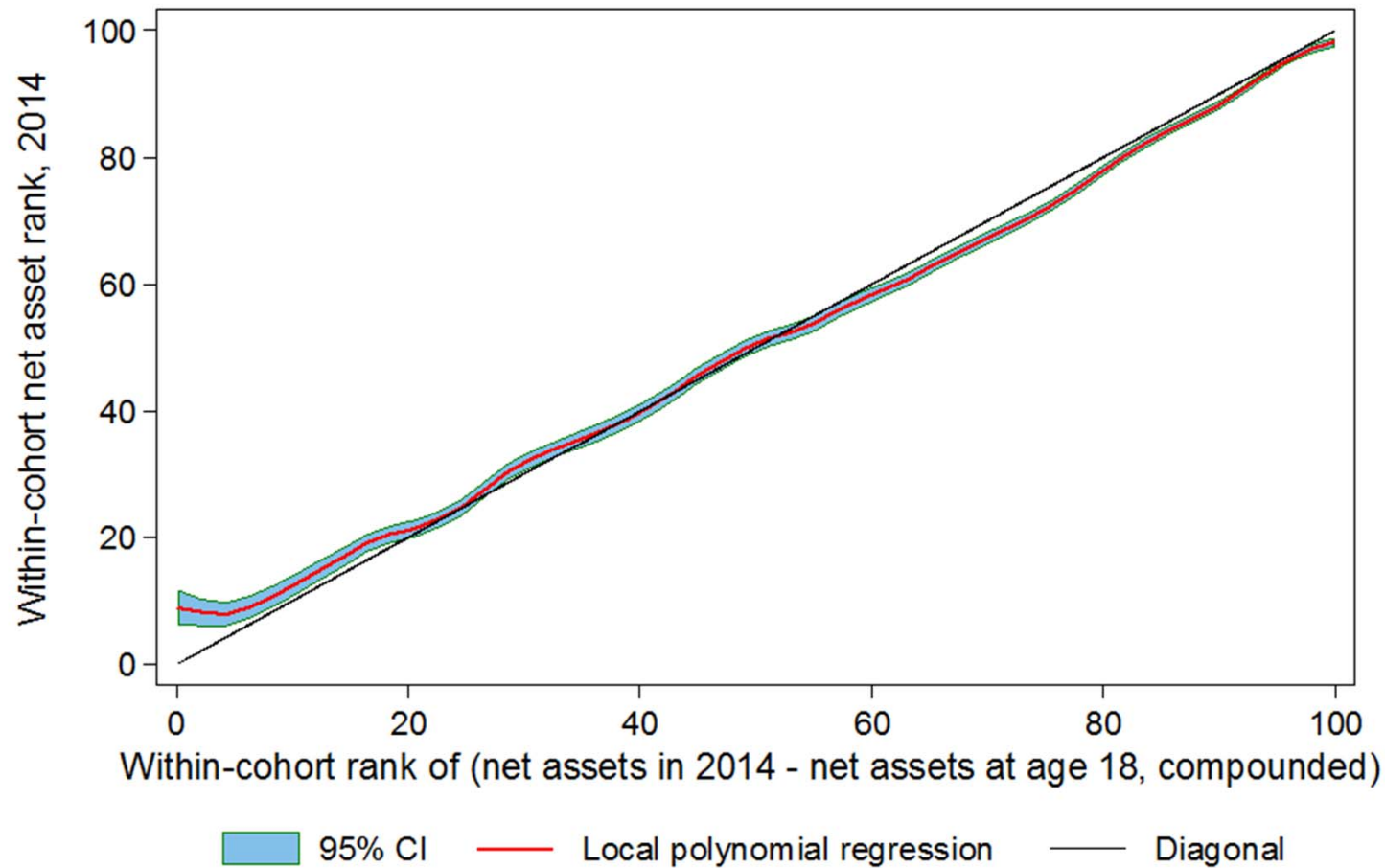
After controlling for education

Results:
Controlling for income and school performance

Within-cohort average net asset percentile rank (2012-2014) regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
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Results:
Initial wealth (at age 18) not important

Results:
Controlling for initial wealth and parental wealth

Within-cohort average net asset percentile rank (2012-2014) regressions

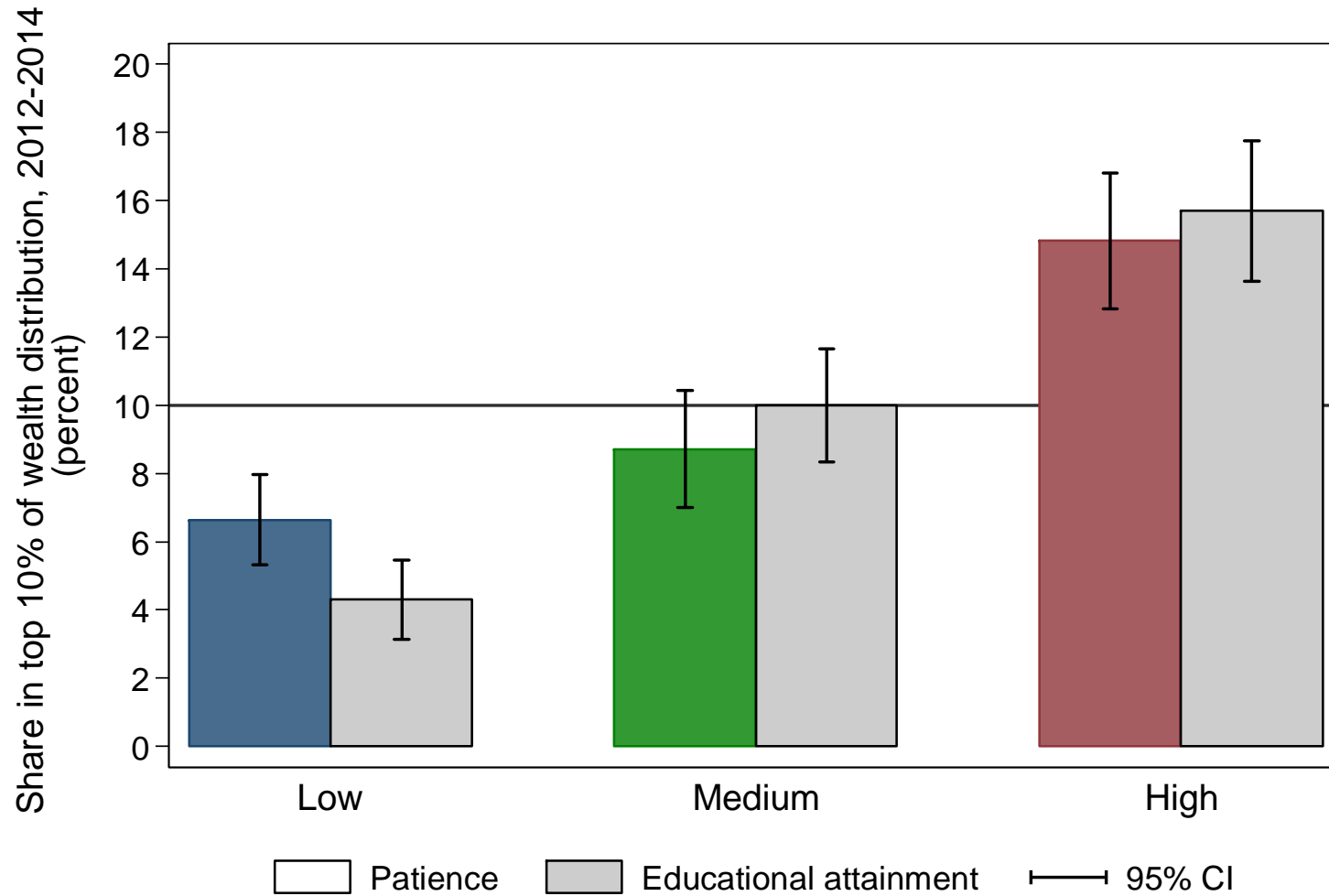|	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
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Results:
Controlling for risk aversion and demographics

Within-cohort average net asset percentile rank (2012-2014) regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Patience	8.14 ***	6.62 ***	6.45 ***	6.88 ***	6.46 ***	5.89 ***	6.09 ***	6.35 ***
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Constant	44.68 ***	42.86 ***	43.93 ***	43.09 ***	37.26 ***	35.31 ***	33.70 ***	33.07 ***
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Results:
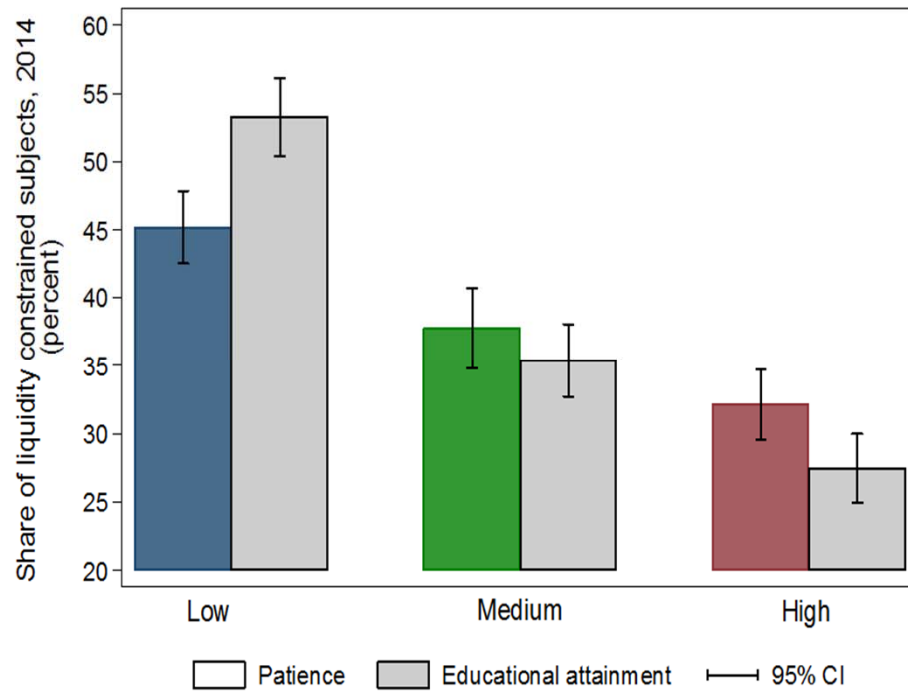**Top 10% wealthiest**

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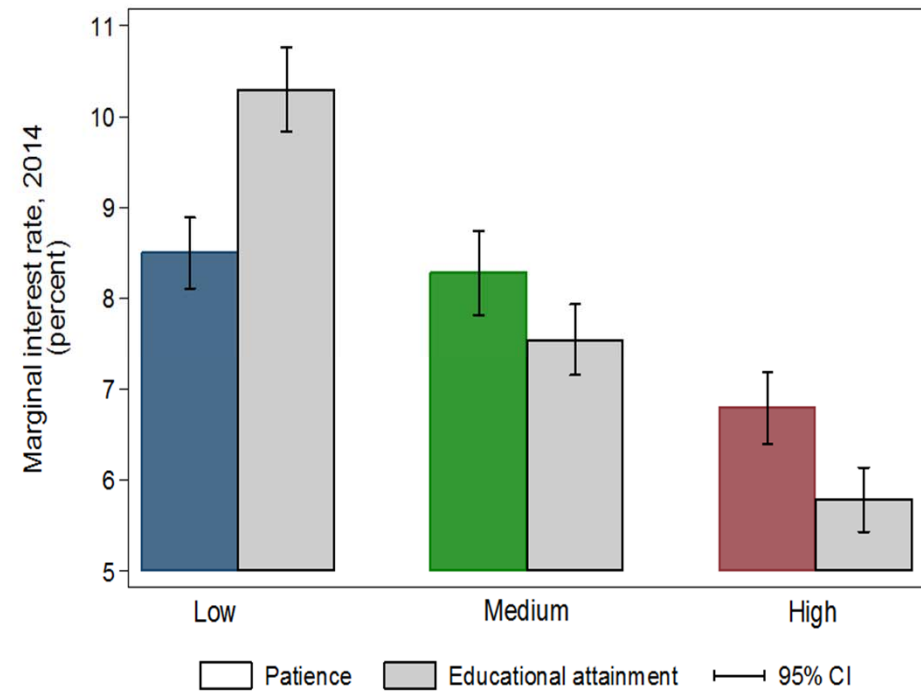I NEQUALITY

Results:
Patience and (self-imposed) credit constraints

Hard credit constraints

Soft credit constraints

Preliminary conclusions

Results suggest that

- differences in discounting behavior $\Rightarrow$ wealth inequality

- a large part of the effect goes through savings behavior

- differences in discounting behavior increase the likelihood of becoming credit constrained ("self-imposed")

Relevant for macro literature on understanding wealth inequality and effects of business cycle shocks and stimulus policy (Krusell and Smith 1998, Carroll et al. 2014, Krueger et al. 2015, Carroll et al. 2017)

Policy relevance

- Differences in wealth occurring through the budget constraint reflect differences in lifetime consumption possibilities, but this is not the case for differences in discounting behavior

- The relationship between subjective discounting and wealth may also point to long term consequences of school initiatives that influence discounting behaviour (recent evidence by Alan and Ertac JPE forthcoming)

EKSTRA

Table. Means of selected characteristics.

	(1) Respondents vs. non-respondents		(2) Gross sample vs. 10 % of population	
	Respondents	Non-respondents	Gross sample	Population
Age	36.32	35.45	35.57	36.38
Woman (=1)	0.50	0.49	0.49	0.50
Single (=1)	0.29	0.39	0.37	0.29
Dependent children (=1)	0.57	0.52	0.53	0.60
Homeowner (=1)	0.40	0.33	0.34	0.56
Years of education	14.65	13.93	14.03	14.46
Ln(Non-capital income)	12.74	12.56	12.59	12.68
Ln(Liquid assets)	10.47	10.10	10.15	10.31
Observations	3634	23823	27457	67588

Notes: Register variables are based on 2014 values All individuals in the table are born in the period 1973-1983. (=1) indicates a dummy variable which takes the value 1 for

Distribution of risk aversion measure

**Research agenda and motivation:
Significant and persistent wealth inequality**

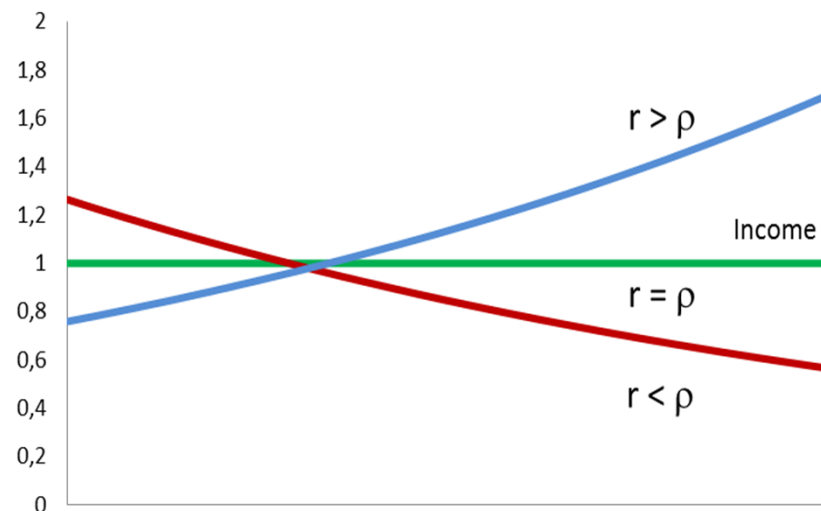## Wealth inequality in Europe and the United States, 1870–2010
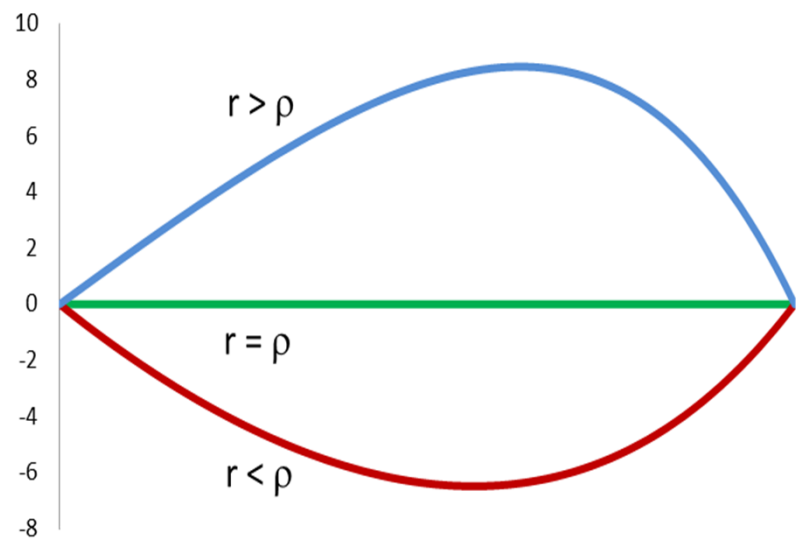
Share of top wealth decile in total net wealth

Piketty & Saez (Science, 2014)

Basic neoclassical model of lifecycle savings:
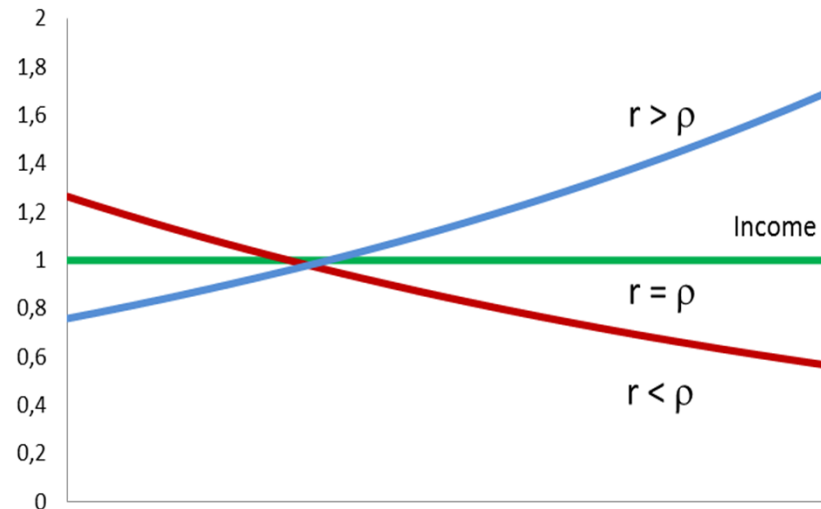**Income, consumption and wealth over the lifecycle**

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INEQUALITY

Income/consumption over the lifecycle
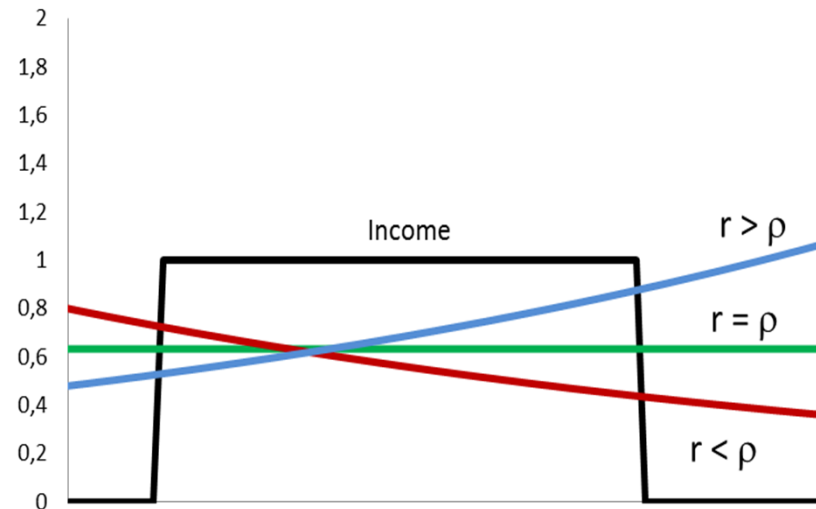

Wealth over the lifecycle

Basic neoclassical model of lifecycle savings: Income, consumption and wealth over the lifecycle
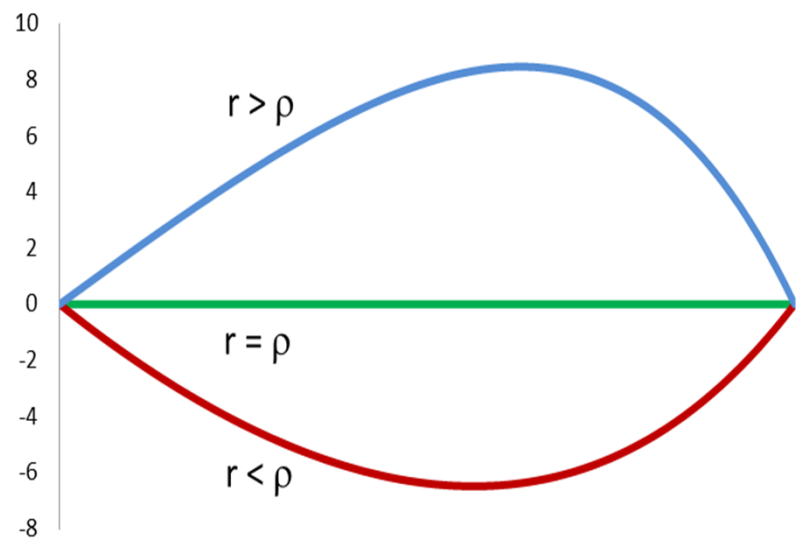
Income/consumption over the lifecycle

Income/consumption over the lifecycle

Wealth over the lifecycle

Wealth over the lifecycle