Research Module in Management and Applied Economics

Fall/Winter Term 2020

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Preferences, Character Skills and Outcomes

Personality and educational outcomes

Personality Traits and Educational Outcomes

Table 1.8 The Relationship Between Years of Educational Attainment and Big Five Traits

Source	Sample	Timing of Measurement and Outcome	Controls	Metric	Results	
Goldberg, Sweeney, Merenda, and Hughes (1998)	Representative sample of US working adults aged 18–75 ($N = 3{,}629$)	All the variables were measured in the same year, but years of schooling were cumulative.	Age, gender, ethnicity	Partial correlation with years of schooling (r)	Openness Conscientiousness Extraversion Agreeableness Neuroticism	0.31*** 0.12*** −0.04** −0.08*** −0.03
Van Eijck and De Graaf (2004)	Representative sample of Dutch adults aged 25–70 ($N = 1{,}735$)	All the variables were measured in the same year, but years of schooling were cumulative.	Age, gender, father's education, mother's education, father's occupational status	Standardized regression coefficient (β)	Openness Conscientiousness Extraversion Agreeableness Neuroticism	0.14*** 0.05*** −0.07*** −0.07** −0.09***
German Socio-Economic Panel GSOEP (2004–2008), own calculations	Representative sample of Germans aged 21–94 ($N = 2{,}381$)	The Big Five were measured three years prior to the measurement of schooling, but years of schooling were cumulative.	Age, age^2, gender, crystallized intelligence, fluid intelligence	Standardized regression coefficient (β)	Openness Conscientiousness Extraversion Agreeableness Neuroticism	−0.03 0.18*** −0.02 −0.03 −0.09***

**Statistically significant at the 5% level; ***statistically significant at the 1% level.

Source: Table 1.8 in Almlund et al. (2011)

Personality Traits and Educational Outcomes

Table 1.9 The Relationship between Probability of High-School Graduation and Locus of Control

Source	Sample	Timing of Measurement and Outcome	Controls	Metric	Results	
Báron and Cobb-Clark (2010)	Australians born in 1987 or 1988 (N = 2,065)	Contemporaneous	Welfare receipts, family structure, sex, parental education, parental immigration status, parental involvement in education, indigenous background, and born early for their grade	The effect of a standard deviation increase in locus of control on the probability of high-school graduation (*b*)	Locus of control	4.5*
Cebi (2007)	Nationally representative sample of students in the United States (N = 1,394)	Locus of control was measured in grades 10 or 11	(1) Race, gender, urban, parental education, family structure; (2) race, gender, urban, parental education, family structure, home life, AFQT.	The effect of a standard deviation increase in locus of control on the probability of high-school graduation (*b*).	Locus of control (1) Locus of control (2)	4.6*** 1.5
Coleman and DeLeire (2003)	Nationally representative sample of students in the United States (N = (1) 13,720 and (2) 12,896).	Locus of control was measured in grade 8.	(1) Race, gender; (2) race, gender, eighth-grade math score, eighth-grade reading score, eighth-grade GPA, parent's education, parenting controls, family structure	The effect of a standard deviation increase in locus of control on the probability of high-school graduation (*b*).	Locus of control (1) Locus of control (2)	6.8 1.4**

Notes: The numbers in the "Controls" column indicate the controls used in different specifications. The numbers preceding the estimate reported in the "Results" column indicate the model used as defined in the "Controls" column.
*Statistically significant at 10% level; **statistically significant at 5% level; ***statistically significant at 1% level.

Source: Table 1.9 in Almlund et al. (2011)

Personality Traits and Educational Outcomes

Table 1.10 The Predictive Power of Conscientiousness Relative to SAT Scores for College GPA

Source	Sample	Timing of Measurement and Outcome	Controls	Results	standardized regression coefficient
Conard (2005)	University students in the United States (N = 186).	College GPA and SAT were both self-reported during college. Personality was measured in college.	Class Attendance	SAT Total Conscientiousness	0.27** 0.30**
Noftle and Robins (2007)	University students in the United States (N = 10,472).	College GPA and SAT were both self-reported during college. Personality was measured in college.	Gender, Other Big Five Traits.	SAT Verbal SAT Math Conscientiousness	0.19*** 0.16*** 0.24***
Noftle and Robins (2007)	University students in the United States (N = 465).	College GPA and SAT were both self-reported during college.1 Personality was measured in college.	Gender, Other Big Five Traits	SAT Verbal SAT Math Conscientiousness	0.28*** 0.28*** 0.18***
Noftle and Robins (2007)	University students in the United States (N = 444).	College GPA and SAT were both self-reported during college. Personality was measured in college.	Gender, Other Big Five Traits	SAT Verbal SAT Math Conscientiousness	0.18*** 0.25*** 0.22***
Wolfe and Johnson (1995)	University students in the United States (N = 201).	GPA and SAT were provided by the College's Record Office. Personality was measured in college.	High School GPA	SAT Total Conscientiousness	0.23*** 0.31***

Notes: (1) Self-reported SAT scores and those obtained from college records were highly correlated (r = 0.92). Self-reported GPA and that obtained from college records were highly correlated (r = 0.89).

* Statistically significant at the 10% level; ** statistically significant at the 5% level; *** statistically significant at the 1% level.

Source Almlund et al. (2011). Chapter 1, Handbook of the Economics of Education

Preferences and outcomes

Preferences and Individual Outcomes

- Correlations of economic and social behaviors, around the world
  - Patience and accumulation decisions
  - Risk taking and risky choices
  - Social preferences and social interactions
- Important to understand role of preferences in generating observed variation in choice behavior...
  - ... but also to provide an out-of-sample validation check on the meaningfulness of the survey measures in culturally and economically highly heterogeneous samples

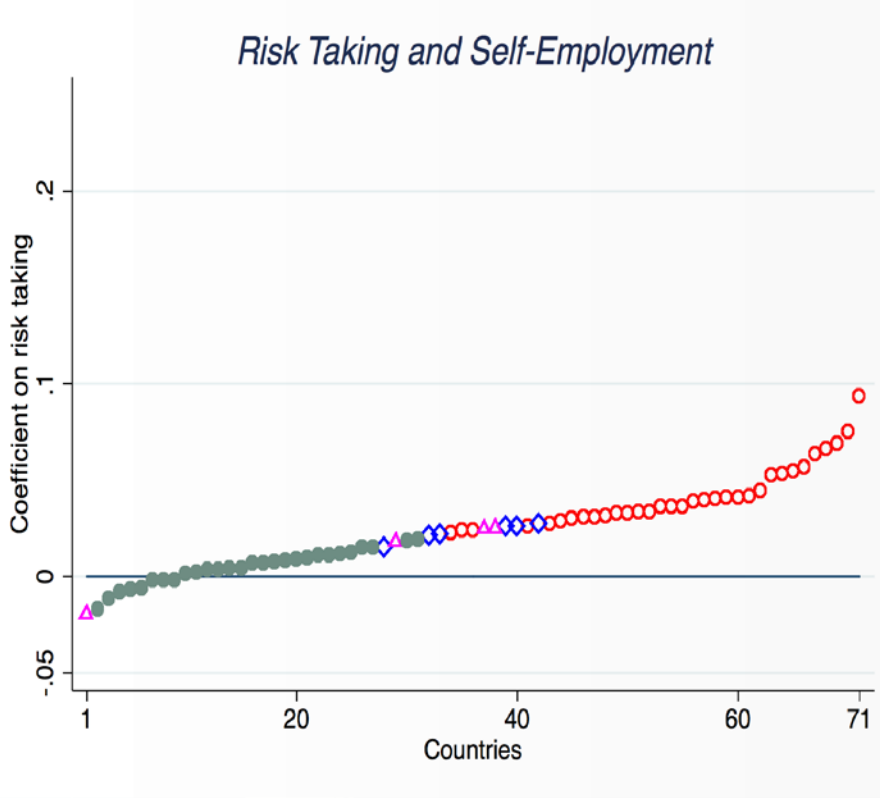
Patience, Risk Taking, and Behaviors

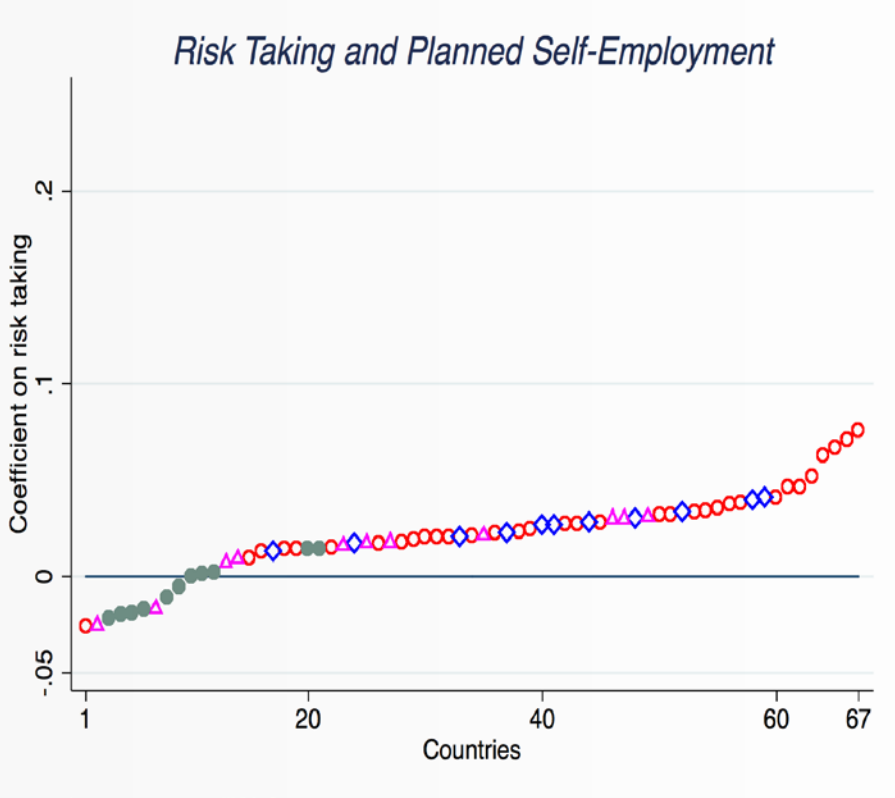
	Dependent variable:				
	Accumulation decisions		Risky choices		
	Saved last year	Education level	Own business	Plan to start business	Smoking intensity
	(1)	(2)	(3)	(4)	(5)
Patience	0.027***	0.033***			
	(0.01)	(0.00)			
Risk taking			0.024***	0.019***	0.032**
			(0.00)	(0.00)	(0.01)
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Constant	-0.38***	0.16**	-0.37***	0.094***	0.067
	(0.09)	(0.07)	(0.04)	(0.03)	(0.11)
Region FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Observations	14459	68409	62125	50687	14490
$_R2$	0.183	0.359	0.137	0.167	0.229

Patience and Accumulation – Universality and Country-Specificity

Relationship between patience and accumulation decisions separately by country. Green dots: not statistically different from zero at the 10% level, while red / blue / pink dots denote countries in which the effect is significant at the 1% / 5% / 10% level, respectively.

Risk Preferences and Self-employment – Universality and Country-Specificity





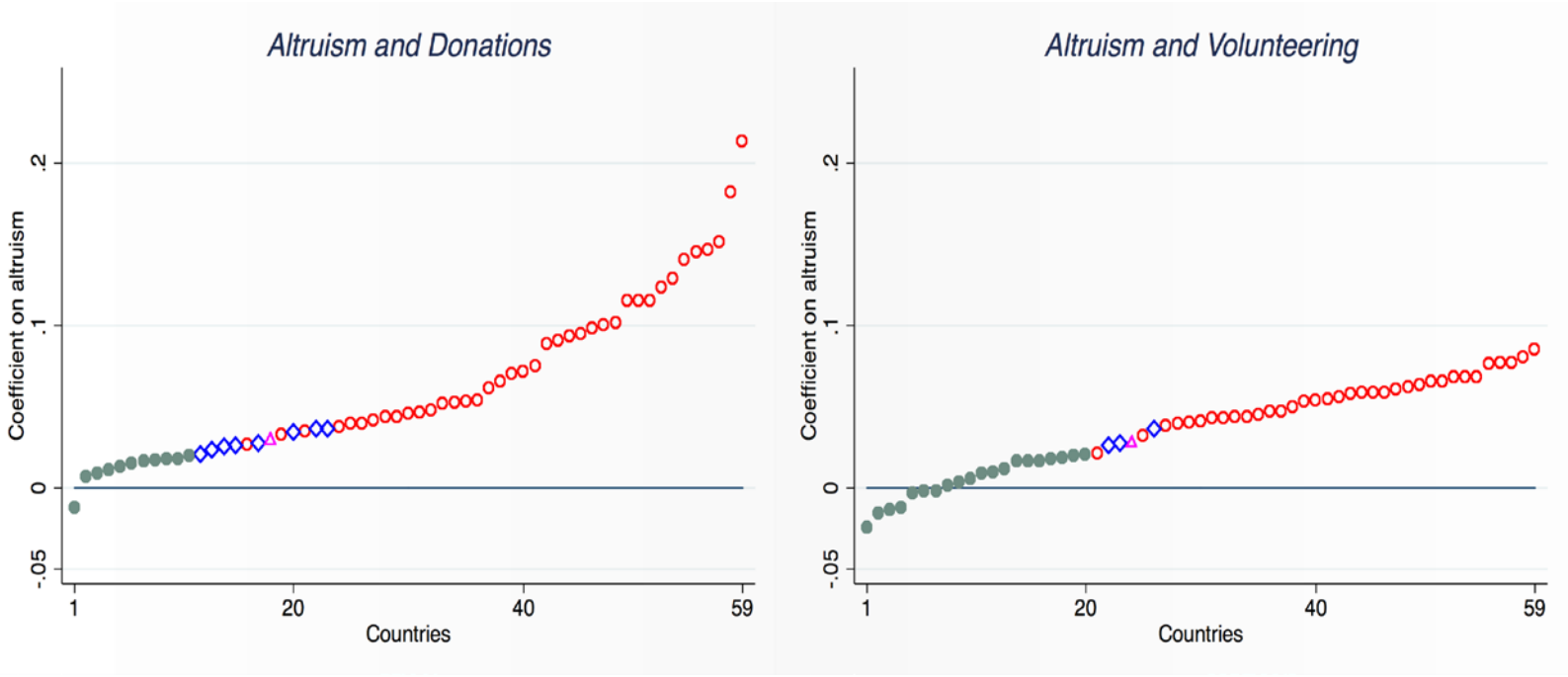
Relationship between patience and accumulation decisions separately by country. Green dots: not statistically different from zero at the 10% level, while red / blue / pink dots denote countries in which the effect is significant at the 1% / 5% / 10% level, respectively.

Social Preferences and Social Interactions

	Dependent variable:						
	Donated money (1)	Volunteered time (2)	Helped stranger (3)	Sent money to other individual (4)	Voiced opinion (5)	Have friends I can count on (6)	In a relationship (7)
Altruism	0.059***	0.038***	0.052***	0.032***	0.023***	0.017***	0.0032
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Positive reciprocity	0.0049	0.0031	0.034***	0.020***	-0.0016	0.016***	0.0085***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Negative reciprocity	-0.0024	-0.00058	-0.0024	0.0032	0.017***	0.0016	0.00041
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Constant	0.30***	0.030	0.33***	-0.25***	0.016	0.32***	-0.38***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.05)
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	52686	52677	52473	52812	52421	58479	67420
R^2	0.241	0.138	0.148	0.179	0.105	0.170	0.237

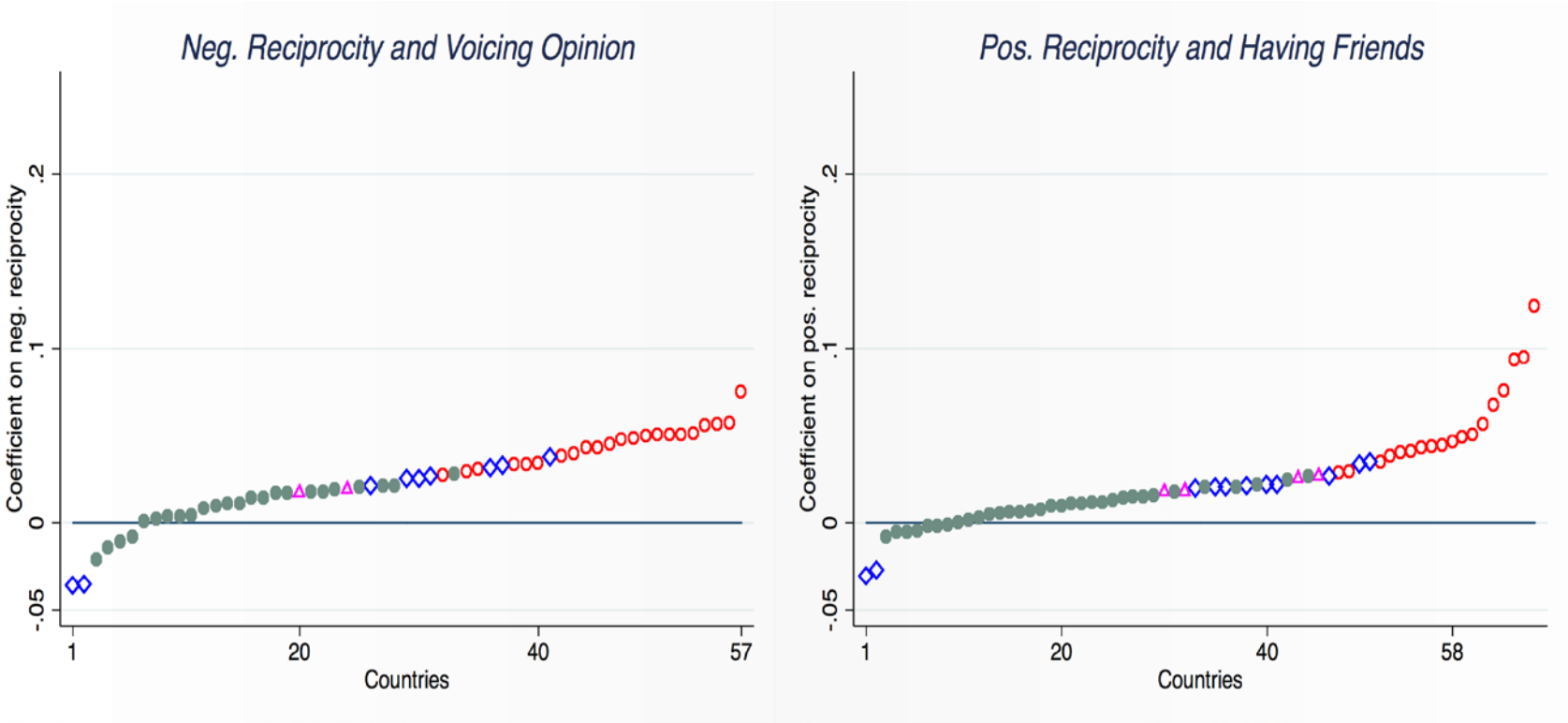
Table: Social preferences and social interactions

Social Preferences and Behavior – Universality and Country-Specificity



Relationship between patience and accumulation decisions separately by country. Green dots: not statistically different from zero at the 10% level, while red / blue / pink dots denote countries in which the effect is significant at the 1% / 5% / 10% level, respectively.

Social Preferences and Behavior – Universality and Country-Specificity



Relationship between patience and accumulation decisions separately by country. Green dots: not statistically different from zero at the 10% level, while red / blue / pink dots denote countries in which the effect is significant at the 1% / 5% / 10% level, respectively.

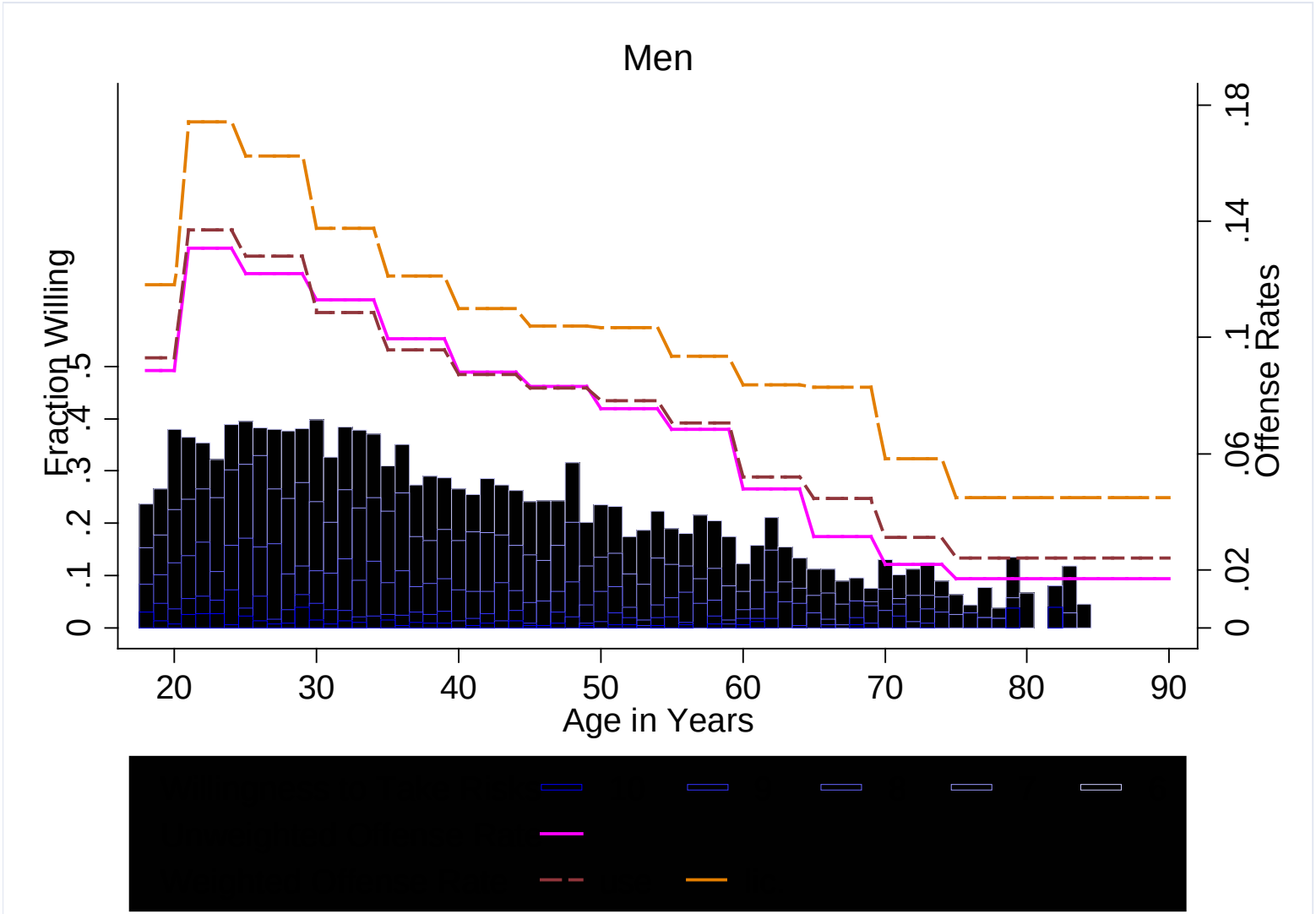
Measured risk attitudes and economic outcomes

evidence from Dohmen, Falk, Huffman, Sunde, Schupp, Wagner (2011, JEEA)

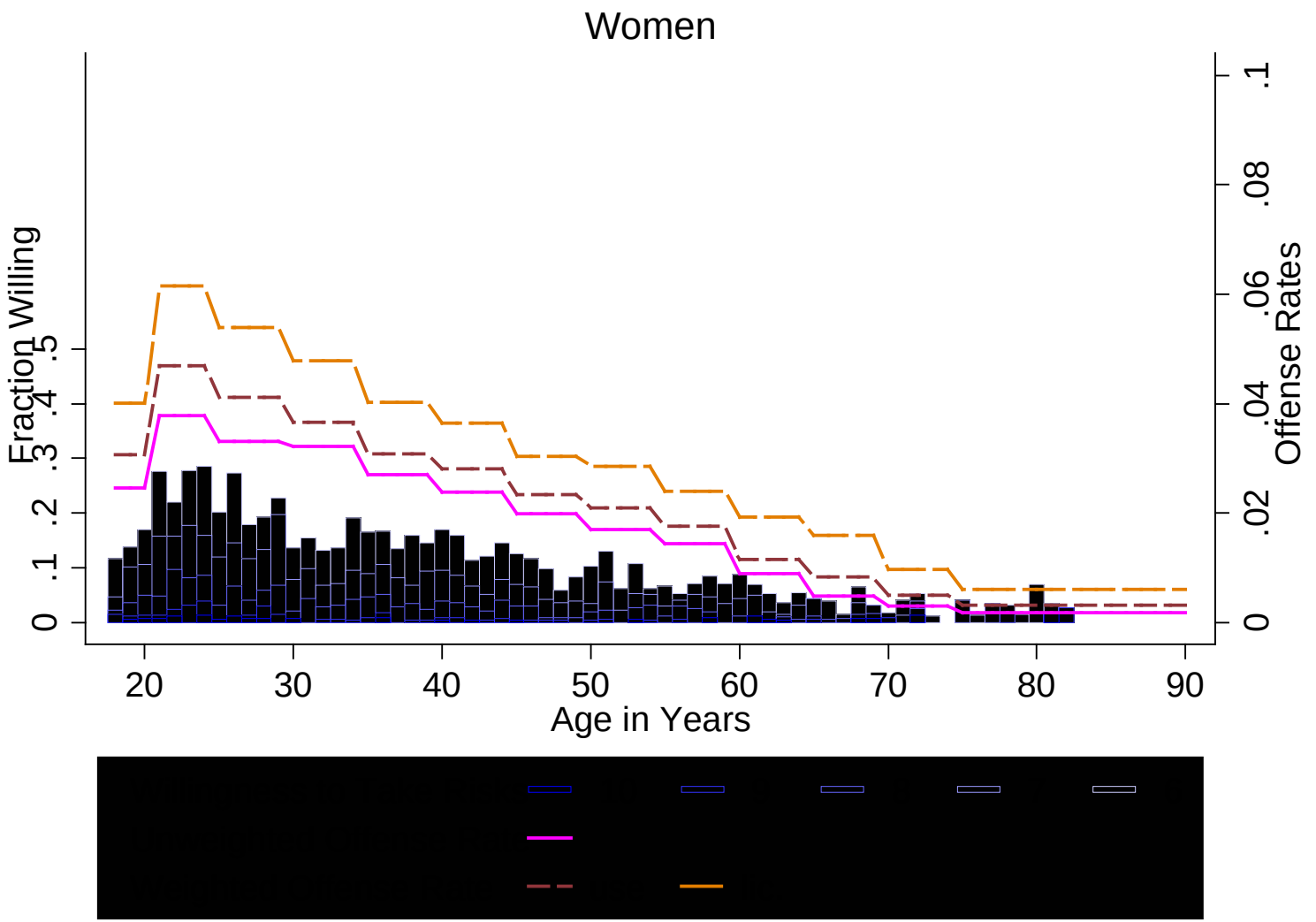
- Holding stock:
  - a one standard deviation increase in willingness to take risks (in financial matters) is associated with a 35 percent increase in the probability of holding stocks
- Self-employment:
  - a one standard deviation increase in willingness to take risks (general risk question) is associated with a 30 percent increase in the probability of being self-employed
- Educational choice
- Investment in health
- Traffic offenses

Dependent variable:	Investment instocks	Active sports	Self-employed	Smoking
	(1)	(2)	(3)	(4)
Willingness to take risks in general	0.029***	0.061***	0.024***	0.037***
	[0.006]	[0.005]	[0.003]	[0.004]
	(-3,993)	(-7,426)	(-2,599)	(-7,772)
Willingness to take risks in ~~~Car driving	0.024***	0.037***	0.007**	0.018***
	[0.006]	[0.005]	[0.003]	[0.004]
	(-3,996)	(-7,489)	(-2,636)	(-7,801)
~~Financial matters	0.117***	0.063***	0.013***	-0.003
	[0.006]	[0.005]	[0.003]	[0.004]
	(-3,799)	(-7,425)	(-2,626)	(-7,810)
~~Sports and leisure	0.052***	0.143***	0.003	0.002
	[0.006]	[0.005]	[0.003]	[0.005]
	(-3,969)	(-7,075)	(-2,638)	(-7,810)
~~Career	0.035***	0.065***	0.036***	0.025***
	[0.006]	[0.005]	[0.003]	[0.004]
	(-3,987)	(-7,419)	(-2,539)	(-7,793)
~~Health	0.023***	0.029***	0.012***	0.060***
	[0.006]	[0.005]	[0.003]	[0.004]
	(-3,997)	(-7,499)	(-2,628)	(-7,704)
Observations	7,345	13,52	9,897	13,571
Unconditional probability (dependent variable=1)	0.341	0.662	0.084	0.294

Traffic Offenses and Willingness to Take Risks



Traffic Offenses and Willingness to Take Risks



Measured risk attitudes and economic outcomes:

- Sorting into occupations based on earnings variance
  - Bonin et al. (2007 Labour Economics)
  - Pollmann, Dohmen, Palm (2012)
  - Fouarge, Dohmen, Kriechel (2012)
  - Skriabikova, Dohmen, Kriechel (2012)
- Geographical mobility:
  - Jaeger et al. (2010, Review of Economics and Statistics)
- Sorting into incentive schemes:
  - Dohmen and Falk (2011, AER)
  - Dohmen and Falk (2010, EJ)

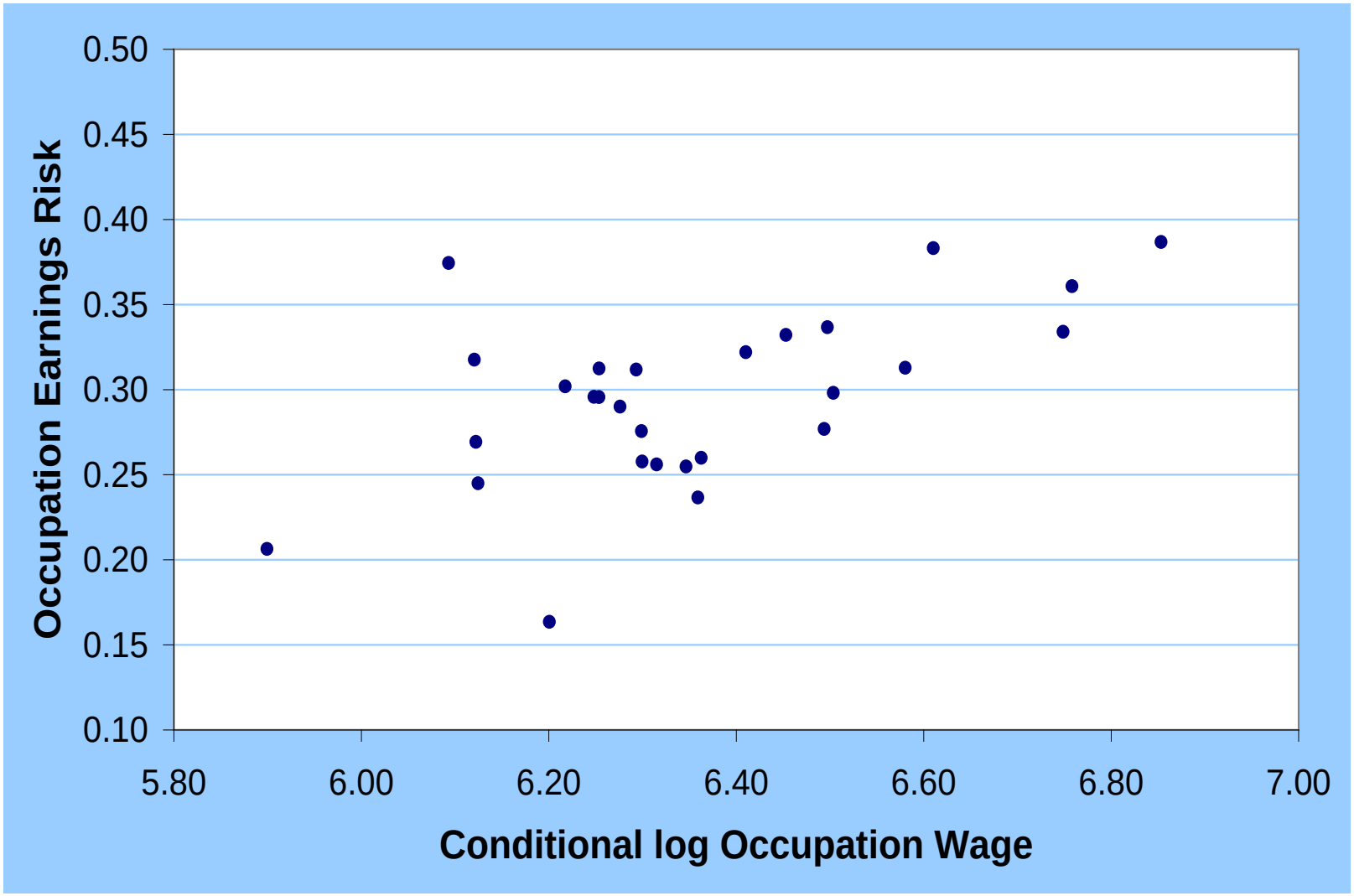
DIRECT EVIDENCE ON RISK ATTITUDES AND MIGRATION

Cross-sectional earnings risk and occupational sorting:
The role of risk attitudes

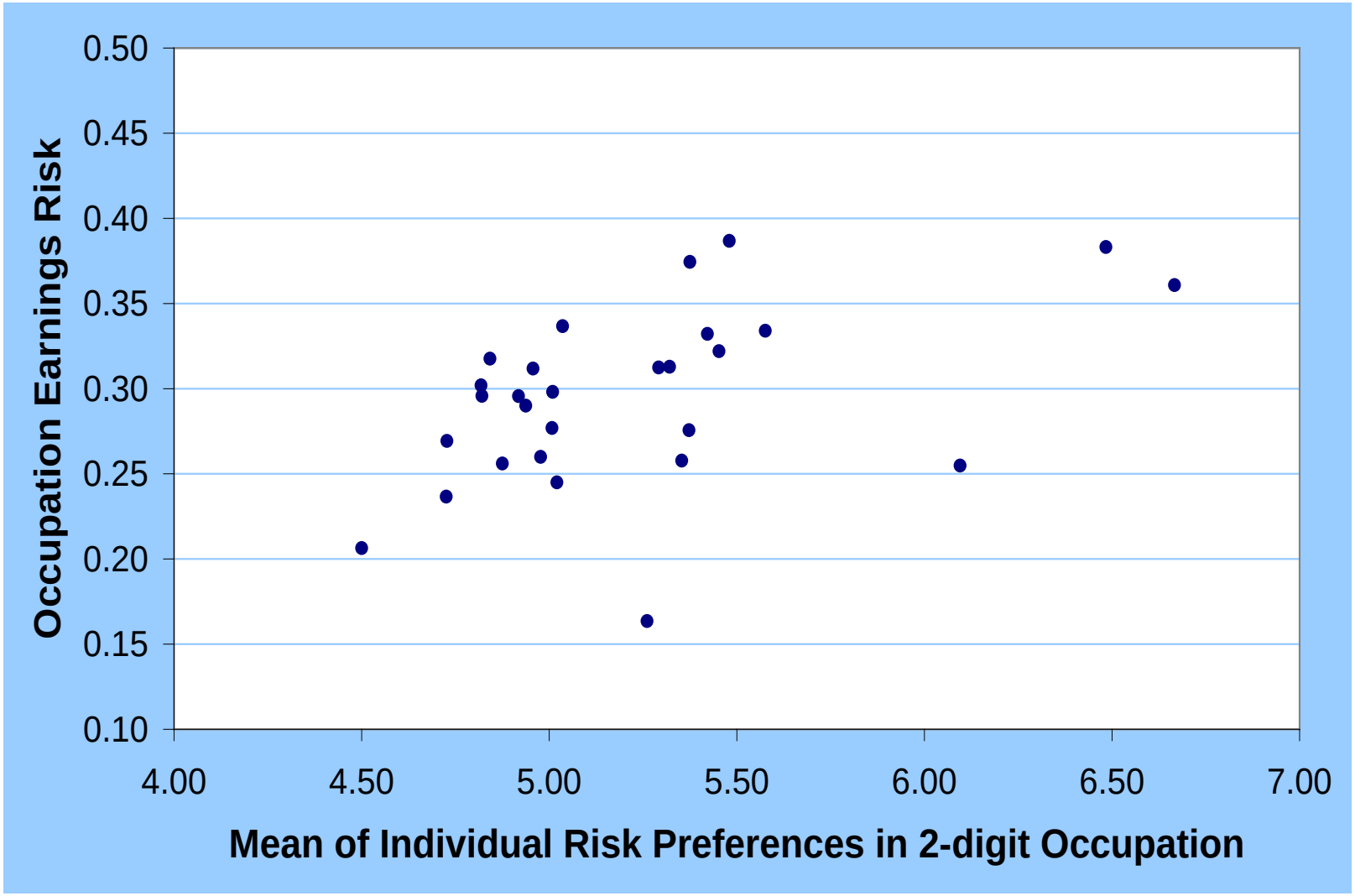
Holger Bonin, Thomas Dohmen, Armin Falk, David Huffman, Uwe Sunde

Labour Economics 2007

Occupational Earnings Risk



Risk Attitudes and Occupational Sorting



Earnings Risk and Average Individual Risk Attitudes

Dependent Variable: Standard Deviation of Occupational Wage Residuals				
	2-digit ISCO	Classification	3-digit ISCO	Classification
	(1)	(2)	(3)	(4)
Mean Risk Attitude by Occupation	0.051**	0.047**	0.035**	0.033**
	(0.019)	(0.018)	(0.014)	(0.014)
Constant	0.044	0.065	0.113	0.126*
	(0.095)	(0.093)	(0.075)	(0.073)
Observations	28	28	102	102
R-squared	0.22	0.20	0.06	0.05

OLS estimates. Robust standard errors, allowing for clustering at the 2-digit occupation level, in parentheses;***, **, * indicate significance at 1-, 5-, and 10-percent level, respectively. Dependent Variable is standard deviation of wage residuals on 2-digit occupation level in specifications in columns (1)-(2), and on 3-digit occupation level in specifications in columns (3)-(4).

Earnings Risk and Individual Risk Attitudes

Dependent Variable: Standard Deviation of Occupational Wage Residuals			
	(1)	(2)	(3)
General Risk Attitude	0.001***	0.001***	0.001**
	(0.0004)	(0.0003)	(0.0003)
Experience *100		0.020	0.009
		(0.014)	(0.012)
Tenure *100		0.005	−0.009
		(0.015)	(0.015)
Years of Education		0.004***	0.002***
		(0.001)	(0.001)
Married living together		−0.001	−0.002
		(0.002)	(0.002)
Body height *10		0.002*	0.001
		(0.001)	(0.001)
East Germany		−0.003	0.002
		(0.001)	(0.002)
Public Sector Employment		−0.004	−0.002
		(0.007)	(0.007)
Log Monthly Income			0.014**
			(0.006)
Constant	0.299***	0.219***	0.143**
	(0.001)	(0.013)	(0.058)
Observations	4094	3985	3605
R-squared	0.004	0.11	0.13

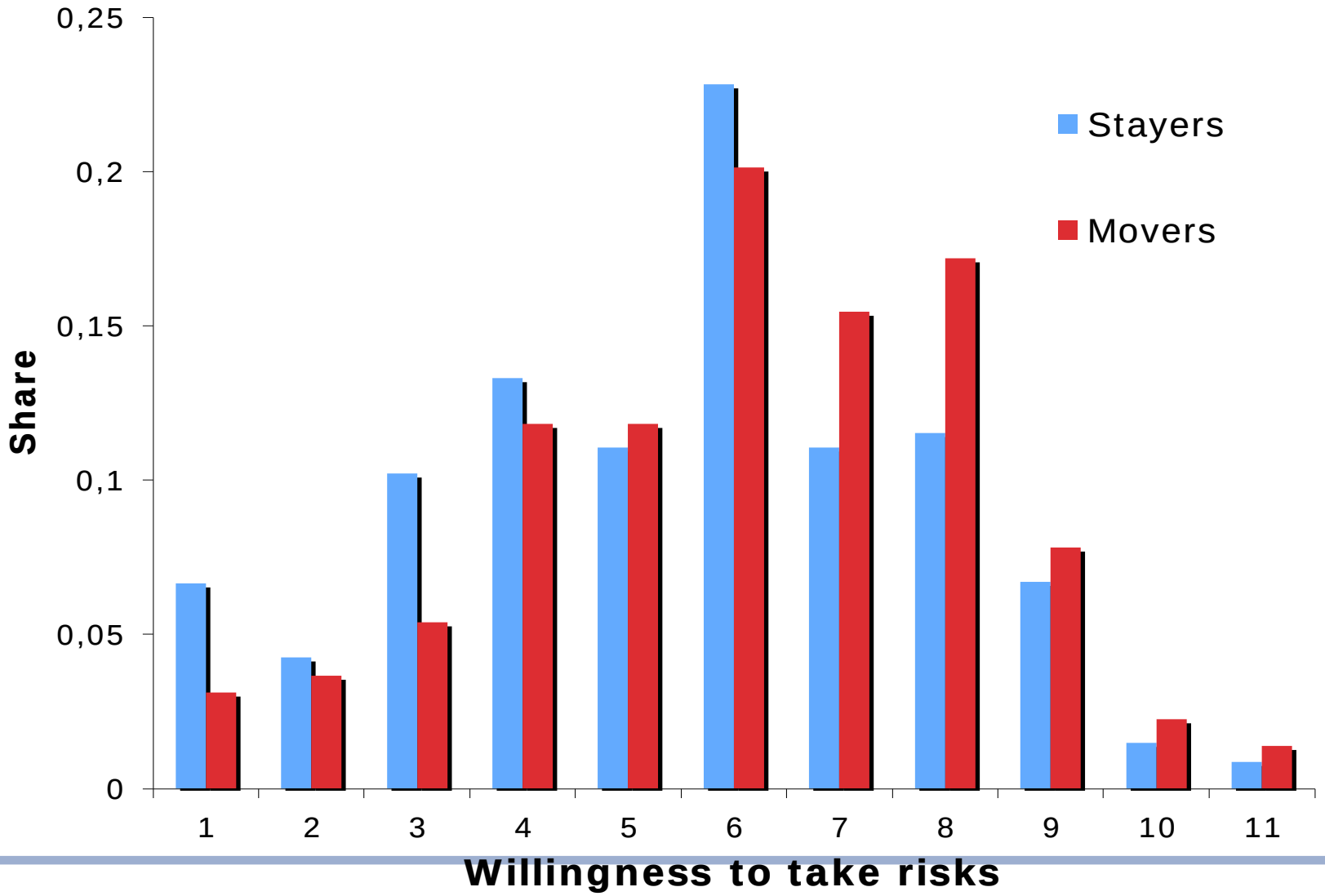
OLS estimates. Robust standard errors of coefficient estimates, allowing for clustering at the 2-digit occupation level, in parentheses; ***, **, * indicate significance at 1-, 5-, and 10-percent level, respectively. Dependent Variable is the standard deviation of occupational wage residuals, obtained from wage regressions of specification (2) in Table 1, on 2-digit ISCO Classification level.

DIRECT EVIDENCE ON RISK ATTITUDES AND MIGRATION

David A. Jaeger, Thomas Dohmen, Armin Falk, David Huffman,
Uwe Sunde, and Holger Bonin

Review of Economics and Statistics, 2010, 92(3): 684–689

Risk Attitudes and Regional Mobility in Germany



Regression results

TABLE 3.—ARE RISK ATTITUDES AFFECTED BY MIGRATION?

Dependent Variable and Covariates	*N*	Mean of Dependent Variable	Marginal Effects (1)	(2)	(3)
Effect of Risk Index (2004) on:					
a. Ever moved, 2000–2004	10,155	.044	.0048	.0030	.0017
			(.0009)	(.0008)	(.0007)
b. Moved, 2004–2006	10,155	.019	.0026	.0017	.0011
			(.0006)	(.0005)	(.0005)
c. Moved, 2004–2006, no prior moves	9,706	.014	.0017	.0012	.0008
			(.0005)	(.0005)	(.0005)
Effect of ever moved, 2004–2006, on:					
c. Change in risk index, 2004–2006	10,108	0.285	−.2493	−.1939	−.1123
			(.2653)	(.2658)	(.2643)
d. Risk index 2006, including Risk index 2004 as a covariate	10,108	4.784	.2463	.1785	.1624
			(.2343)	(.2352)	(.2360)
Covariates					
Age, female				X	X
Origin, married, years of education					X

Source: Authors' tabulations from the 2000–2006 waves of the SOEP.

Note: Standard errors in parentheses. Entries in rows a–c are marginal effects from probit estimation, evaluated at sample means. Entries in rows c and d are coefficients from OLS estimation. The risk index is an individual's response to a question asking about "willingness to take risks, in general" on a scale from 0 to 10, where 0 indicates "unwilling to take risks" and 10 indicates "very willing to take risks." Covariates measured at the beginning of period (in 2000 and 2004).

Risk Preferences and Schooling Decisions

Positive or negative correlation?

- Theory does not lead to unambiguous predictions
- Empirical evidence is mixed

For references see:

Hartog, Joop and Luiz Diaz-Serrano (2014). Why Do We Ignore the Risk in Schooling Decisions? IZA Discussion Paper 8110. (http://ftp.iza.org/dp8110.pdf)

Hartog, Joop and Luiz Diaz-Serrano (2013). Schooling as a Risky Investment: A Survey of Theory and Evidence. Foundation and Trends in Microeconomics 9(3-4), 159-331.

Field Evidence on Success and Prevalence of Homo Reciprocans

Based on Thomas Dohmen, Armin Falk, David Huffman, Uwe Sunde (2009). Homo Reciprocans: Survey Evidence on Behavioral Outcomes, Economic Journal, 119(536): 592-612

Questions

- How prevalent is Homo Reciprocans?
- Individual determinants of reciprocity?
- Correlation of positive and negative reciprocity?
- Consequences of reciprocity for economic and social outcomes (wages, subjective well-being, friendships)?
- Answering these questions requires
  - Leaving the lab, and using a large, representative samples
  - Combine measures of reciprocity with demographic variables

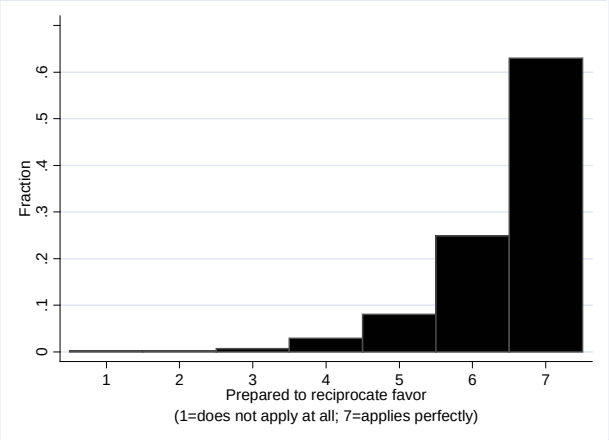
Data

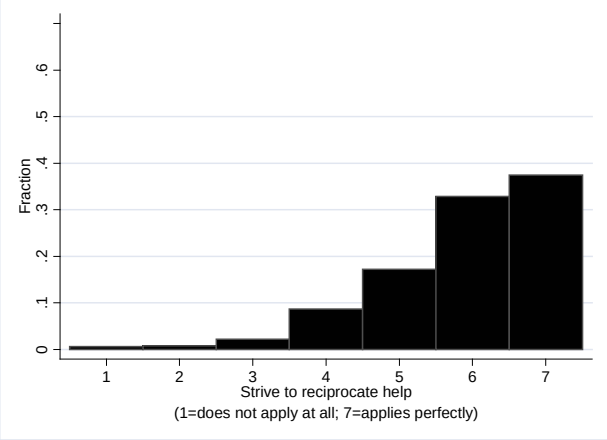
- Large sample SOEP (2005 wave)
  - About 22,000 individuals (age 17+), 12,000 households
  - Representative of the population
- Each adult household member is interviewed
- Extensive socio-demographic information
  - Individual characteristics
  - Family and household background

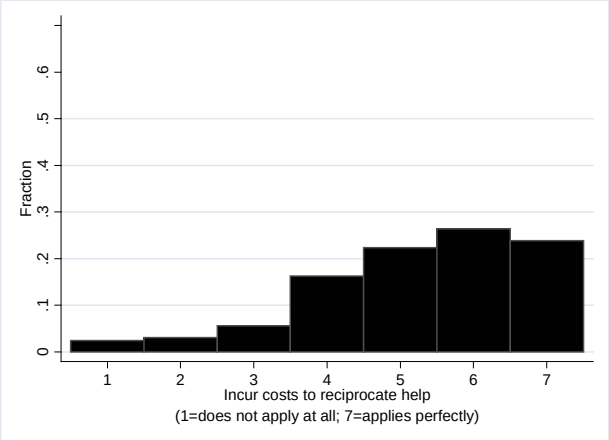
Reciprocity measures

- Positive reciprocity
  - If someone does me a favor, I am prepared to return it
  - I go out of my way to help somebody who has been kind to me before
  - I am ready to undergo personal costs to help somebody who helped me before
- Negative reciprocity
  - If I suffer a serious wrong, I will take revenge as soon as possible, no matter what the cost
  - If somebody puts me in a difficult position, I will do the same to him/her
  - If somebody insults me, I will insult him/her back
- 7-point scales
  - 1 means: “does not apply to me at all”; 7 means: “applies to me perfectly”
- Two questions ask explicitly whether the respondent would incur costs in order o be reciprocal
- 20,774 individuals responded to all six reciprocity measures

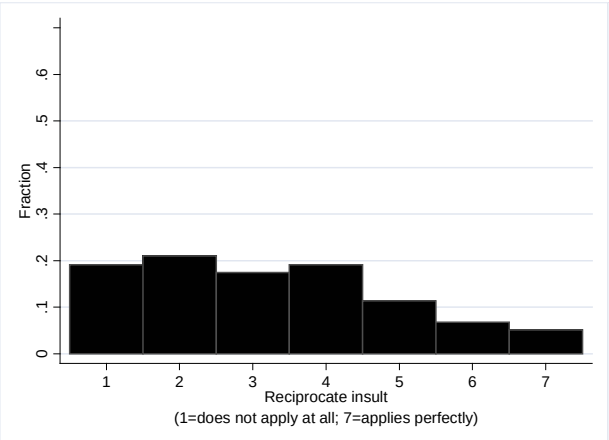
Positive Reciprocity Measures

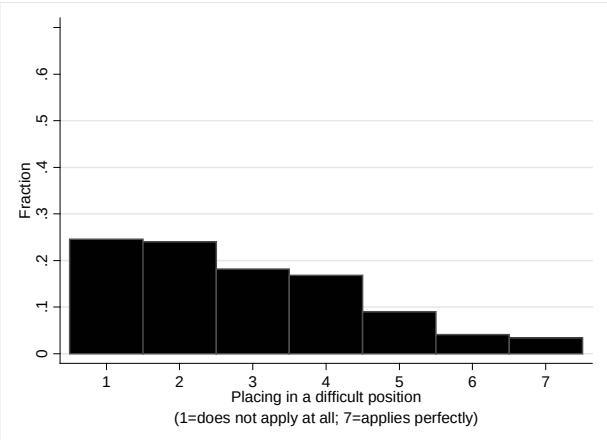


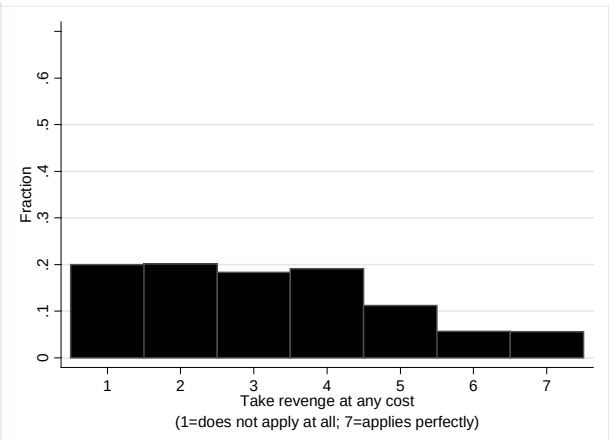




Negative Reciprocity Measures







Consequences of reciprocity

- Effort in employment relationships
  - Experiments and questionnaires: positive relation between wages and effort on the job, even when not enforceable
  - Hypothesized to reflect positive reciprocity among workers
    - Fehr, Kirchsteiger and Riedl (1993), Fehr and Falk (1998), Bewley (1999), Agell and Lundborg (1997) etc.
- Do we find evidence from the field that Homo Reciprocans works harder?
- Three measures of effort
  - Total weekly hours, overtime hours
  - Absenteeism

Reciprocity and Work Effort

Dependent Variable:	Actual Weekly Hours Worked (1)	Hours Overtime last Month (2)	Days of Sick Leave in 2004 (3)
Positive Reciprocity	0.222**	0.213***	-0.058
	[0.111]	[0.071]	[0.456]
Negative Reciprocity	-0.032	-0.023	0.514*
	[0.068]	[0.046]	[0.283]
Bad Subjective Health Status			7.586***
			[0.496]
Log Gross Monthly Income	10.297***	0.981***	9.963***
	[0.190]	[0.136]	[0.762]
Years of Education	-0.429***	-0.036	-0.675***
	[0.049]	[0.030]	[0.199]
Experience	-0.212***	0.007	-0.013
	[0.038]	[0.023]	[0.159]
Experience^2	0.001**	0	-0.006*
	[0.001]	[0.000]	[0.003]
Female	-3.843***	-0.778***	5.571***
	[0.232]	[0.137]	[0.956]
Constant	-30.584***	-4.188***	-103.135***
	[1.773]	[1.275]	[7.112]
Occupational Controls	Yes	Yes	Yes
Observations	9662	4314	8896
R-squared	0.53	0.11	

Reciprocity and Work Effort

Dependent Variable:	Actual Weekly Hours Worked (1)	Hours Overtime last Month (2)	Days of Sick Leave in 2004 (3)
Positive Reciprocity	0.222**	0.213***	-0.058
	[0.111]	[0.071]	[0.456]
Negative Reciprocity	-0.032	-0.023	0.514*
	[0.068]	[0.046]	[0.283]
Bad Subjective Health Status			7.586***
			[0.496]
Log Gross Monthly Income	10.297***	0.981***	9.963***
	[0.190]	[0.136]	[0.762]
Years of Education	-0.429***	-0.036	-0.675***
	[0.049]	[0.030]	[0.199]
Experience	-0.212***	0.007	-0.013
	[0.038]	[0.023]	[0.159]
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	[0.001]	[0.000]	[0.003]
Female	-3.843***	-0.778***	5.571***
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	[1.773]	[1.275]	[7.112]
Occupational Controls	Yes	Yes	Yes
Observations	9662	4314	8896
R-squared	0.53	0.11	

Consequences of reciprocity

- Sustaining employment relationships
  - Experimental evidence suggests positive reciprocity helps sustain long-term relationships
    - Brown, Falk, and Fehr (2004) on endogenous relations
  - Experimental and field evidence suggests workers retaliate against employers in response to unfair treatment
    - Bewley (1999); Mas and Kreuger (2004)

- Does positive reciprocity increase ability to stay employed?
- Does negative reciprocity make unemployment more likely?
  - Firms fire workers to prevent retaliation
  - Workers quit as a form of retaliation
  - More unemployment among negatively reciprocal workers

Reciprocity and Unemployment

Dependent Variable:	1 if unemployed
	(1)
Positive Reciprocity	-0.010***
	[0.003]
Negative Reciprocity	0.007***
	[0.002]
Years of Education	-0.018***
	[0.001]
1 if female	0.001
	[0.005]
Age (in Years)	0.002***
	[0.000]
Lived in GDR in 1989	0.089***
	[0.009]
Lived abroad in 1989	0.061***
	[0.018]
Residence in 1989 missing	0.035
	[0.036]
German Nationality	-0.033**
	[0.014]
Observations	12028

Additional controls are marital status, number of children in the household, and religious background.

Success of Homo Reciprocans

- Strategic disadvantage?
  - Wasting resources to engage in costly rewards and sanctioning
- Strategic advantage?
  - Credible signal of reward or retaliation leads to better treatment
  - Social competence: friendships and networks
- Three measures of success
  - Number of close friends (SOEP question)
  - Income (Mincerian wage regression)
  - Happiness (SOEP question)
    - Important goal of human life and summarizing success and achievement in a general way (see Frey and Stutzer 2002)

Success of Homo Reciprocans

Dependent Variable:	Number of Friends (1)	Log Income (2)	Log Income (3)	Overall Life Satisfaction (4)
Positive Reciprocity	0.217***	0.020***	0.005	0.172***
	[0.039]	[0.008]	[0.006]	[0.016]
Negative Reciprocity	-0.078***	0.006	0.004	-0.103***
	[0.027]	[0.005]	[0.004]	[0.010]
Actual weekly hours			0.032***	
			[0.001]	
Controls 1	No	Yes	Yes	No
Controls 2	Yes	No	No	Yes
Observations	15704	9856	9662	16698
R-squared	0.03	0.49	0.66	

Controls 1: years of education, experience, experience-squared, female

Controls 2: years of education, age, married, divorced, widowed, region, employment status, health status, log monthly income

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Controls 1: years of education, experience, experience-squared, female

Controls 2: years of education, age, married, divorced, widowed, region, employment status, health status, log monthly income

Summary

- Reciprocity rule rather than exception
- Heterogeneity and surprisingly weak correlation between positive and negative reciprocity
  - Suggests that positive and negative reciprocity are distinctive behavioral concepts
  - Corroborated by asymmetry in determinants (gender, age and height)
- Positive relation between positive reciprocity and higher work effort
- Positively reciprocal people report having more close friends and a higher overall level of life satisfaction.
- In this sense, Homo Reciprocans - in the positive domain - is in fact more successful than his or her non-reciprocal fellows

Negative Reciprocity and Outcomes

Raymond Montizaan, Andries de Grip, Frank Cörvers, Thomas Dohmen (2016) The Impact of Negatively Reciprocal Inclinations on Worker Behavior: Evidence from a Retrenchment of Pension Rights. Management Science 62(3):668-681

Motivation

- Experimental economists and psychologists have provided ample evidence that reciprocity is a key driver of human motivation (e.g. Bowles, 2008; Fehr and Gächter, 2000; and many other studies).
- Theory predicts that reciprocity also affects labor market outcomes (Akerlof, 1982; Rabin, 1993).
- Convincing evidence on effect of positive reciprocity in labor markets of lab experiments (Fehr et al., 1993; Fehr and Falk, 1999; Brown et al., 2004).
- More controversial evidence from field experiments (Gneezy and List, 2006; Cohn et al., 2009; Bellemare and Shearer, 2009; Kube et al., 2012; Kube et al., 2011).

Motivation

- Some studies have focused on the impact of unfair treatment on workers' motivation.
  - Greenberg (1990, Journal of Applied Psychology):
    quasi-experimental field study documenting that wage cuts affect the rate of employee theft in manufacturing plants.
  - Krueger and Mas (2004, JPE):
    Case study that shows that labor strife at a U.S. tire production site coincides with the production of substantially lower quality tires.
  - Mas (2006, QJE):
    negative outcomes in final offer arbitrations for police unions in New Jersey significantly reduce police performance.
  - Mas (2008, REStud):
    contract dispute between a labor union and Caterpillar substantially reduced the quality of construction equipment produced by Caterpillar in that period.
  - Kube et al. (2012):
    a wage cut significantly decreases the productivity of student workers in a data entry job.
  - Dohmen, Falk, Huffman, Sunde (2009, EJ):
    Evidence based on survey data from the German Socio-Economic Panel Study (SOEP) that negatively reciprocal workers tend to be unemployed more often

Research question in this paper

- Do reciprocal inclinations of workers catalyze a reduction in effort provision after unfair treatment?
  - Do workers reduce effort (become less motivated) after being treated unfairly?
  - **Does the treatment effect (measured as reduction in job motivation) depend on workers' reciprocal inclinations?**

Approach in this paper

- Focus on actual labor market (the Dutch public sector)
- Exploit data from a quasi-natural experiment that entailed a treatment that is likely to be perceived as unfair by a group of "treated" workers.
  - Exogenous change in pension rights for public sector workers.
  - Sizable differential treatment of different age cohorts.
  - Exact design came as a surprise.
- Clearly defined discontinuity in policy splits sample into two groups of otherwise similar workers
  - Workers born before 1950 (who are still eligible for generous pension benefits under the old system).
  - Workers born on or after January 1st 1950.
- Use a regression discontinuity design (Imbens and Lemieux, 2008; Lee and Lemieux, 2010).

Background: The Dutch Pension System

- 3 Pillars
  - State old age pension
    - Inhabitants aged 65 and older are eligible
    - Pay-as-you-go system financed by income taxes
  - Supplementary sector pension
    - Defined benefit type
    - Mandatory
    - Offer scope for early retirement schemes
  - Private pension plans
    - Typically annuity payments
    - Voluntary
    - Not widespread

Background: The 2006 reform

- Abolishment of favorable tax treatment of contributions to early retirement schemes in sectoral pension systems
  - Introduced January 1, 2006 (announced July 5, 2005)
  - Does not affect workers born on December 31, 1949 and earlier
  - Exact design came as a surprise (when the policy was announced): i.e. size of discontinuity in treatment and affected cohorts
  - Specific situation for public sector: government is initiator of the reform and employer

Effect of reform on pension benefits: An example

- Before reform:
  - a worker with 40 years of tenure in the public sector could retire at age 62 and 3 months at a replacement rate of 70 percent
- After reform:
  - a worker with 40 years of tenure in the public sector who retires at age 62 and 3 months attains a replacement rate of 64 percent

Data

- Matched survey and administrative data of male public sector workers born in 1949 and 1950
- Administrative data from the pension fund (ABP)
  - Individual pension rights, annual wage income, tenure in the public sector and organization size
- The Survey
  - Invited all 27,871 male public sector workers born in 949 or 1950
  - Wave March 2008: 6,078 respondents
  - Wave includes proxy for job effort, reciprocal inclinations, job characteristics, retirement expectations and savings
  - Due to item non-response, we have 4,520 men, of whom 2,373 were born in 1950.

detailed results

Data continued

- Measure job motivation of workers (proxy for effort)

- Agreement to the following statement:
  “At times, I have difficulties to motivate myself for my job.”

  - 5-point scale:
    1 means: “does perfectly apply to me”;
    5 means: “does not apply to me at all”

    ➔ a higher number is associated with higher job motivation

Data continued

- Elicit reciprocal inclinations of workers: (validated by Perugini et al., 2003)
  - Positive reciprocity
    - If someone does me a favor, I am prepared to return it.
    - I go out of my way to help somebody who has been kind to me before.
    - I am ready to undergo personal costs to help somebody who helped me before.
  - Negative reciprocity
    - If I suffer a serious wrong, I will take revenge as soon as possible, no matter what the cost.
    - If somebody puts me in a difficult position, I will do the same to him/her.
    - If somebody offends me, I will offend him/her back.
- 5-point scales
  - 1 means: “does not apply to me at all”; 5 means: "applies to me perfectly"

Behavioral relevance

- Perugini et al. (2003)
  - Criterion related validity:
    - Measures are significantly related to allocation choices that reward or punish others (e.g. positive reciprocity positively related to rewarding allocation after fair/cooperative choices)
    - Behavior in ultimatum game
- Dohmen et al. (2009)
  - Negatively reciprocal are unemployed more
  - Positively reciprocal work harder and receive higher wages

Empirical strategy

- Compare job motivation of treated workers to job motivation of untreated workers (i.e., those who are not affected by the reform)
- Assess whether the treatment effect depends on negatively reciprocal inclinations of treated workers
  - Identified as the interaction effect of negative reciprocity and the treatment dummy
- Comparison of treatment effect along additional dimensions
  - Perceived unfairness
  - Accountability

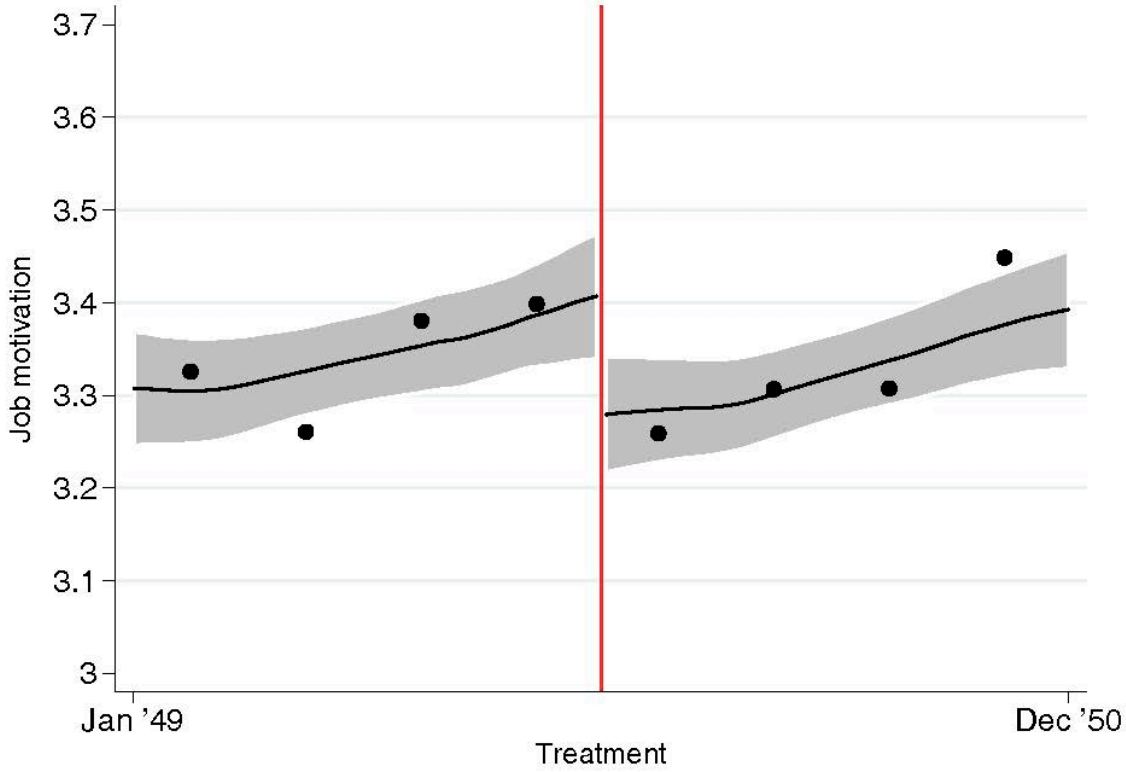
Descriptives

Descriptive statistics

	Entire sample	Born in 1949	Born in 1950
Take revenge for a serious wrong	3.06	3.06	3.06
	(1.04)	(1.04)	(1.05)
Retaliate for being put in a difficult position	2.54	2.54	2.54
	(0.85)	(0.84)	(0.86)
Reciprocate insult with an insult	2.60	2.60	2.62
	(0.91)	(0.90)	(0.91)
Reciprocate a favor	4.29	4.31	4.27
	(0.64)	(0.63)	(0.64)
Exert effort to help somebody who is kind	4.11	4.11	4.11
	(0.62)	(0.62)	(0.62)
Undergo personal costs to help someone …..	3.73	3.73	3.72
	(0.70)	(0.69)	(0.71)
Negative reciprocity (averaged)	2.73	2.74	2.73
	(0.79)	(0.78)	(0.79)
Positive reciprocity (averaged)	4.04	4.05	4.04
	(0.51)	(0.50)	(0.51)
Expected retirement benefit at age of 62	69.02	71.66	66.62
	(11.67)	(11.67)	(11.14)
Number of observations	4,520	2,147	2,373

distribution of neg. rec.

Figure 1 Job motivation



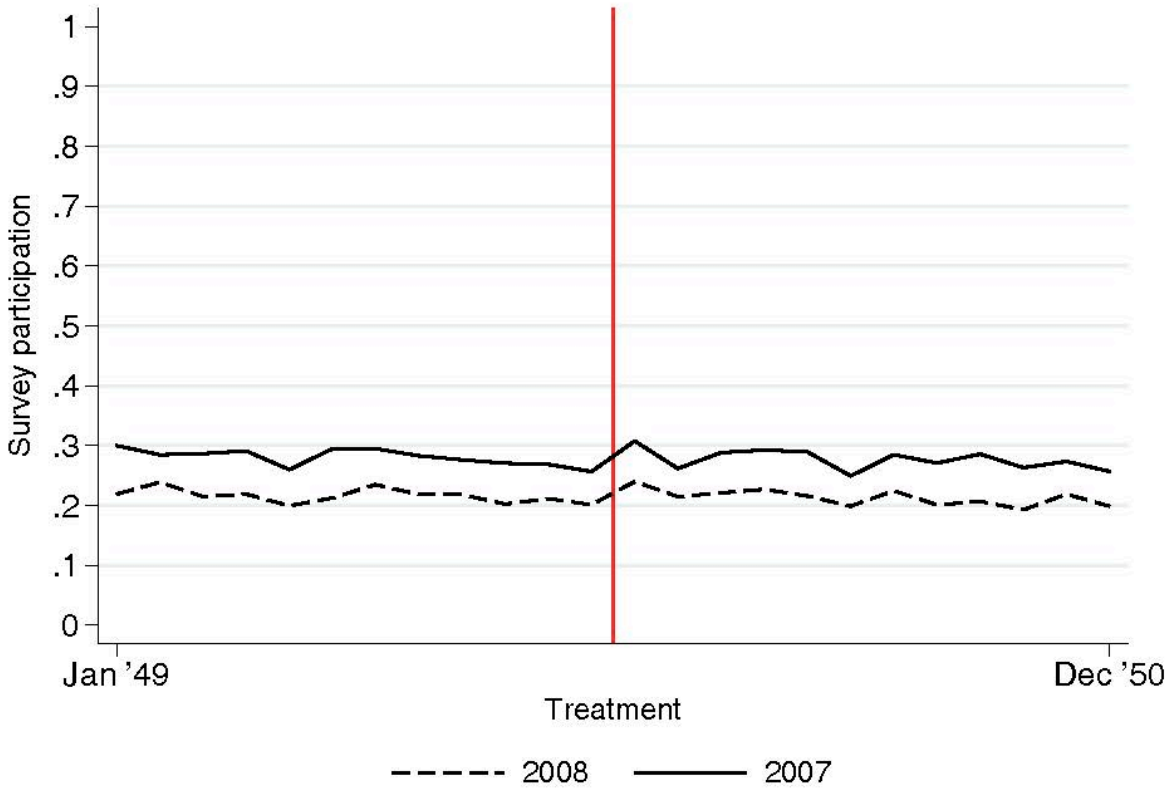
This figure presents birth quarter averages of job motivation and a local polynomial smooth of job motivation on birth date with a 95% confidence interval, using a Epanechnikov kernel function. The bandwidth used for the kernel function corresponds to the optimal bandwidth derived from the Imbens and Kalyanaraman procedure (Imbens and Kalyanaraman, 2012). Job motivation is based on the following 5-level Likert item: 'At times, I have difficulties to motivate myself for my job'. Answers categories ranged form 1 ('does applies perfectly to me') to 5 ('does not apply to me at all'). Our sample consists of two birth years where workers born in 1949 are entitled to the old pension rules and workers born in 1950 are subject to the new pension rules. The vertical line in the figure marks the threshold which divides the control from the treatment group.

Self-Selection

Non-respondents vs. respondents

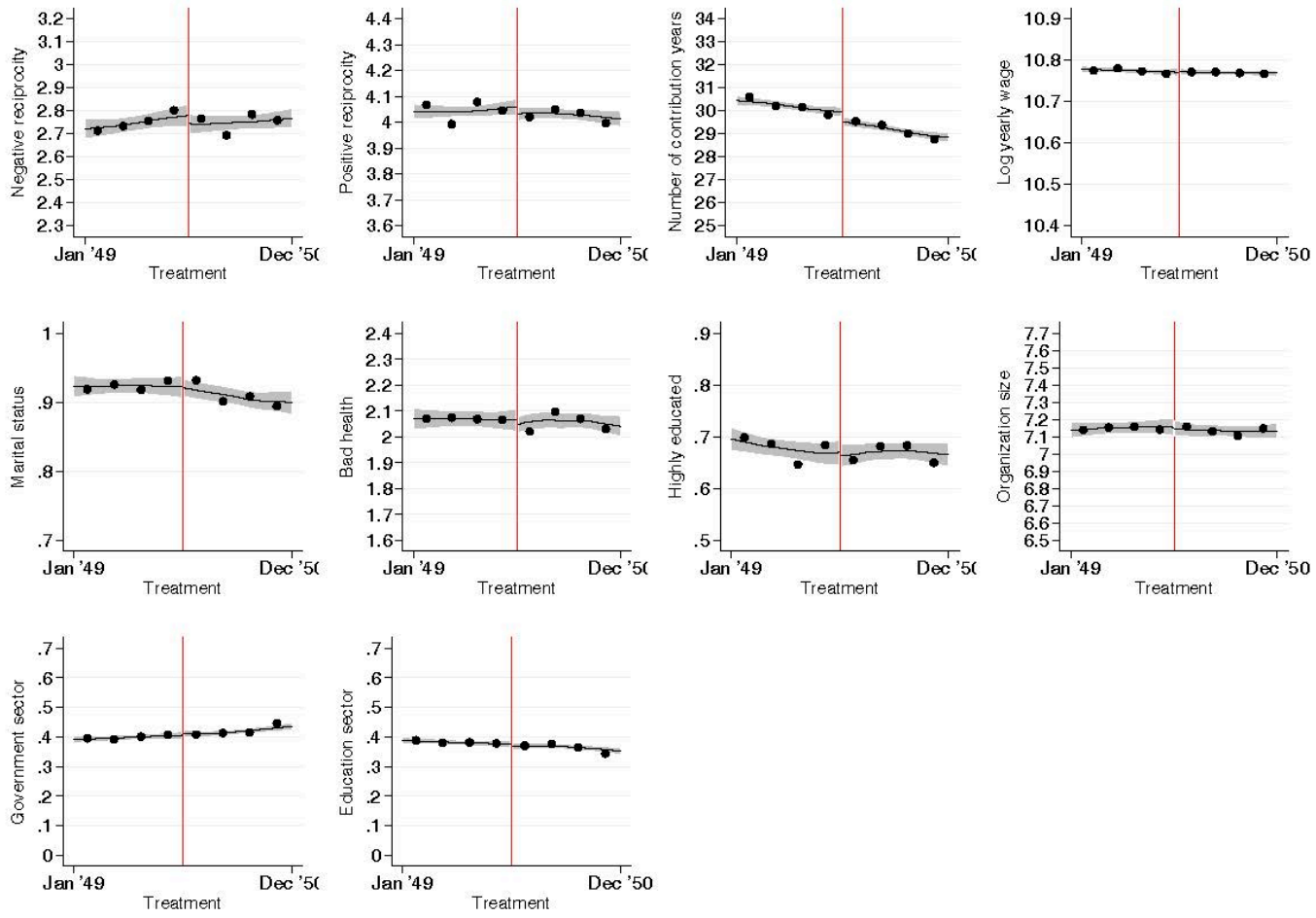
- No evidence of selective participation in survey
  - Those invited to participate were not informed about nature of questions and research goal
  - Difference in participation rates are very small:
    - In 2007: 30.5% in treatment vs. 31% in control
    - In 2008: 21.6% in treatment vs. 22.2% in control
  - Probit analyses confirm that selection into survey was not related to treatment
- No evidence that treated and untreated respondents differ with respect to observable characteristics

Figure A1 Survey participation



This figure presents the survey participation for each birth month. Our sample consists of two birth years where workers born in 1949 are entitled to the old pension rules and workers born in 1950 are subject to the new pension rules. The vertical line in the figure marks the threshold which divides the control from the treatment group.

Figure A6 RD-plots for all control variables



This figure presents birth quarter averages of all control variables and a local polynomial smooth of these variables on birth date with a 95% confidence interval, using a Epanechnikov kernel function. The bandwidth used for the kernel function corresponds to the optimal bandwidth derived from the Imbens and Kalyanaraman procedure (Imbens and Kalyanaraman, 2012).

Estimation Results

Table A2: Treatment and job motivation: OLS estimates

	(1)	(2)	(3)	(3)
Treatment	-0.163***	-0.160**	-0.152*	-0.151**
	(0.063)	(0.063)	(0.084)	(0.067)
Age	0.150***	0.112	0.128	0.133**
	(0.054)	(0.079)	(0.137)	(0.058)
Age x Treatment		0.072		
Age2		(0.108)	-0.087	
			(0.186)	
Age3			0.025	
			(0.138)	
Other Controls (years contributed to pension fund, log wage, marital status, size of organization)	no	no	no	yes
Negative reciprocity				-0.189***
				(0.022)
Positive reciprocity				-0.003
				(0.033)
Constant	3.418***	3.399***	3.411***	0.729
	(0.036)	(0.047)	(0.055)	(0.985)
Observations	5,287	5,287	5,287	4,524

The measures of negative and positive reciprocity used in Column 4 estimations are constructed by taking the average of the three underlying items. Additional control variables in the estimations in Column 4 are: educational levels; sector fixed effects. Standard errors are in parentheses. $***$ < 0.01, $**$ < 0.05, $*$ < 0.10.

Table 2: Negative reciprocity, treatment and job motivation: OLS estimates

	(1)	(2)	(3)	(4)	(5)
Negative reciprocity x treatment	**-0.173****	**-0.173****	**-0.174****	**-0.228****	**-0.192****
	(0.080)	**(0.080)**	**(0.080)**	**(0.106)**	**(0.085)**
Positive reciprocity x treatment	-0.038	-0.038	-0.030	0.053	-0.040
	(0.126)	(0.126)	(0.127)	(0.145)	(0.134)
Negative reciprocity	-0.107**	-0.107**	-0.103**	-0.075	-0.087*
	(0.046)	(0.046)	(0.052)	(0.063)	(0.050)
Positive reciprocity	0.016	0.016	-0.018	-0.060	0.019
	(0.073)	(0.073)	(0.083)	(0.091)	(0.078)
1 if treated	0.465	0.467	0.435	0.278	0.541
	(0.529)	(0.530)	(0.532)	(0.587)	(0.564)
Age	-0.002	-0.007	0.015	0.364	-0.106
	(0.454)	(0.461)	(0.456)	(0.718)	(0.488)
Age x treatment		0.007			
		(0.109)			
Age x negative reciprocity	0.060	0.060	0.072	0.052	0.061
	(0.070)	(0.070)	(0.100)	(0.104)	(0.074)
Age x positive reciprocity	-0.001	-0.001	-0.095	-0.068	0.017
	(0.107)	(0.108)	(0.153)	(0.155)	(0.115)
quadratic in age interacted with negative and positive reciprocity	no	no	yes		no
cubic in age interacted with negative and positive reciprocity	no	no	no	yes	no
Other Controls (years contributed to pension fund, log wage, marital status, size of organization)	no	no	no	no	yes
Constant	3.652***	3.650***	3.771***	3.853***	0.329
	(0.307)	(0.310)	(0.347)	(0.370)	(1.031)
Observations	5,182	5,182	5,182	5,182	4,524

detailed result

The measures of negative and positive reciprocity used in the estimations are constructed by taking the average of the three underlying items. Additional control variables in the estimations in Column 6 are: educational levels; sector fixed effects. Standard errors are in parentheses. * * * < 0.01, * * < 0.05, * < 0.1

Table A3: Negative reciprocity, treatment and job motivation: Ordered Probit estimates

	(1)	(2)	(3)	(4)	(5)
Negative reciprocity x treatment	-0.165**	-0.165**	-0.166**	-0.229**	-0.182**
	(0.075)	(0.075)	(0.075)	(0.099)	(0.080)
Positive reciprocity x treatment	-0.066	-0.067	-0.059	0.025	-0.066
	(0.118)	(0.118)	(0.119)	(0.136)	(0.126)
Negative reciprocity	-0.107**	-0.106**	-0.104**	-0.071	-0.088*
	(0.043)	(0.043)	(0.049)	(0.059)	(0.047)
Positive reciprocity	0.043	0.044	0.007	-0.037	0.045
	(0.068)	(0.069)	(0.078)	(0.085)	(0.073)
Treatment	0.568	0.572	0.538	0.408	0.630
	(0.496)	(0.497)	(0.498)	(0.549)	(0.530)
Age	-0.090	-0.102	-0.075	0.212	-0.183
	(0.426)	(0.432)	(0.427)	(0.671)	(0.458)
Age x negative reciprocity	0.055	0.055	0.062	0.038	0.057
	(0.065)	(0.065)	(0.093)	(0.097)	(0.070)
Age x positive reciprocity	0.021	0.022	-0.080	-0.054	0.036
	(0.101)	(0.101)	(0.143)	(0.145)	(0.108)
Age x Treatment		0.017			
quadratic in age interacted with negative and positive reciprocity	no	no	yes		no
cubic in age interacted with negative and positive reciprocity	no	no	no	yes	no
Other Controls (years contributed to pension fund, log wage, marital status, size of organization)	no	no	no	no	yes
Observations	5,182	5,182	5,182	5,182	4,524

The measures of negative and positive reciprocity used in the estimations are constructed by taking the average of the three underlying items. Additional control variables in the estimations in Column 7 are: educational levels; sector fixed effects. Standard errors are in parentheses. $***$ < 0.01, $**$ < 0.05, $*$ < 0.10.

Perceived unfairness of the policy change

Table 3: Treatment effect on job motivation: Results for different birth date bandwidths

	(1) I 1950 vs IV 1949	(2) II-IV 1950 vs IV 1949
Negative reciprocity x treatment	**-0.354****	**-0.123**
	(0.160)	**(0.126)**
Positive reciprocity x treatment	0.128	-0.057
	(0.262)	(0.196)
Negative reciprocity	-0.011	-0.095
	(0.092)	(0.062)
Positive reciprocity	-0.069	0.050
	(0.153)	(0.101)
Treatment	0.565	0.377
	(1.093)	(0.826)
Age	1.166	0.290
	(3.835)	(0.926)
Age x Negative reciprocity	0.644	-0.036
	(0.562)	(0.146)
Age x Positive reciprocity	-0.966	-0.004
	(0.910)	(0.218)
Constant	3.601***	3.494***
	(0.641)	(0.427)
Observations	1,280	2,526

OLS estimates. In Column 1, workers born in the first quarter of 1950 are compared to workers in the control group who were born in the fourth quarter of 1949, which corresponds to the optimal bandwidth which we derived by implementing the procedure of Imbens and Kalyanaraman (2012). Column 2 compares workers born in the second, third or fourth quarter of 1950 with those born in the fourth quarter of 1949. Standard errors are in parentheses. $*$ $*$ $*$ < 0.01, $*$ $*$ < 0.05, $*$ < 0.10.

Table 4: Treatment effect on job motivation: social comparisons

	(1) Percentage untreated colleagues above median	(2) Percentage untreated colleagues below median
Negative reciprocity x treatment	**-0.269****	**-0.074**
	(0.115)	**(0.116)**
Positive reciprocity x treatment	0.090	-0.169
	(0.185)	(0.179)
Negative reciprocity	-0.089	-0.118*
	(0.065)	(0.069)
Positive reciprocity	-0.031	0.038
	(0.104)	(0.107)
Treatment	0.220	0.750
	(0.784)	(0.748)
Age	0.603	-0.572
	(0.668)	(0.638)
Age x negative reciprocity	0.075	0.012
	(0.100)	(0.101)
Age x Positive reciprocity	-0.163	0.162
	(0.157)	(0.152)
Constant	3.777***	3.594***
	(0.436)	(0.450)
Observations	2,542	2,472

All columns show results which are based on OLS estimates. We use administrative data on the total number of workers in the organization in which each employee is working to construct proxies for the incidence of social comparisons in the organization. We determine whether treated workers who were born in 1950 are working in an organization in which the group of untreated workers who were born in 1949 is comparatively large (percentage untreated above or under median). Standard errors are in parentheses. $***$ < 0.01, $**$ < 0.05, $*$ < 0.10.

Accountability: The nature of the employer – employee relation

Table 5: Treatment effect on job motivation: Heterogenous sector effects

	(1) Government	(2) Other sectors
Negative reciprocity x treatment	**-0.256****	**-0.108**
	(0.124)	**(0.105)**
Positive reciprocity x treatment	0.033	-0.108
	(0.194)	(0.167)
Negative reciprocity	-0.084	-0.131**
	(0.074)	(0.059)
Positive reciprocity	-0.004	0.057
	(0.113)	(0.096)
Treatment	0.347	0.614
	(0.795)	(0.709)
Age	0.509	-0.433
	(0.678)	(0.611)
Age x Negative reciprocity	0.050	0.061
	(0.108)	(0.092)
Age x Positive reciprocity	-0.105	0.090
	(0.164)	(0.143)
Constant	3.770***	3.474***
	(0.461)	(0.410)
Observations	2,137	3,045

OLS estimates. Standard errors are in parentheses. $***$ < 0.01, $**$ < 0.05, $*$ *<0.10.*

Treatment effect on job motivation: retirement expectations

Dependent variable: Job motivation	(1) Expected pension benefit at age 62 low	(2) Expected pension benefit at age 62 high
Interaction treatment and negative reciprocity	-0.139**	-0.096
	(0.061)	(0.066)
Interaction treatment and positive reciprocity	0.055	-0.036
	(0.096)	(0.100)
Negative reciprocity	-0.086**	-0.120**
	(0.038)	(0.055)
Positive reciprocity	-0.014	-0.001
	(0.059)	(0.083)
Treatment dummy	0.029	0.225
	(0.414)	(0.428)
Age (divided by 365)	-0.081	-0.154*
	(0.079)	(0.081)
Observations	2,192	2,248
R-squared	0.107	0.105

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

detailed results

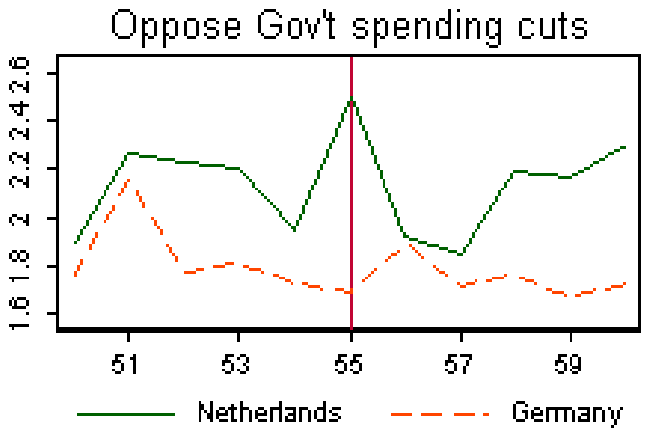
Additional Findings

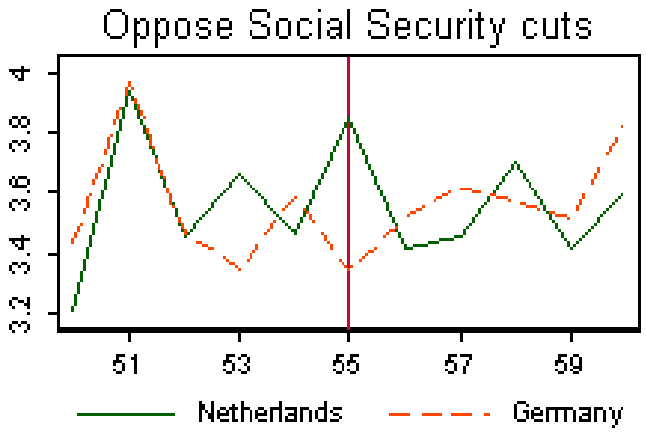
Alternative productivity indicators	
	(1)
Dependent variable:	1 if depressed
Interaction treatment and negative reciprocity	0.022***
	(0.008)
Interaction treatment and positive reciprocity	0.009
	(0.012)
Negative reciprocity	-0.009
	(0.006)
Positive reciprocity	0.016*
	(0.009)
Treatment dummy	-0.066
	(0.051)
Age (divided by 365)	0.012
	(0.010)
Observations	4,431
R-squared	0.076

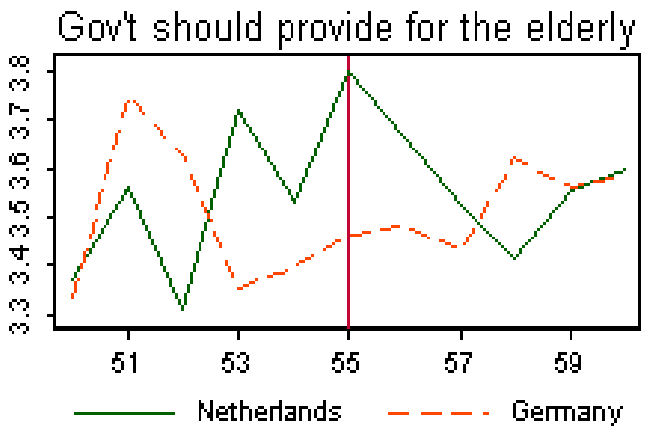
Standard errors in parentheses

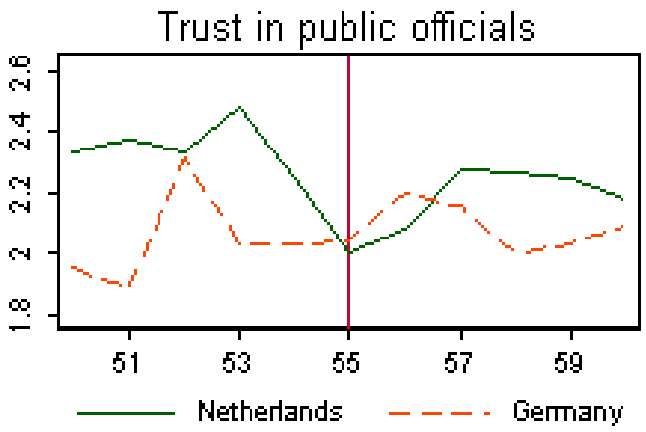
*** p<0.01, ** p<0.05, * p<0.1

Some additional evidence from ISSP 2006









Summary and Conclusion

- Negative reciprocity drives behavior in labor relations.
  - Retrenchment of pension rights triggers a decrease in job motivation among negatively reciprocal employees.
- Results are in line with experimental evidence and theoretical predictions:
  - Workers who arguably perceive the treatment as more unfair, respond in a stronger punishing way:
  - workers who are born in the first three months of 1950 are more de-motivated than workers who were born later in 1950
  - Retaliation is stronger for those working for the government.
- Results are relevant for the design of (pension) reforms.

Preferences, incentives and sorting in the labour market

Performance Pay and Multi-dimensional Sorting: Productivity, Preferences and Gender

Thomas Dohmen and Armin Falk

(*American Economic Review*, 101 (2): 556-590)

Motivation

- Rationale for providing incentive and performance related pay: align the interests of principals and agents to increase output
- Output depends not only on incentives but also on the composition of the workforce
  - Composition endogenous, due to sorting: Agents with different characteristics feel attracted by different incentives

Motivation

- Little is known empirically about the nature of this selection process
  - Data availability
  - Empirical studies have focused on incentive effect
    - Sorting is a confounding factor rather than object of study
    - Random assignment in experiments

This study

- We do not rule out sorting by random assignment but study sorting in a controlled environment

- Which personal characteristics affect the decision to work under different incentive schemes?
  - Role of individual productivity
  - Role of other characteristics like risk aversion, social preferences, overconfidence, personality and gender

Ideal data set: Field vs. lab

- Knowledge about individual characteristics and observing the selection decision in well defined environment

- Such data are difficult to obtain in the field
  - Mix of incentives (piece rate and profit sharing or promotion tournaments, implicit contracts)
  - Productivity measures often not available or fraught with measurement error
  - Preferences and personality traits are typically not observed by the econometrician
  - Firm level data: policy changes are endogenous
  - Sorting takes time: how much time should the researcher allow?

Method

- Laboratory experiment
- Real effort (multiplication of numbers)
- Three phases
  1. elicitation of productivity
  2. sorting and working under different incentives
  3. elicitation of preferences, attitudes,personal characteristics
- Three treatments
  - Fixed pay vs. Piece rate
  - Fixed pay vs. Tournament
  - Fixed pay vs. Revenue-sharing incentives

Work Task

- Multiplying one- and two-digit numbers, different degrees of difficulty (usage of work memory)

- Examples:
  - Level 1 11*9 = ???
  - Level 2 3*32 = ???
  - Level 3 6*43 = ???
  - Level 4 4*68 = ???
  - Level 5 7*89 = ???

Why this work task?

- Real effort task
- Requires no previous knowledge
- Simple to explain
- Sufficient heterogeneity
- Proxy for general cognitive ability (external validity)
- Learning effects are expected to be small (evidence from neuroscience, e.g., Roth 2001)

Stages of the Experiment

Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
Productivity Indicator 1	**Productivity Indicator 2**	**Productivity Indicator 3**	**Effort questions**	**Relative self-assessment**	**Sorting decision**	**Sorting with different fixed payment alternatives**
Calculate one problem with degree of difficulty 4 as fast as possible	Calculate one problem with degree of difficulty 4 as fast as possible (paid)	Piece-Rate with 10 P per correct answer 5 minutes	How much effort have you exerted? How stressed did you feel? How exhausted did you get?	How many people (out of 20) solved more questions than you did? Paid correct: 100 P +/-1: 50 P	a) **Piece-Rate**: 10 P per correct answer b) **Tournament**: Winner is who has more correct answers Winner gets 1300 P Loser gets 0 P c) **Revenue-sharing**: (Sum of output)*10 divided by 2 vs. **Fixed Payment**: 400 P independent of output	Varying the fixed payment alternatives

Stages of the Experiment ctd.

Step 8	Step 9	Step 10	Step 11	Step 12
Working time	**Effort questions**	**Social preferences**	**Risk preferences**	**Questionnaires**
10 minutes Piece-Rate, Tournament, Revenue-sharing or Fixed Payment	How much effort have you exerted? How stressed did you feel? How exhausted did you get?	2-player, sequential trust game Endowment of 120 Transfer of first mover is tripled Contingent response method for second mover (steps of 20) Role reversal No information	Choice between L(400, 0; 0.5) and 15 safe options 25, 50, …, 375 One alternative randomly chosen	Risk-preference questions Attitudes “Big Five” Math and high-school grades Socioeconomics

Procedural Details

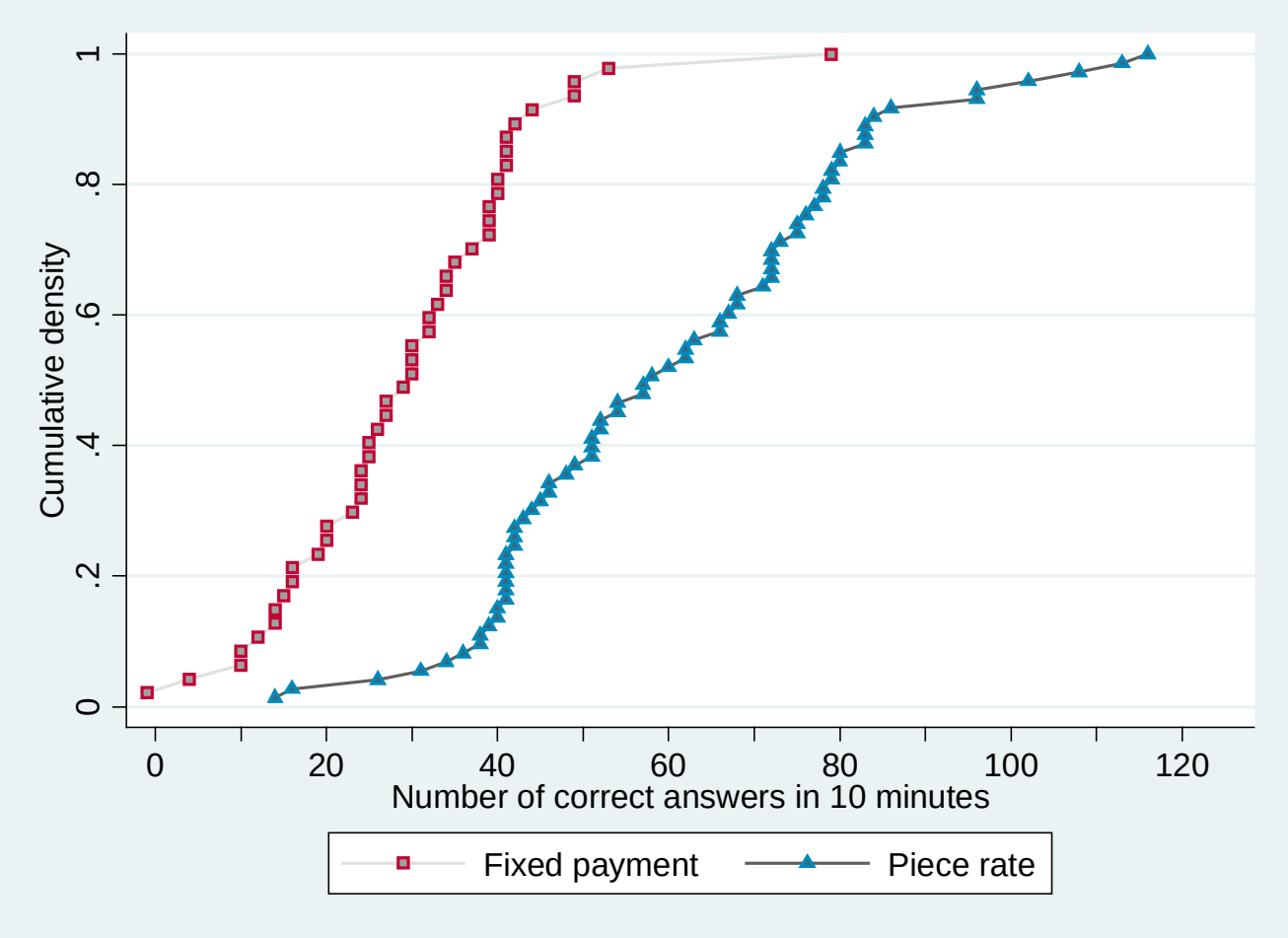
- 6 sessions per treatment
  - Piece-rate
  - Tournament
  - Revenue-sharing treatment
- 360 subjects, 181 females, 179 males

- Average earnings: Euro 21.20
- Anonymous interaction
- Computerized, software z-Tree (Fischbacher 1999)

Output

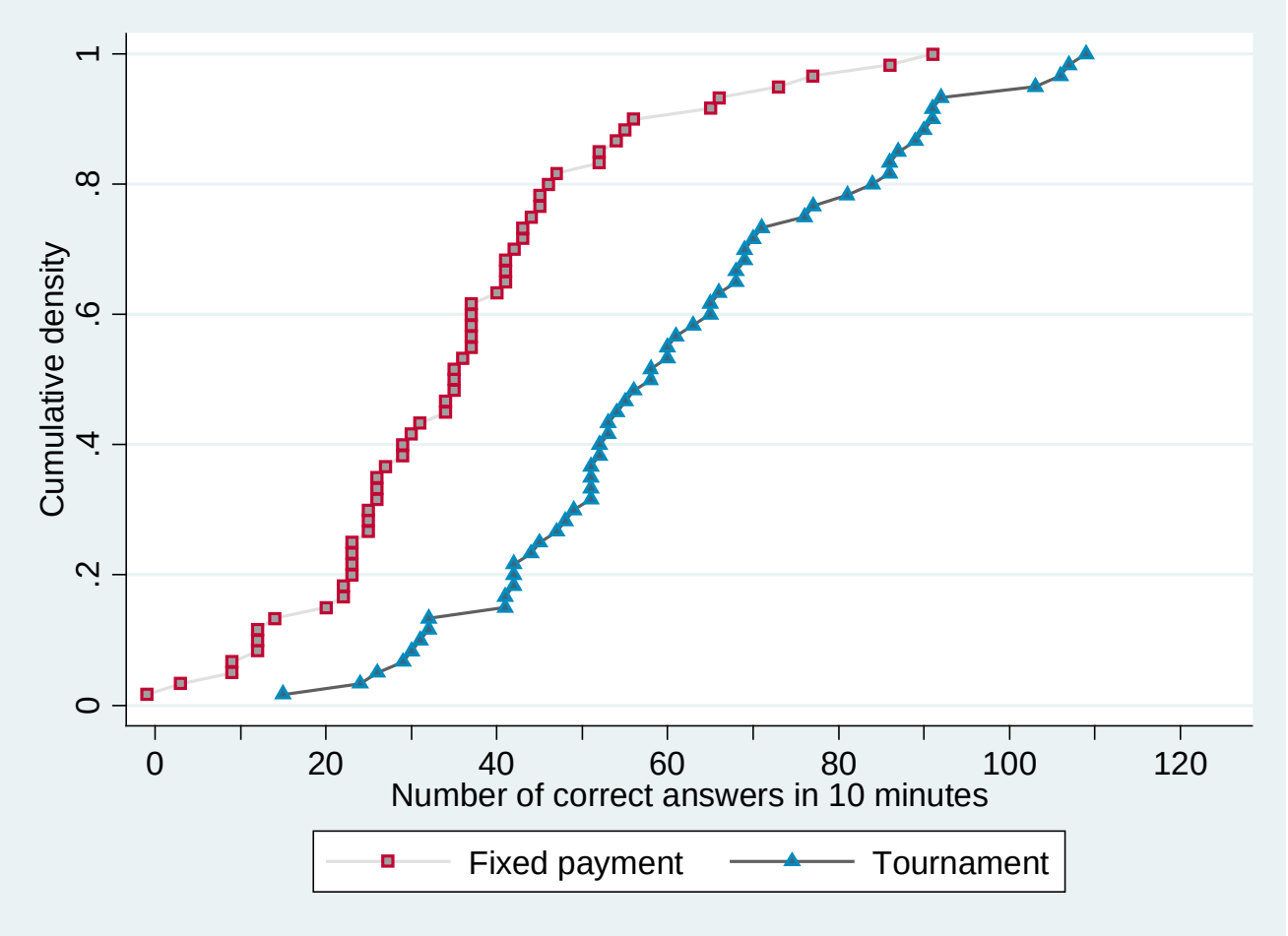
Output in the variable pay schemes is higher than output in the fixed wage regime.

Output in the 10-Minute Work Task of the Piece-Rate Treatment



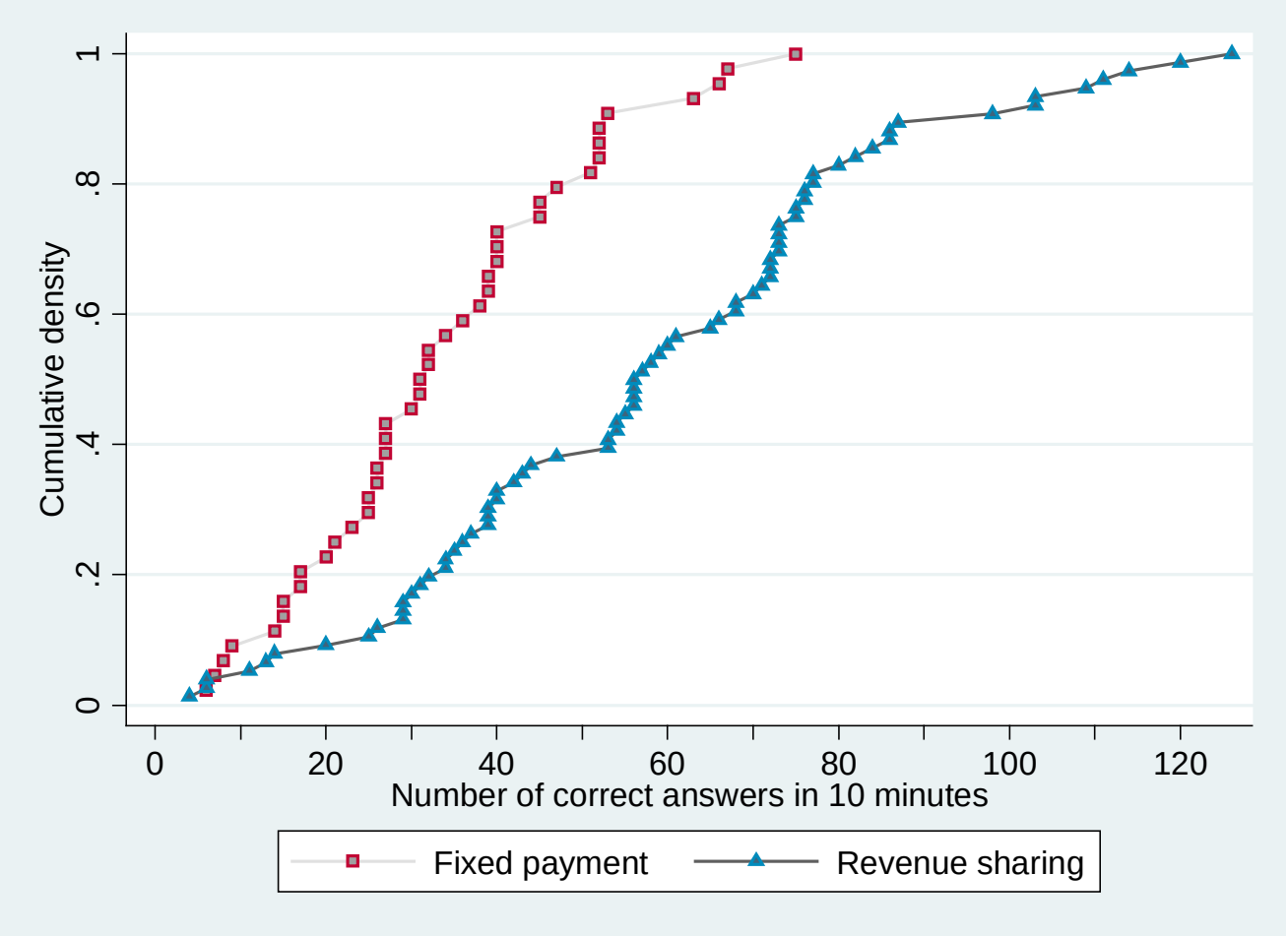
Mean output Fixed payment: 29.51
Mean output Piece rate: 60.59
Mann-Whitney test: p-value < 0.0001

Output in the 10-Minute Work Task of Tournament Treatment



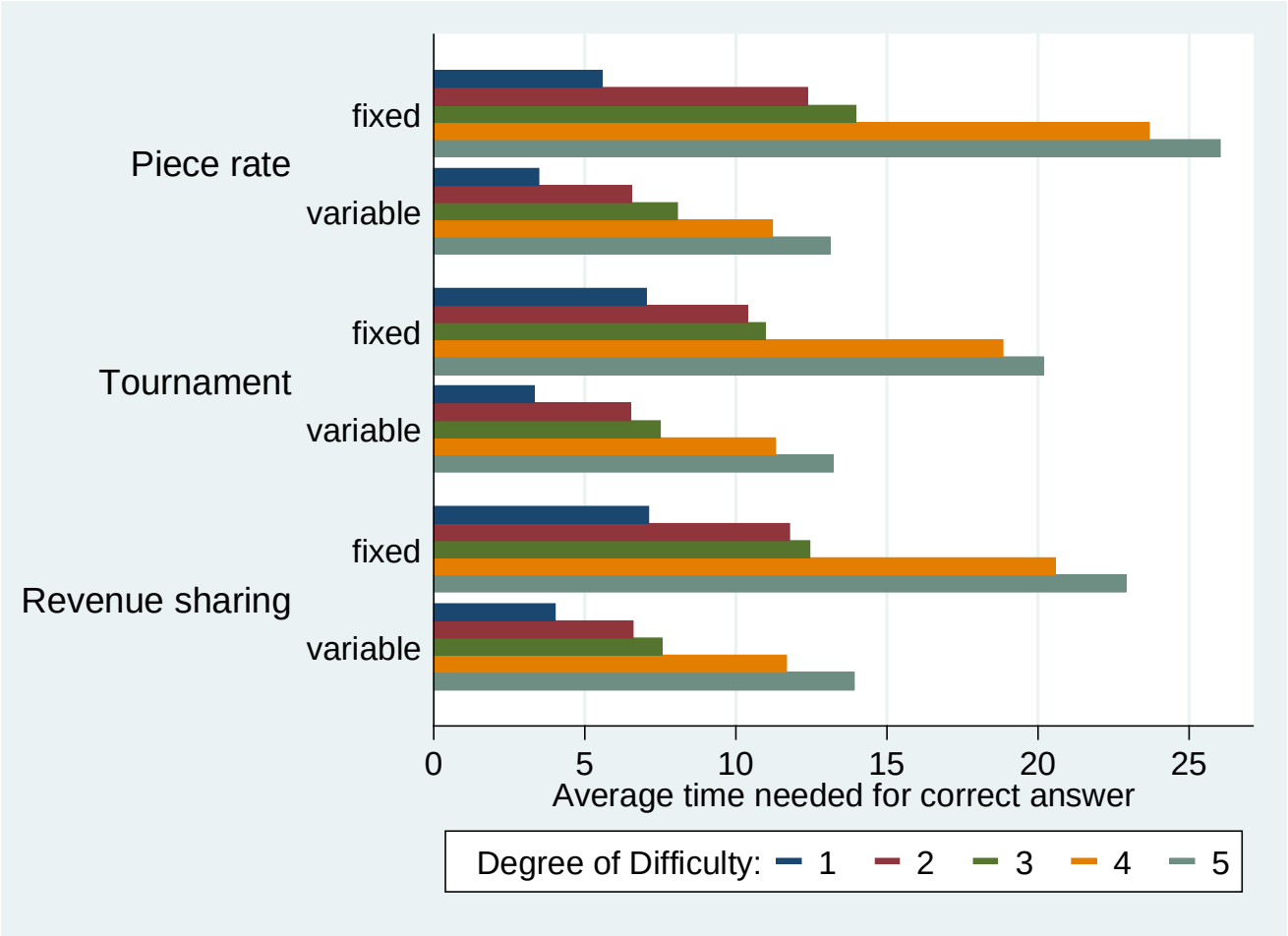
Mean output Fixed payment: 36.08
Mean output Tournament: 61.08
Mann-Whitney test: p-value < 0.0001

Output in the 10-Minute Work Task of Revenue-sharing Treatment



Mean output Fixed payment: 33.75
Mean output Revenue-sharing: 57.93
Mann-Whitney test: p-value < 0.0001

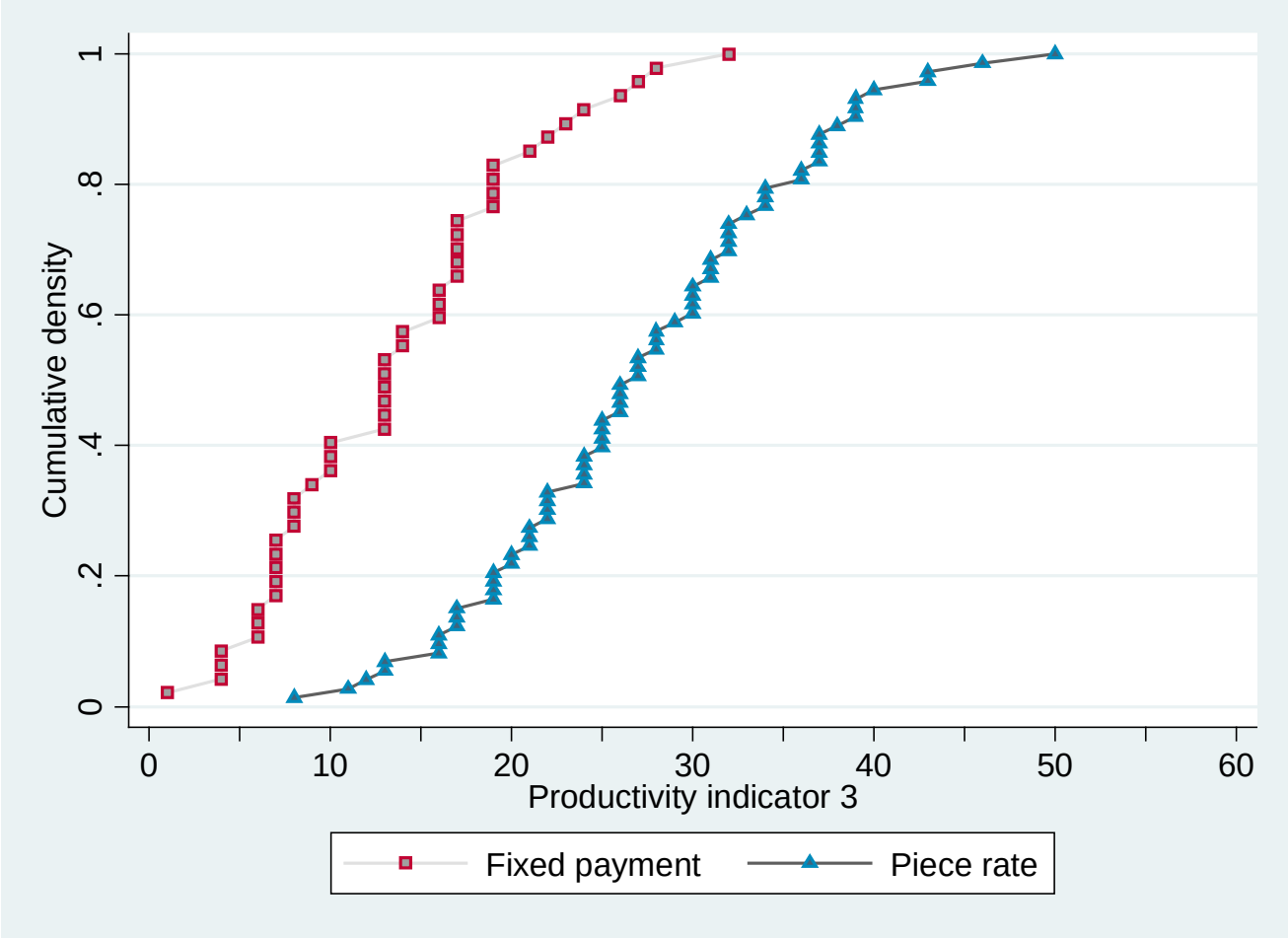
Performance and Difficulty of Task



Productivity Sorting

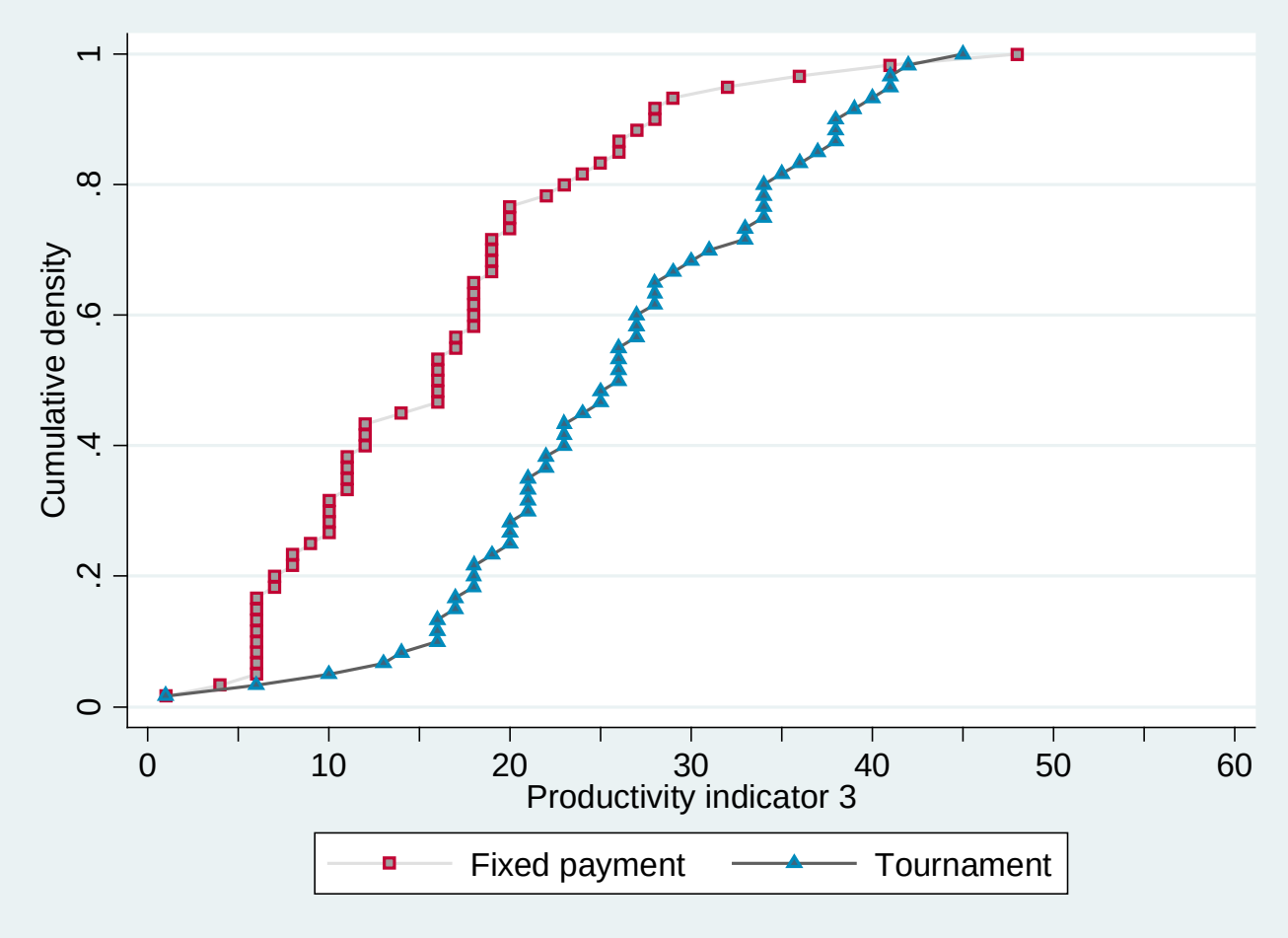
More productive subjects sort into the variable pay schemes.

Productivity of Sorted Subjects in Piece-Rate Treatment



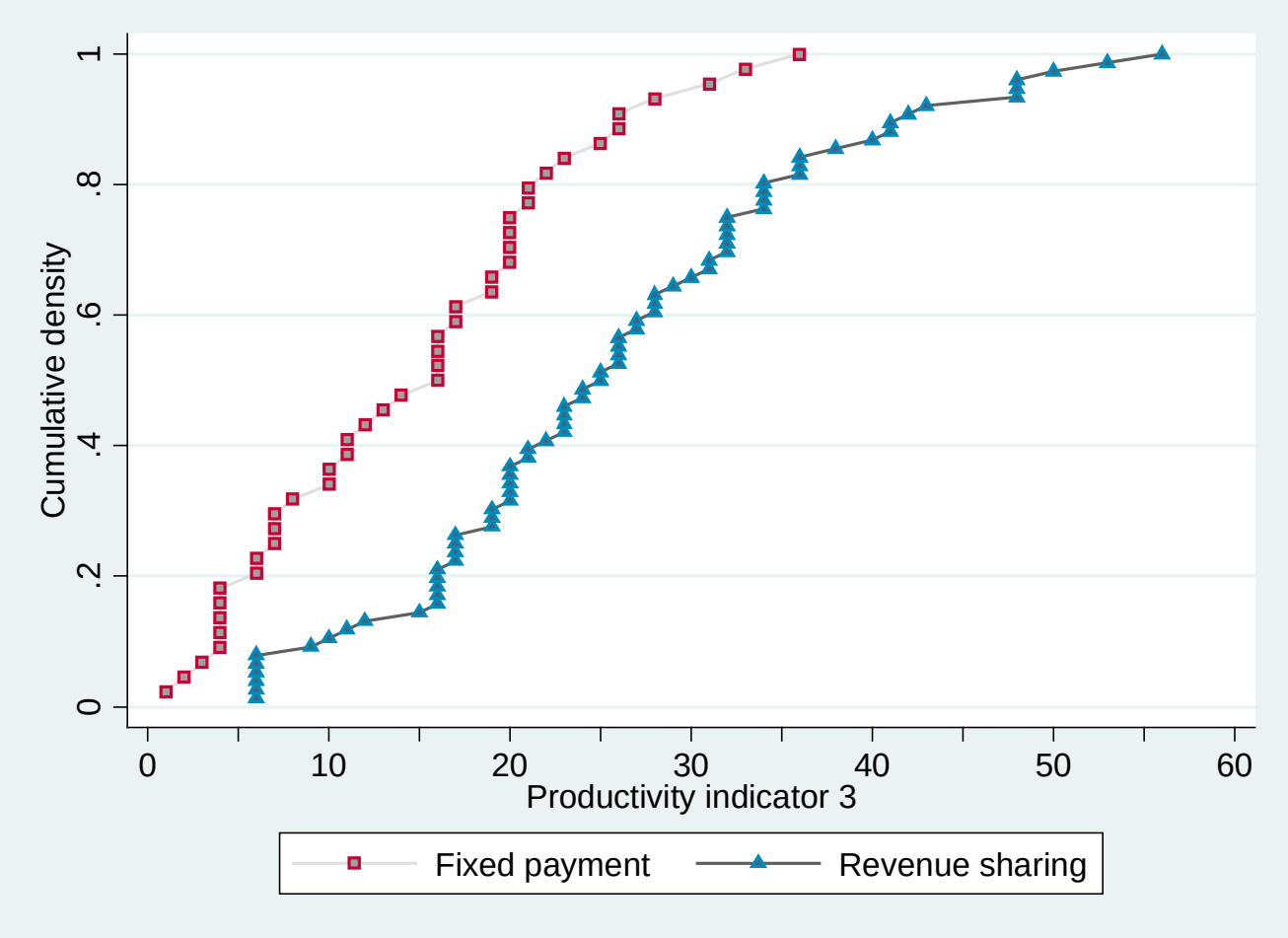
Mean productivity Fixed payment: 14.16
Mean productivity Piece rate: 26.70
Mann-Whitney test: p-value < 0.0001

Productivity of Sorted Subjects in the Tournament Treatment



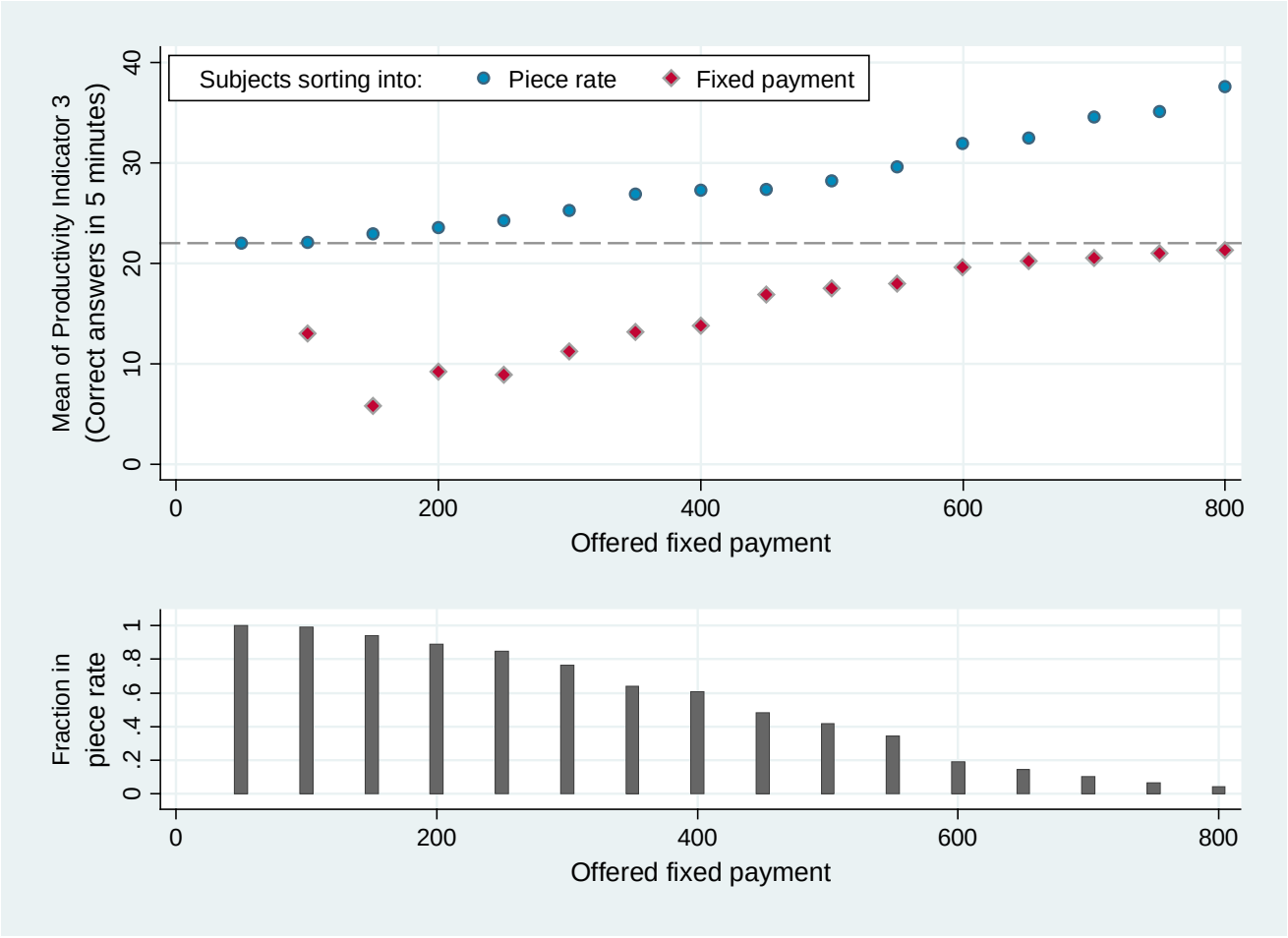
Mean productivity Fixed payment: 14.82
Mean productivity Tournament: 25.82
Mann-Whitney test: p-value = 0.0028

Productivity of Sorted Subjects in the Revenue-sharing Treatment

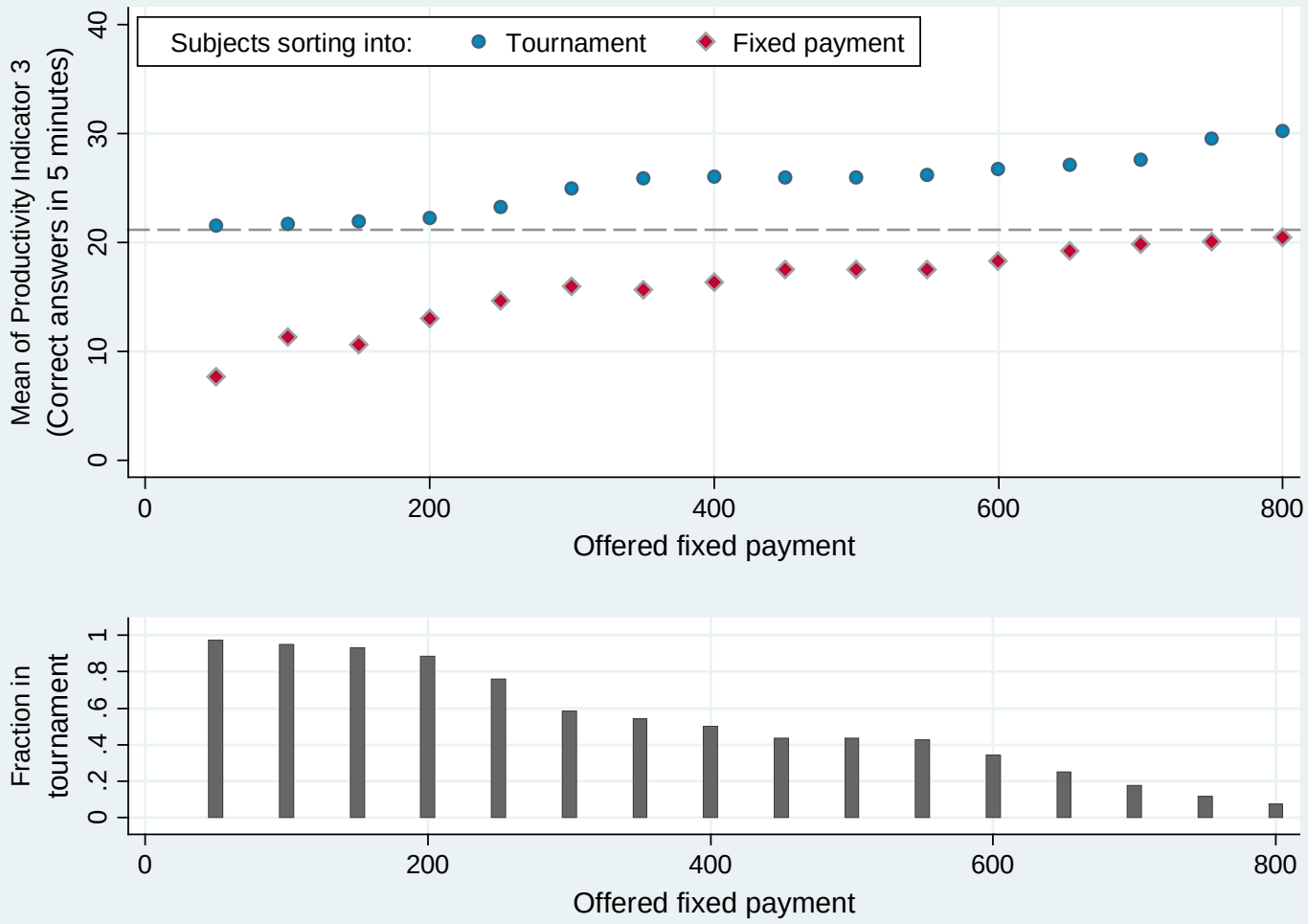


Mean productivity Fixed payment: 14.64
Mean productivity Revenue-sharing: 24.53
Mann-Whitney test: p-value = 0.0001

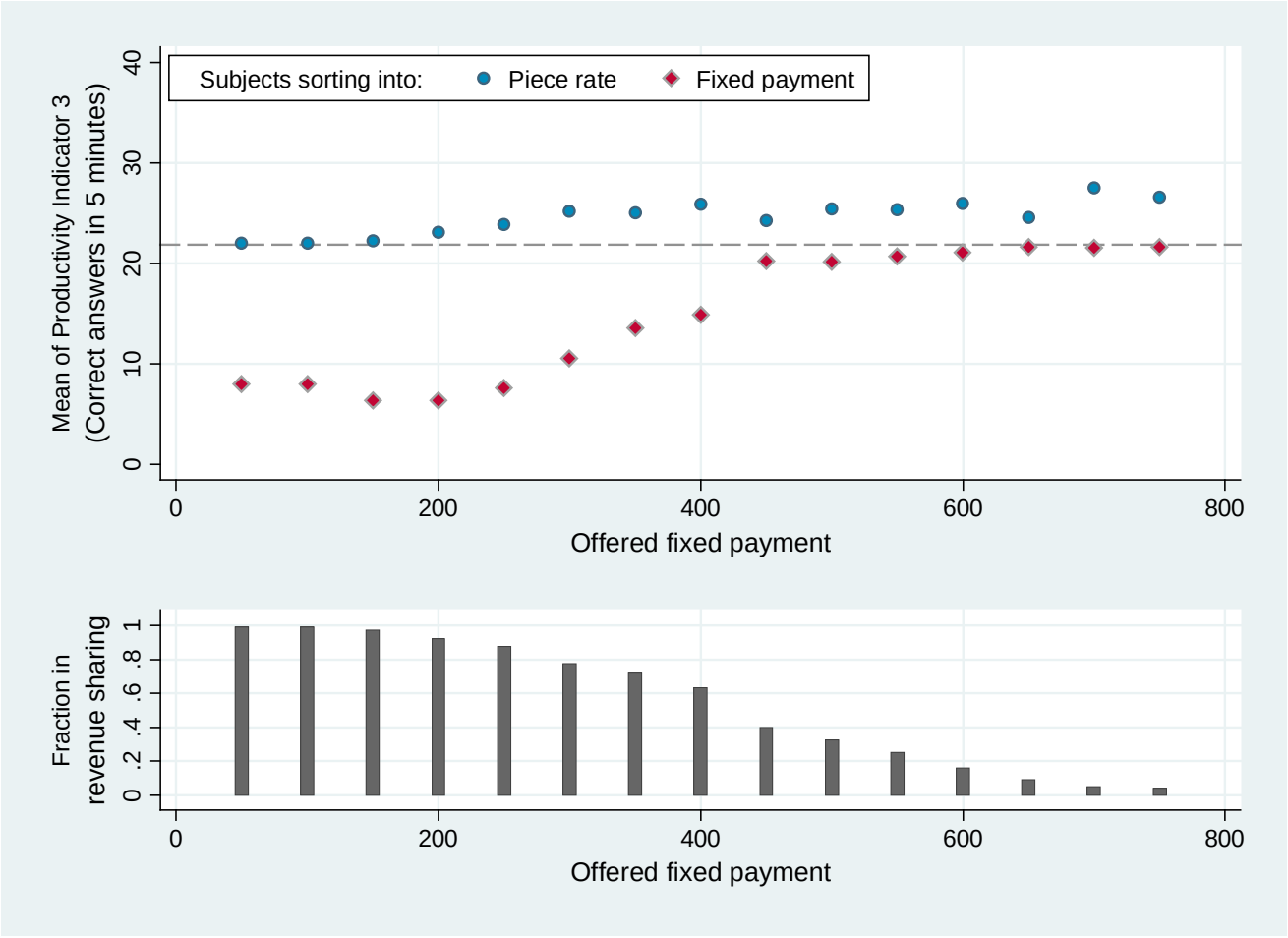
Sorting with varying fixed wages: Piece rate



Sorting with varying fixed wages: Tournament



Sorting under different fixed payments: Revenue-sharing



The impact of attitudes and preferences on sorting

- Risk attitudes
- Relative self-assessment
- Trust
- Reciprocity

Table: Determinants of Sorting

Dependent variable	1 if piece rate	1 if tournament	1 if revenue sharing	1 if variable pay
	(1)	(2)	(3)	(4)
Productivity indicator 3	0.044***	0.018***	0.016***	0.023***
	[0.009]	[0.007]	[0.003]	[0.004]
Risk attitude	0.053***	0.087***	0.008	0.054***
	[0.015]	[0.032]	[0.013]	[0.014]
Relative self-assessment	0.003	-0.027*	-0.020	-0.015*
	[0.015]	[0.015]	[0.014]	[0.009]
Trust (amount sent)	0.002*	0.002	-0.001	0.001
	[0.001]	[0.002]	[0.002]	[0.001]
Reciprocity	0.006	0.012	0.063	0.012
	[0.041]	[0.098]	[0.046]	[0.034]
1 if female	0.029	-0.157	-0.097	-0.068
	[0.121]	[0.137]	[0.075]	[0.059]
Pseudo R^2	0.410	0.307	0.204	0.268
Observations	120	120	120	360

Notes: Probit estimates. Marginal effects (evaluated at the mean of independent variables) reported; * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors clustered for sessions are reported in brackets below the marginal effects estimates. The smaller the value of the self-assessment variable is, the more productive a subject thinks he is relative to others.

Table: Determinants of Sorting at the Margin

Dependent variable	Piece rate treatment			Tournament treatment		Revenue-sharing treatment	
	1 if piece rate chosen			1 if tournament chosen		1 if revenue sharing chosen	
	marginal type (productivity)	marginal type (response time)	non-marginal type (response time)	marginal type (response time)	non-marginal type (response time)	marginal type (response time)	non-marginal type (response time)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Productivity indicator 3	0.046***	0.053***	0.036***	0.013	0.023*	0.023***	0.001
	[0.012]	[0.012]	[0.012]	[0.012]	[0.012]	[0.005]	[0.005]
Risk attitude	0.073**	0.076***	-0.017	0.139***	0.034	0.033	-0.007
	[0.030]	[0.027]	[0.044]	[0.044]	[0.051]	[0.030]	[0.007]
Relative self-assessment	0.008	0.015	-0.020	-0.011	-0.046**	-0.023	-0.023
	[0.018]	[0.033]	[0.023]	[0.022]	[0.021]	[0.016]	[0.016]
Trust (amount sent)	0.001	0.003	0.001	0.002	0.003	-0.004***	0.002**
	[0.002]	[0.003]	[0.002]	[0.003]	[0.003]	[0.002]	[0.001]
Reciprocity	-0.001	0.005	0.022	-0.014	0.069	0.077	0.028
	[0.041]	[0.068]	[0.042]	[0.098]	[0.112]	[0.050]	[0.016]
1 if female	0.001	0.121	-0.160	-0.086	-0.259	-0.029	0.011
	[0.154]	[0.160]	[0.187]	[0.207]	[0.197]	[0.084]	[0.035]
Pseudo R^2	0.215	0.348	0.529	0.283	0.457	0.220	0.401
Observations	76	60	60	62	58	61	59

Notes: Probit estimates. Marginal effects (evaluated at the mean of independent variables) reported; * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors clustered for sessions are reported in brackets below the marginal effects estimates. In column (1), only observations of participants who solved between 10 and 30 problems in the 5-minute work condition correctly are considered. In columns (2)-(7) we define marginal candidates based on the response time they take to make a sorting decision. Subjects whose response time is above the median response time of the respective treatment are classified as marginal types. Subjects whose response time is below the median are classified as non-marginal types. The respective median response times for the piece-rate, tournament, and revenue-sharing treatment are 34.5 seconds, 72 seconds, and 116 seconds. The variable ``relative self-assessment'' takes values from 0 to 19 and measures a subject's estimate of the number of persons that were more productive in step 3 of the experiment. The smaller the value of the self-assessment variable is, the more productive a subject thinks he is relative to others.

Gender Sorting

Sorting by gender

	Piece rate	Tournament	Team	All variable
Female (percent)	47.5	37.3	54	46.4
Male (percent)	73.8	62.3	73.7	69.8

Women are less likely to sort into variable payment schemes.
This effect seems to be driven by risk preferences
(on gender and risk, see Dohmen, Falk, Huffman, Sunde, Schupp and Wagner 2011).

Effort

Effort, stress and exhaustion

Subjects in variable pay schemes provide more effort.

They also feel more stressed and exhausted than subjects working for the fixed payment.

Table: Effort, Stress, and Exhaustion

Effort, Stress and Exhaustion in Piece-Rate Treatment

	Before sorting decision			After sorting decision		
	Piece rate (Mean) (1)	Fixed (Mean) (2)	M-W test (p-value) (3)	Piece rate (Mean) (4)	Fixed (Mean) (5)	M-W test (p-value) (6)
Effort	5.60	5.49	0.596	6.03	4.26	<0.001
Stress	5.48	5.62	0.502	5.71	3.51	<0.001
Exhaustion	3.05	2.74	0.317	4.07	2.68	<0.001
Observations	73	47		73	47	

Effort, Stress and Exhaustion in Tournament Treatment

	Before sorting decision			After sorting decision		
	Tournament (Mean) (1)	Fixed (Mean) (2)	M-W test (p-value) (3)	Tournament (Mean) (4)	Fixed (Mean) (5)	M-W test (p-value) (6)
Effort	5.57	5.37	0.264	6.23	4.70	<0.001
Stress	5.43	5.48	0.524	5.80	3.95	<0.001
Exhaustion	2.93	2.93	0.698	3.67	3.30	<0.268
Observations	60	60		60	60	

Effort, Stress and Exhaustion in Revenue-Sharing Treatment

	Before sorting decision			After sorting decision		
	Revenue sharing (Mean) (1)	Fixed (Mean) (2)	M-W test (p-value) (3)	Revenue sharing (Mean) (4)	Fixed (Mean) (5)	M-W test (p-value) (6)
Effort	5.54	5.39	0.536	5.66	4.48	<0.001
Stress	5.41	5.61	0.241	5.37	3.91	<0.001
Exhaustion	2.57	2.50	0.806	3.63	2.84	<0.020
Observations	76	44		76	44	

Can we replicate our findings with field data?

- Does the likelihood of working under variable pay depend on
  - Gender
  - Risk attitudes
  - Reciprocal inclinations
  - Trust?

Data from Socio Economic Panel

- 2005 wave of Socio Economic Panel (SOEP)
  - About 22,000 individuals (age 17+), 12,000 households
  - Representative of the German population
- Each adult household member is interviewed
- Extensive socio-demographic information
- Variables
  - Performance dependent pay
  - Risk attitudes (validated in field experiment (Dohmen et al., 2005)
  - Trust (validated in field experiment (Fehr et al., 2006)
  - Reciprocity

Measures

- Reciprocity
  - If someone does me a favor, I am prepared to return it
  - I go out of my way to help somebody who has been kind to me before
  - I am ready to undergo personal costs to help somebody who helped me before
  - If I suffer a serious wrong, I will take revenge as soon as possible, no matter what the cost
  - If somebody puts me in a difficult position, I will do the same to him/her
  - If somebody insults me, I will insult him/her back
- Risk
  - How do you see yourself: Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?
- Trust
  - In general, one can trust people
  - In these days you can’t rely on anybody else
  - When dealing with strangers it is better to be careful before you trust them
- Performance related pay
  - Is your performance evaluated and is that evaluation relevant for your payments?

Table:Survey Evidence on Sorting into Performance Pay

Dependent variable:	1 if performance evaluation	
	(1)	(2)
Years of schooling	0.022***	-0.001
	[0.002]	[0.003]
Experience full-time (in years)	0.011***	0.006***
	[0.002]	[0.002]
Experience full-time^2 /100	-0.021***	-0.011**
	[0.004]	[0.005]
Experience part-time (in years)	-0.002	0.000
	[0.003]	[0.004]
Experience part-time^2 /100	0.008	0.003
	[0.013]	[0.014]
Tenure (in years)	0.004***	-0.002**
	[0.001]	[0.001]
Age (in years)	-0.006***	-0.003**
	[0.001]	[0.001]
Risk attitude	0.010***	0.008***
	[0.002]	[0.003]
Trust in strangers	-0.001	0.004
	[0.008]	[0.008]
Reciprocity	-0.014**	-0.008
	[0.006]	[0.006]
1 if female	-0.057***	-0.041***
	[0.012]	[0.014]
i if in public sector		-0.050***
		[0.016]
1 if living in East Germany		0.020
		[0.014]
Firm size dummies	no	yes
Industry dummies	no	yes
Occupation dummies	no	yes
Pseudo R^2	0.0340	0.140
Observations	8159	8110

Concluding remarks

- Incentives systematically affect sorting – in multiple dimensions
  - Productivity, risk and social preferences, overconfidence, personality and gender
- These characteristics affect success of firms
    - Risk attitudes/overconfidence of fund manager: portfolio strategy; social preferences in non-profit organizations etc.
  - Often unobservable: incentives as screening devices
  - Optimality of organizational changes: job satisfaction
- Gender effects: sorting offers a possible channel for gender differences in occupational choice and the existence of the gender wage gap

New Evidence

- Bernard et al. replicate results of earlier studies: crucial sorting dimensions are productivity, relative self-assessment, and risk attitude.
- No systematic sorting on other variables (loss and ambiguity aversion, competitiveness, personality traits) but may be relevant at the margin or in specific environments.
- Alternative contracts matter in ways predicted by theory.
  - Important for firms (different effects in different environments)
  - Example: tournament attracts productive workers who are not particularly risk tolerant when the alternative is a fixed payment. This may change when the alternative is a piece rate.

Bernard et al. (2014)

Implications for career choice and the labor market

Selection in the labor market

	(1)
Dependent variable	1 if public sector
Risk attitude	-0.004*
1 if female	0.031***
Years of education	0.007***
Controls for experience	yes
Controls for age and tenure	no
Controls for trust and reciprocity	yes
Controls for firm size and sector	yes
Controls for occupation	no
Observatiion	8097
Pseudo R-squared	0.440

Selection in the labor market

	(1)	(2)	(3)
	1 if public sector	Private sector only: 1 if performance pay	
Risk attitude	-0.004*	0.008***	0.006**
1 if female	0.031***	-0.070***	-0.051***
Years of education	0.007***	0.034***	0.009***
Controls for experience	yes	yes	yes
Controls for age and tenure	no	yes	yes
Controls for trust and reciprocity	yes	yes	yes
Controls for firm size and sector	yes	no	yes
Controls for occupation	no	no	yes
Observations	8097	5184	5184
Pseudo R-squared	0.440	0.0689	0.200

Who chooses to become a teacher?

Dependent variable: 1 if respondent is teacher	(1) Germany
Risk attitude	-0.014***
1 if female	0.132***
Age (in years)	0.011***
Positive reciprocity	-0.005
Negative reciprocity	-0.027***
Observations	1521
Pseudo R-squared	0.138

Who chooses to become a teacher?

Dependent variable:
1 if respondent is teacher

	(1) Germany	(2) Netherlands
Risk attitude	-0.014***	-0.034***
1 if female	0.132***	0.248***
Age (in years)	0.011***	0.023***
Positive reciprocity	-0.005	0.022
Negative reciprocity	-0.027***	-0.040*
Observations	1521	353
Pseudo R-squared	0.138	0.296

occupational sorting

Policy implications

- Composition of the workforce
- Implications for changes in incentives
  - Job satisfaction among incumbents: disutility needs to be compensated, or
  - Turnover
  - Work stress (implications for health)
- Labor market outcomes:
  - Occupational choice
  - Career profile
  - Earnings
  - Gender differences

Evidence on stress

Outcomes at the Aggregate Level

Preferences and country-level outcomes

Table: Country-level outcomes and preferences

	Dependent variable:									
	Entrepreneurship						Social outcomes			
	Patent applic. p/c		Scientific articles p/c		TFP		Volunt. & donat.		Armed conflicts	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Risk taking	-0.031	0.28	-0.013	0.094**	0.11	0.22**				
	(0.98)	(0.43)	(0.05)	(0.05)	(0.10)	(0.09)				
Prosociality							0.85	1.23**		
							(0.57)	(0.48)		
Negative reciprocity									1.59***	1.20***
									(0.41)	(0.41)
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	64	61	69	67	60	59	32	32	76	73
R^2	0.00	0.66	0.00	0.44	0.02	0.49	0.06	0.42	0.13	0.32

OLS estimates, robust standard errors in parentheses. The dependent variables in columns (1)–(2) and (3)–(4) are the logs of the number of patent applications p/c and the number of scientific articles p/c, respectively. In columns (7)–(8), the dependent variable is volunteering and donation as a fraction of GDP. Frequency of conflicts is measured by the log of conflicts according to PRIO, in the Quality of Government dataset. Prosociality is the first principal component of altruism, positive reciprocity, and trust. Controls include distance to equator, average temperature, average precipitation, the share of the population living in (sub-)tropical zones, terrain ruggedness, average distance to nearest waterway, and an island dummy.

Preferences and country-level outcomes

Table: Economic development and preferences

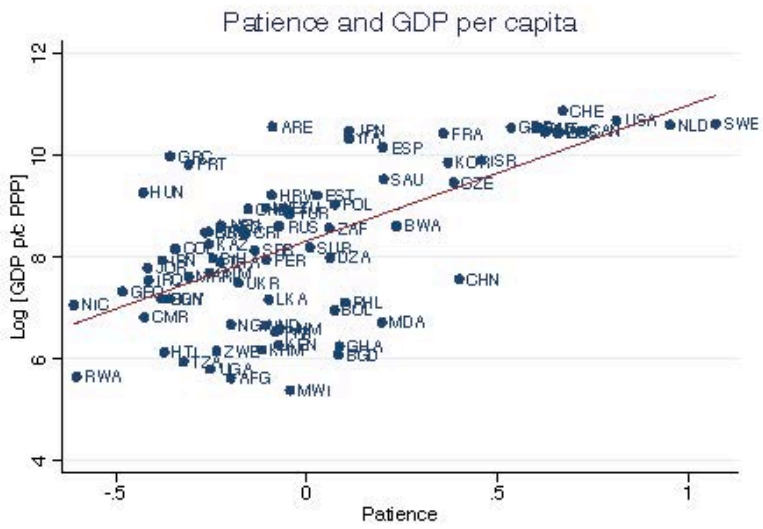
	Dependent variable: Log [GDP p/c]									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Patience	2.63***	1.73***							2.67***	1.92***
	(0.26)	(0.27)							(0.29)	(0.31)
Trust			1.58**	0.56					0.73	0.31
			(0.68)	(0.48)					(0.56)	(0.45)
Risk taking					-0.53	0.59*			-1.34***	-0.53
					(0.56)	(0.33)			(0.50)	(0.39)
Neg. reciprocity							1.30**	0.51	0.54	0.092
							(0.51)	(0.50)	(0.52)	(0.45)
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	76	73	76	73	76	73	76	73	76	73
R^2	0.39	0.70	0.08	0.59	0.01	0.59	0.05	0.59	0.48	0.71

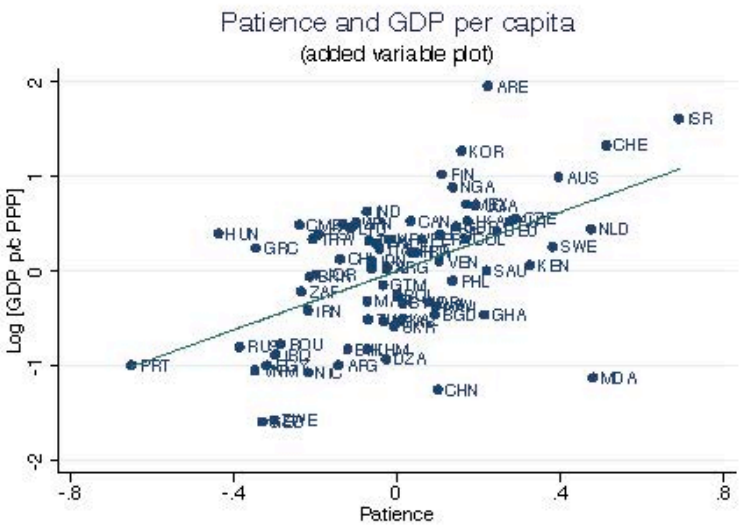
OLS estimates, robust standard errors in parentheses. Controls include distance to equator, average temperature, average precipitation, the share of the population living in (sub-)tropical zones, terrain ruggedness, average distance to nearest waterway, and an island dummy. See Online Appendix ?? for additional information about the variables. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Application: Patience and the Wealth of Nations

- Dynamic theories in both micro- and macroeconomics highlight the crucial role of time preference for accumulation processes and hence ultimately income
- In neoclassical development framework, patience affects accumulation of physical capital (Ramsey-Cass-Koopmans), human capital (Becker, Ben-Porath) as well as ideas and knowledge (Romer, Aghion & Howitt)
- Investigate consistency of this large and influential body of theoretical work with empirical facts
- Exploit variation in patience, accumulation, and income across countries as well as across regions within countries

Patience and Contemporary Income





Patience and per capita income. Added variable plot conditional on geography, climate, continent FE, ethnic and gentic diversity, trust.

Similar results with short- and long-run growth rates since 1800, 1900, 1950

Patience and Accumulation

	Dependent variable:						
	Human capital		Physical capital		TFP and Institutions		
	Schooling	Educ. exp.	Log [capital stock]	Savings	Log [TFP]	R&D exp.	Property rights
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Patience	4.67***	1.45***	2.03***	7.70***	0.60***	2.09***	46.3***
	(0.53)	(0.31)	(0.28)	(2.23)	(0.10)	(0.23)	(4.39)
Constant	5.40***	4.28***	10.0***	10.2***	-0.57***	0.96***	48.3***
	(0.24)	(0.16)	(0.13)	(1.07)	(0.05)	(0.08)	(1.95)
Observations	71	71	71	68	60	64	74
R^2	0.429	0.138	0.327	0.102	0.265	0.574	0.515
Adjusted R^2	0.421	0.125	0.317	0.088	0.253	0.567	0.508

OLS estimates, robust standard errors in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Patience, Accumulation, and Income Across Regions

	Dependent variable:					
	Log [Regional GDP p/c]			Avg. years of education		
	(1)	(2)	(3)	(4)	(5)	(6)
Patience	1.39***	0.21***	0.16**	3.34***	0.43**	0.32**
	(0.23)	(0.07)	(0.07)	(0.55)	(0.17)	(0.14)
Constant	8.74***	9.18***	8.66***	7.17***	7.37***	6.53***
	(0.18)	(0.02)	(0.37)	(0.36)	(0.04)	(0.67)
Country FE	No	Yes	Yes	No	Yes	Yes
Additional controls	No	No	Yes	No	No	Yes
Observations	704	704	687	693	693	676
R^2	0.184	0.937	0.950	0.252	0.936	0.957
Adjusted R^2	0.183	0.932	0.946	0.251	0.931	0.953

WLS estimates, observations weighted by number of observations in each region. Standard errors (clustered at country level) in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.