Discussion paper

Fairness and the Development of Inequality Acceptance

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Abstract

Fairness considerations fundamentally affect human behavior, but our understanding of the nature and development of people's fairness preferences is limited. The dictator game has been the standard experimental design for studying fairness preferences, but it only captures a situation where there is broad agreement that fairness requires equal split. In real life, people often disagree on what is fair, largely because they disagree on whether individual achievements, luck, and efficiency considerations of what maximizes total benefits, can justify inequalities. We modified the dictator game to capture these elements, and studied how inequality acceptance develops in adolescence. We found as children enter adolescence, they increasingly viewed inequalities reflecting differences in individual achievements, but not luck, fair, whereas efficiency considerations mainly played a role in late adolescence.

JEL code: D63

It is well documented that adult humans are motivated by fairness considerations and are willing to sacrifice personal gains in order to eliminate inequalities they view as unfair (Fehr and Falk, 2002; Camerer, 2003). It is also evident from the political debate, surveys (Schokkaert and Devooght, 2003; Gaertner and Schwettmann, 2007), and economic experiments (Konow, 2000; Frohlich et al., 2004; Cappelen et al., 2007) that most adults view *some* inequalities as fair. In particular, most adults believe that differences in individual achievements (Konow, 2000; Cherry et al., 2002; Frohlich et al., 2004; Cappelen et al., 2007) and efficiency considerations of what maximizes total benefits (Van Lange, 1999; Andreoni and Miller, 2002; Fisman et al., 2007) may justify an unequal distribution

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of income, but disagree on whether inequalities reflecting luck are fair (Cappelen et al., 2010, 2007).

To illustrate how efficiency and individual achievements may justify an unequal distribution of resources, consider two children, Anne and Carla, who discuss how to divide a cake. Anne appeals to efficiency when she argues that total benefits are maximized by giving her the largest share because she enjoys cake the most. Carla appeals to individual achievements when she argues that she should get the largest share because her contribution to making the cake was largest. The legitimacy of these, and other, fairness considerations have been extensively discussed in the philosophical literature (Rawls, 1971; Nozick, 1974; Sen, 2009), and such considerations are important for how people make decisions in a wide range of situations (Montada, 2002). For example, in the workplace, some may find it fair that a more productive colleague has a higher wage, and, in allocating public funds, some may find it fair to pay some attention to which projects produce the greatest total benefits in the population.

Disagreements over questions of fair distribution are fundamental in human life and to get a better understanding of the source of such disagreements it is important to study how fairness views develop in childhood (Moore et al., 1993). The development of children's fairness views has been extensively studied in the psychological literature (Piaget, 1965; Damon, 1977; Hook and Cook, 1979; Kohlberg, 1984; Gilligan, 1982; Eisenberg et al., 1995) and also, more recently, in behavioral economics (Benenson et al., 2007; Harbaugh et al., 2007; Sutter and Kocher, 2007; Sutter, 2007; Fehr et al., 2008). It has been shown that young children with age tend to become less selfish in their reasoning (Piaget, 1965; Damon, 1977; Kohlberg, 1984; Eisenberg et al., 1995) and choices (Hook and Cook, 1979; Benenson et al., 2007; Harbaugh et al., 2007; Fehr et al., 2008), while the evidence for adolescents is more mixed (Eisenberg et al., 1995; Harbaugh et al., 2007; Sutter and Kocher, 2007; Sutter, 2007; Gummerum et al., 2008), and that they tend to move from a strict egalitarian view towards fairness views taking into account individual contributions and circumstances (Piaget, 1965; Mikula, 1972; Damon, 1977; Hook and Cook, 1979; Kohlberg, 1984; Moore et al., 1993).

There has, however, been little research on the development of two important characteristics of adults' distributive behavior, namely that they distinguish between achievements and luck (Cappelen et al., 2010, 2007) and take efficiency considerations into account (Van Lange, 1999; Andreoni and Miller, 2002; Fisman et al., 2007). To study the development of these features, we conducted a computer-based experiment that employed two versions of the dictator game. In the dictator game, the dictator is assigned an amount of money to distribute between him- or herself and another person, and the total income of the two participants is unaffected by how the money is distributed. In such a situation, there is no apparent fairness argument justifying an unequal split. In the first part of the

experiment, we modified this design by introducing a production phase, such that the money to be distributed was earned and depended on individual achievements and luck. In the second part of the experiment, the dictator was given a number of points to distribute, and the distribution of points determined the income for each of the two participants. To introduce efficiency considerations, we made the points most valuable for the other participant, so that the dictator could maximize the total income of the two by giving away all the points.

The framework for our analysis assumes that children make a trade-off between two primary motives in their distributive choices, self-interest and fairness, and that they may differ both in their level of self-interest and in what they considered fair. By observing how the children chose in a series of different situations in each part of the experiment, where the different fairness views to a varying degree justified giving money to the other participant, we established the importance of each of the fairness views at the different grade levels.

Before they started the first part of the experiment, the participants were given complete information about both the production phase and the distribution phase. The production phase lasted 45 minutes, and the participants could move between two web sites. At a production site the participants could collect points by ticking off every appearance of a particular number on a sequence of screens filled with different three-digit numbers. At an entertainment site, the participants could view short videos or pictures, read cartoons, or play computer games. The participants decided how much time they wanted to spend on each of the two sites. Most participants worked all the time on the production site (average time, 42 minutes), but this design made salient that production was the result of individual ability and choice of effort. After the production phase, the computer calculated how many points each participant had collected. The participants were then randomly assigned either a high price per point of 0.40 NOK (approximately 0.08 USD) or a low price per point of 0.20 NOK. This design introduced a distinction between two sources of inequality in earnings: production, reflecting individual achievements, and earnings, partly reflecting luck in the random draw of prices.

In the distribution phase, the participants were randomly matched in a sequence of pairs with participants at the same grade level. For each pair, the participants were given information about the time spent on the production site, the number of points collected, the price, and the earnings, and then asked to choose how much of the total income (the sum of individual earnings for the pair) to take for themselves. Since average production increased with age, the average income to be distributed in each pair also increased with age (Table S4).

The mean share given to the other participant in the first part of the experiment was very high, close to 45 percent for the whole sample, and there was no statistically significant difference in mean share given between 5th graders and 13th graders (Table 1A, t-test, unequal variance, p=0.460 (males) and p=0.179

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(females)). Hence, we did not find any evidence of a change in selfishness from mid-childhood to late adolescence. Moreover, we did not find any statistically differences in self-interest between males and females (Table 1A, t-test, unequal variance, p=0.481 (5th grade), p=0.438 (7th grade), p=0.621 (9th grade), p=0.996 (11th grade), and p=0.330 (13th grade)).

We did, however, observe an increase in the acceptance of inequalities reflecting differences in production. The coefficient for share produced by the other participant in a regression of share given showed that older participants were much more likely to differentiate on the basis of individual achievements (Figure 1A). The sharpest increase in the coefficient occurred from 5th grade to 7th grade, but there was also a further increase from 7th grade to 13th grade. There was a statistically significant difference between 5th grade and all other grades in the coefficient for share produced (multiple Wald tests of equality with Bonferroni adjustments, p=0.001 (7th grade), p=0.001 (9th grade), p=0.025 (11th grade), and p<0.001 (13th grade)), and between 7th grade and 13th grade (Wald test, p=0.034). We observed the same developmental pattern for both males and females; there were no statistically significant gender differences in the coefficient for share produced (Wald test, p=0.980 (5th grade), p=0.949 (7th grade), p=0.534 (9th grade), p=0.571 (11th grade), and p=0.214 (13th grade)). The coefficient for the relative price was also statistically significant different from zero, but stable across grade levels and gender.

To further understand the importance of production and price in explaining the observed behavior, we estimated a model of individual choices that captured the basic assumptions of our theoretical framework and allowed for some randomness in the participants' choices. Specifically, for each grade level, we estimated a distribution of the weight attached to fairness and the share of participants motivated by different fairness views. Informed by normative theory and our own previous work (Cappelen et al., 2010, 2007), we assumed that there were three salient fairness views in this situation: strict egalitarianism (Rawls, 1971), finding all inequalities unfair; meritocratism (Arrow et al., 2000), justifying inequalities reflecting differences in production; and libertarianism (Nozick, 1974), justifying all inequalities in earnings.

We found striking differences in the prevalence of fairness views between the grade levels (Table 2). The large majority of 5th graders were strict egalitarians, and, remarkably, there were almost no meritocrats at this grade level. In contrast, meritocratism was the dominant position in late adolescence, and the share of strict egalitarians fell dramatically. The share of libertarians was stable across grade levels. In sum, this analysis showed that individual achievements, measured by production, became increasingly important with age, whereas there was no similar developmental trend in the importance of luck, measured by the price.

The estimated model also confirmed our finding of no change in selfishness

Table 1: **Descriptive statistics**

A: Mean share given in first part of experiment

Grade level	Males					Females				
	5th	7th	9th	11th	13th	5th	7th	9th	11th	13th
Mean	0.422	0.449	0.466	0.435	0.448	0.443	0.467	0.457	0.435	0.481
	(0.020)	(0.017)	(0.013)	(0.027)	(0.028)	(0.022)	(0.016)	(0.014)	(0.016)	(0.018)

B: Mean share given in second part of experiment

Grade level	Males					Females				
	5th	7th	9th	11th	13th	5th	7th	9th	11th	13th
Mean (multiplier=1)	0.371	0.382	0.443	0.282	0.366	0.438	0.402	0.455	0.372	0.423
	(0.031)	(0.028)	(0.021)	(0.040)	(0.038)	(0.028)	(0.025)	(0.018)	(0.024)	(0.029)
Mean (multiplier=2)	0.400	0.418	0.500	0.429	0.470	0.397	0.425	0.472	0.396	0.442
	(0.035)	(0.030)	(0.019)	(0.043)	(0.033)	(0.030)	(0.024)	(0.017)	(0.025)	(0.037)
Mean (multiplier=3)	0.418	0.430	0.510	0.495	0.496	0.418	0.426	0.482	0.396	0.491
	(0.037)	(0.031)	(0.022)	(0.046)	(0.047)	(0.031)	(0.025)	(0.023)	(0.032)	(0.035)
Mean (multiplier=4)	0.408	0.435	0.562	0.507	0.536	0.451	0.415	0.483	0.413	0.501
	(0.037)	(0.034)	(0.022)	(0.049)	(0.046)	(0.033)	(0.025)	(0.023)	(0.032)	(0.035)

Panel C: Number of participants, by grade and gender

Grade level	Males					Females				
	5th	7th	9th	11th	13th	5th	7th	9th	11th	13th
Number of individuals	58	51	51	36	35	46	56	42	61	50

Note: Standard errors in parentheses. Mean share given was calculated as the recipients share of total income for the pair.

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Table 2: **Estimates of choice model**

| | Grade level | | | | | |
	5th	7th	9th	11th	13th	all
share of egalitarians	0.636	0.401	0.272	0.267	0.224	0.365
	(0.060)	(0.059)	(0.057)	(0.056)	(0.056)	(0.027)
share of meritocrats	0.054	0.220	0.363	0.396	0.428	0.287
	(0.037)	(0.054)	(0.063)	(0.069)	(0.075)	(0.028)
share of libertarians	0.310	0.379	0.364	0.337	0.347	0.348
	(0.057)	(0.055)	(0.061)	(0.059)	(0.069)	(0.026)
Log likelihood	−827.4	−881.4	−797.6	−865.0	−790.3	−4219.7

Note: Standard errors in parentheses, complete set of estimates in Table S3.

from mid-childhood to late adolescence; the estimated median weight attached to self-interest was stable across grade levels (Table S3). Overall, the estimated model fit the data well for all grade levels (Figure S1).

In the second part of the experiment we studied inequality acceptance in situations involving efficiency considerations. The participants were given the task of distributing a number of points, where total benefits, in terms of income, would be maximized by giving all the points to the other participant. Specifically, the participants were informed that he or she would receive 1 NOK for each point kept for him- or herself, whereas each point given to the other participant would earn him or her 1 NOK scaled up by a multiplier. They made choices in four distributional situations, presented in random order, where the multiplier was 1 (the baseline), 2, 3, and 4, respectively. Hence, efficiency considerations did not play any role in the baseline situation, but were increasingly salient in the other three situations. In each situation, the participants were randomly paired with another participants at the same grade level. For comparability, we set the number of points to be distributed such that the average income in the baseline situation was equal to the session-specific average income in the first part of the experiment.

We observed that 5th graders and 7th graders did not assign much importance to efficiency considerations; share given was only slightly higher when the points transferred were scaled up by four than in the baseline situation (Table 1B). In contrast, the effect of the multiplier was substantial for males in late adolescence and also noticeable for females in 13th grade. These patterns are reflected in the coefficient for the multiplier in a regression of share given (Figure 1B). There was a statistically significant increase in the coefficient from 5th grade to 13th grade for both males and females (Wald test, p=0.003 (males) and p=0.019 (females)),

which reflects that older participants were more likely to differentiate on the basis of efficiency considerations. This development, however, took place later in adolescence than the differentiation on the basis of individual achievements. Moreover, we observed a statistically significant difference between males and females from 9th grade, where efficiency considerations played a more important role for males than females (Wald test, p=0.316 (5th grade), p=0.152 (7th grade), p=0.005 (9th grade), p< 0.001 (11th grade), and p=0.060 (13th grade)).

Our analysis showed that children's level of self-interest was stable across adolescence, whereas their fairness views changed fundamentally in the same period. In particular, we found increased importance of the meritocratic fairness view, which requires a distinction between different sources of inequality. Interestingly, however, we did not observe a uniform move away from the two less complex fairness views. While there was a sharp decrease in the importance of the strict egalitarian fairness view, the prevalence of the libertarian fairness view was stable throughout adolescence. These findings shed some light on the role of both cognitive maturation and social experiences in shaping children's fairness preferences. The meritocratic fairness view presupposes the ability to distinguish between relevant and irrelevant information, a cognitive ability that matures during adolescence (Steinberg, 2005), which may partly explain why we observed increased prevalence of this view. The strict egalitarian and libertarian fairness view, however, are straightforward to implement, and thus the different development of these two fairness views is hard to explain by cognitive maturation. This suggests that social experiences also play a role in shaping children's fairness preferences.

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A: Individual achievements
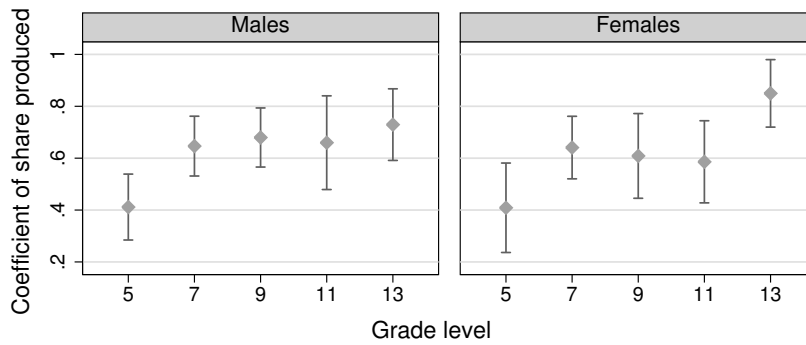
B: Efficiency
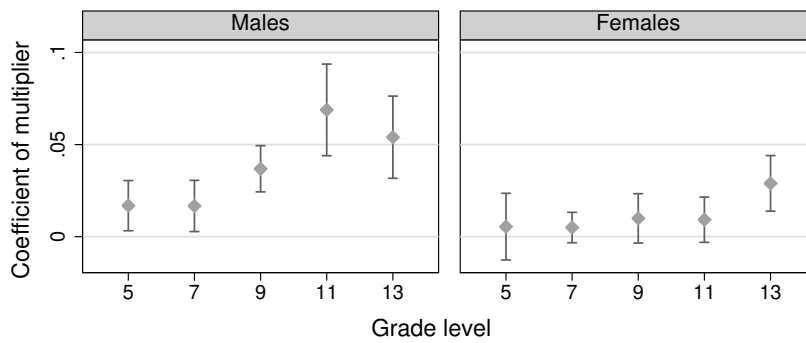
Note: Panel A reports the coefficient for the share produced by the other participant in a regression of share given on share produced, Panel B reports the coefficient for the multiplier in a regression of share given on the multiplier. All regressions control for personal fixed effects. Confidence intervals (95 percent) are indicated.

Supporting materials for
"Fairness and the development of inequality acceptance"

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Contents

1 Regressions

We here report the details of the regressions presented in Figure 1 in the main paper.

Grade level	5th	7th	9th	11th	13th
Share produced	0.408	0.647	0.667	0.613	0.794
	(0.052)	(0.043)	(0.046)	(0.061)	(0.048)
Relative price	0.067	0.074	0.072	0.079	0.072
	(0.012)	(0.010)	(0.011)	(0.011)	(0.010)
Constant	0.148	0.052	0.048	0.038	-0.013
	(0.029)	(0.025)	(0.026)	(0.032)	(0.028)
R-squared	0.196	0.387	0.425	0.318	0.485
Number of observations	504	530	452	468	408

Table 1: **Regression of share given on share produced and relative price for the first part of the experiment - Panel A in Figure 1.** Share given is defined as the other participant's share of total income. The explanatory variables in this regression are share produced (defined as share of total points produced), the relative price (defined as the participant's own price divided by the other participant's price), and personal fixed effects. Standard errors are given in parenthesis.

Grade level	Males					Females				
	5th	7th	9th	11th	13th	5th	7th	9th	11th	13th
Multiplier	0.017	0.017	0.037	0.069	0.054	0.005	0.005	0.010	0.009	0.029
	(0.007)	(0.007)	(0.006)	(0.013)	(0.011)	(0.009)	(0.004)	(0.007)	(0.006)	(0.008)
Constant	0.357	0.375	0.412	0.256	0.332	0.413	0.405	0.448	0.371	0.392
	(0.019)	(0.019)	(0.017)	(0.035)	(0.031)	(0.025)	(0.012)	(0.019)	(0.017)	(0.021)
R-squared	0.035	0.036	0.182	0.236	0.190	0.003	0.009	0.017	0.013	0.091
Number of observations	220	202	201	132	132	178	216	163	232	192

Table 2: **Regression of share given on the multiplier for the second part of the experiment - Panel B in Figure 1.** Share given is defined as the other participant's share of total income. The explanatory variables in this regression are the multiplier and personal fixed effects. Standard errors are given in parenthesis.

2 Choice model

We here present the details of the choice model used to estimate the share of strict egalitarians, meritocrats and libertarians, presented in Table 2 in the main paper.

We assume that individual i makes a trade-off between self-interest and fairness in his choices, which is captured by the following utility function,

$$V_i^{k(i)}(y; \cdot) = y - \beta_i \frac{(y - m^{k(i)})^2}{2X}, \tag{1}$$

where y is what individual i keeps for himself, $m^{k(i)}$ is what he considers fair to keep, β_i is the weight he assigns to fairness, and X is the total income to be distributed.

We assume that individual i endorses a strict egalitarian ideal (m^E), a meritocratic ideal (m^M) or a libertarian ideal (m^L).

$$m^{E(i)} = X/2, \tag{2a}$$

$$m^{M(i)} = \frac{a_i}{a_i + a_j} X, \tag{2b}$$

$$m^{L(i)} = \frac{a_i p_i}{a_i p_i + a_j p_j} X, \tag{2c}$$

where a_i is the production and $p_i a_i$ the earnings of individual i.

To handle deviations from the interior solution, we use a random utility framework (*1*), where total utility is assumed to be the sum of a deterministic part (in our context, V) and a random part that is specific to each alternative in the choice set $\mathcal{Y}$. Total utility is then given by,

$$U_i(y; \cdot) = V_i^{k(i)}(y; \cdot) + \varepsilon_{iy}/\gamma \quad \text{for all } y \in \mathcal{Y}, \tag{3}$$

where γ captures the importance of the random part, and the individual choice is given by the argument that maximizes U_i on $\mathcal{Y}$. We make the standard assumption that the ε is an i.i.d. extreme value variate, which gives rise to choice probabilities of the simple logit form.

In formulating the likelihood function, we need to take into account that the fairness ideals, $m^{k(i)}$, and the weight attached to fairness, β_i, are unobserved characteristics of the individual. We approximate the distribution of β with a lognormal distribution, where the distribution is parameterized such that $\log \beta \sim N(\mu_\beta, \sigma_\beta)$. Moreover, we let λ^E, λ^M, and λ^L represent the estimated shares of the population acting on the egalitarian, meritocratic, and libertarian fairness ideals, respectively. In sum, all parameters to be estimated are contained in $\boldsymbol{\theta} = (\mu_\beta, \sigma_\beta^2, \gamma, \lambda^E, \lambda^M, \lambda^L)$.

To capture that we have repeated observations of each individual, let $s = 1, \ldots, S_i$ index the distributive situations where individual i makes a choice. In each, $(y_{is}, \mathcal{Y}_s, \boldsymbol{a}_s, \boldsymbol{p}_s)$ are the observable variables; y_{is} is the amount of money i takes for himself in s; $\mathcal{Y}_s = \{0, 10, \ldots, \boldsymbol{p}_s \cdot \boldsymbol{a}_s\}$ is the set of all possible choices i could make in s; $\boldsymbol{a}_s$ and $\boldsymbol{p}_s$ are the vectors representing the production and the prices of the two individuals matched in s. We can now state the likelihood contribution of an individual i as,

$$L_i(\boldsymbol{\theta}) = \sum_{k \in \{E,M,L\}} \lambda^k \int \left[\prod_{s=1}^{S_i} \frac{\exp\left(\gamma V^k(y_{is}, \boldsymbol{a}_s, \boldsymbol{p}_s, \beta,)\right)}{\sum_{t \in \mathcal{Y}_s} \exp\left(\gamma V^k(t, \boldsymbol{a}_s, \boldsymbol{p}_s, \beta)\right)} \right.$$
$$\left. \times f(\beta; \mu_\beta, \sigma_\beta) \right] d\beta, \quad (4)$$

where $f(\beta; \mu_\beta, \sigma_\beta)$ is the density of β.

Table 3 in this appendix reports all estimates for this model.

Figure 1 in this appendix provides a comparison of the predicted distribution of the share given to others with the actual distribution, and we observe that the model fits nicely the data for all grade levels

Table 3: **Estimates of choice model**

	Grade level					
	5th	7th	9th	11th	13th	all
λ^E, share of egalitarians	0.636	0.401	0.272	0.267	0.224	0.365
	(0.060)	(0.059)	(0.057)	(0.056)	(0.056)	(0.027)
λ^M, share of meritocrats	0.054	0.220	0.363	0.396	0.428	0.287
	(0.037)	(0.054)	(0.063)	(0.069)	(0.075)	(0.028)
λ^L, share of libertarians	0.310	0.379	0.364	0.337	0.347	0.348
	(0.057)	(0.055)	(0.061)	(0.059)	(0.069)	(0.026)
μ_β, mean of $\log\beta$	4.154	4.426	4.049	4.064	4.901	4.258
	(0.286)	(0.185)	(0.186)	(0.237)	(0.294)	(0.102)
σ_β, standard deviation of $\log\beta$	2.552	1.540	1.334	2.137	2.199	1.970
	(0.272)	(0.143)	(0.121)	(0.208)	(0.197)	(0.072)
γ, inverse weight on random term	2.785	3.320	3.415	3.236	1.106	2.485
	(0.184)	(0.399)	(0.481)	(0.337)	(0.074)	(0.061)
Log likelihood	-827.4	-881.4	-797.6	-865.0	-790.3	-4219.7

Note: Standard errors (in parentheses) are calculated using the BHHH method (*2*). One of the estimated population shares and its standard error are calculated residually. The likelihood is maximized using the FmOpt library (*3*). A likelihood ratio test of the restriction imposed by a common set of parameters for all grades (the last column) has a $\chi^2_{20} = 116.0$, which means the common parameter specification can be rejected at all reasonable levels of significance ($p < 0.001$).

Figure 1: The distribution of outcomes and predictions
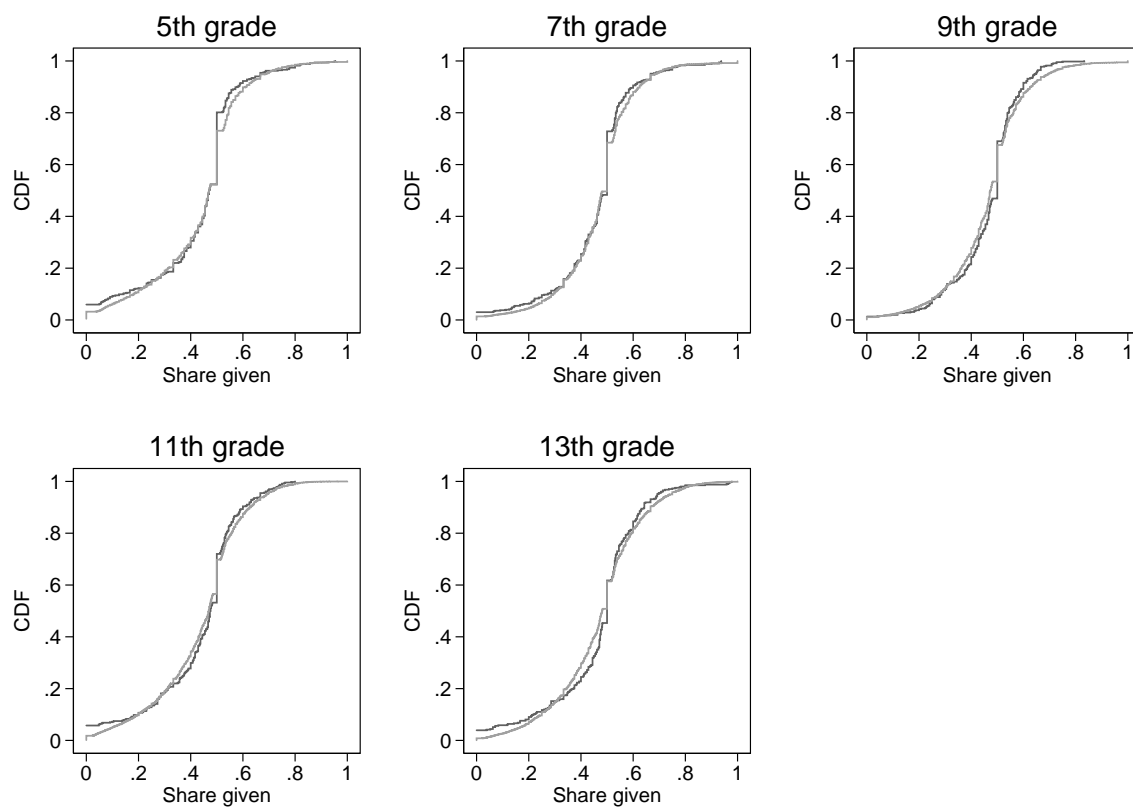
Note: Predictions made at the distuations in the dataset, using the estimates of Table 3. The dark line represents the cumulative distribution function of data, the light gray line that of the predictions.

3   Methodology

We recruited a total of 486 children from schools in Bergen municipality in Norway, by randomly selecting 20 schools and then randomly selecting children at the different grade levels within these schools. The 5th, 7th, and 9th grades are compulsory in Norway, and more than 90 percent of children also continue to high school. At high school, some programs end at the 12th grade. To ensure balanced recruitment across programs, we therefore selected pupils from both 12th and 13th grades (but refer to this, for short, as the 13th grade in the main paper). Bergen municipality, which includes the second largest city in Norway as well as less populated rural farming areas, is close to the national average with respect to the distribution of income, education and occupation. Hence, the selected sample is fairly representative for children in these age groups in Norway. The invitation to participate was accepted by 63.6 percent of the children, where children below the age of 16 needed written consent from their parents to participate.

A total of 10 sessions were conducted in two computer labs at the Norwegian School of Economics and Business Administration and no teachers were present during the experiment. Each session only had participants from the same grade level, a fact that was known to all participants. To avoid any in-group effects we never had more than five participants from the same class in any lab.

At the beginning of the experiment, all participants were given a description of how the experiment would proceed. All interaction between the participants was anonymous and conducted through a web-based interface. The experiment was double blind, i.e., neither subjects nor experimenters could link decisions with particular subjects. A copy of the instructions is provided in a separate appendix.

In total, the participants made 2 362 distributional choices in the first part of the experiment and 1 868 in the second part of the experiment. The participants were not informed about

the actual payment from the experiment before both parts of the experiment were completed. The payment for each part of the experiment was determined by randomly choosing one of the situations that the person had been involved in. The average payment from the experiment was 182 NOK (approximately 35 USD).

At the end of the experiment, the participants were given a code and a claim form. This form was placed in an envelope addressed to the accounting division at our school. The procedure ensured that neither the participants nor the research team were in a position to identify how much each participant earned in the experiment.

References and Notes

1. D. McFadden, *Frontiers in Econometrics*, P. Zarembka, ed. (Academic Press, 1974), chap. 4, pp. 105–142.

2. E. R. Berndt, B. H. Hall, R. E. Hall, J. A. Hausman, *Annals of Economic and Social Measurement* **3**, 653 (1974).

3. C. Ferrall, *Computational Economics* **25**, 343 (2005).

Appendix: Introduction and Screenshots

Welcome to NHH. My name is xx and I will be leading this experiment.

The results from this experiment will be used in a research project. In order for us to be able to use the results, it is important that all of you who participate keep to the rules that have been handed out. Let me repeat the rules:

- You are not allowed to talk to other participants during the experiment
- If you have any questions or problems during the experiment, then please raise your hand and we will come and help you. We cannot answer any questions in plenary. Since this is a research project, this is very important. You must sit quietly with your hand raised and wait until we come over and help you
- All mobile phones must be switched off
- You are not allowed to open any other internet pages than the one we ask you to open
- If you break any of these rules, you will have to leave the room and will not be allowed to participate in the experiment

I am now going to tell you a bit about the experiment. While I do that, you must not touch the keyboard until you are told to do so.

The experiment will be carried out simultaneously in two different rooms. Some of the people who came here on the bus with you were sent to this room, while others were sent to another similar room. The others will receive exactly the same information and do exactly the same things as you will be doing.

The experiment is anonymous. This means that you will not be asked to tell us who you are. It also means that it will not be possible for us or for the other participants to find out what you are doing during the experiment.

This experiment is in two parts. In the first part you have 45 minutes in which you decide yourself what you want to do. You can either choose a closed games page with games,

cartoons, nice pictures and videos. Alternatively you can choose another closed page, where you will be asked to solve a task. On the task page you will be able to make money.

After 45 minutes both the games page and the task page will no longer be available. You will then be told the total number of points you have earned on the task page and how much these are worth. For half of you, one point on the task page will be worth 40 øre, while for the rest of you one point on the task page will be worth 20 øre. How much your points will be worth, is determined randomly by the computer that controls the experiment.

So what happens to the money you have earned on the task page? When you have completed the task, you will be linked to another participant via the internet. You will not be told who the other person is. It may be someone in this room, or someone in the other room. Between you, you will earn a sum of money, and you are going to choose how much you think you should receive. The remainder is what you think the other person should receive. When you decide on the division, you will be told how long each of you has worked on the task. The other person will also choose how much money you will receive and how much the other person will give to him or herself. These choices will decide how much money you will be bringing home with you when you leave. You will receive more information about how this will be done after you have played games and worked on the task.

Part II of the experiment does not have anything to do with part I, so I will not tell you about part II until we have completed part I.

We are soon going to start part I of the experiment and I will explain how you can earn points on the task page.

Part I

The task page

Here is an example of the type of task you will be given on the task page.

Screen Shot 1

Task

You have earned a total of 6 points.

Find all the places where the number 743 appears in the table.

Click in the box on the right-hand side of these numbers.

You earn one point for each correct number

You lose one point for each wrong number

When you wish to continue to the next task, click the submit button underneath the table

SUBMIT

- On the task page there is a table with numbers
- Your task is to find a particular number, for example the number XX
- The number may be found several places in the table and you must click on the right-hand side of the number every time you find it
- You will earn one point for each correct number you have ticked off
- You will lose one point if you tick off a different number from the one you have been asked to tick off
- When you cannot find any more numbers of this type or are tired of looking for this number, then press SUBMIT.

A new table will then appear and you will be asked to find a new number. And this is how it continues. Each time you submit a table the machine will count and register your points. At the top of the page you can check the number of points you have earned.

The other page is a closed games page that will also only be available to you during these 45 minutes. This page is underneath the one that is open now. You may now open the games page but you are not allowed to do anything before I say so.

Here you see a copy of the main page on the games page. It consists of four parts:

- Twelve different games such as Tetrix, Pexcon, Snowboard Stunts and Helicopter
- Commercials for Playstation, iPod, Adidas and others
- Pondus cartoons
- A series of beautiful nature pictures

It is up to you how much time you want to spend on the games page and how much time you want to spend on the task page during the 45 minutes the two pages are open. After 45 minutes both pages will be closed and you will no longer be able to play on the games page or work on the task page.

You can easily move between the two pages, and we are now going to show you how this works. First, everyone goes to the games page.

Here, you see the 12 games that are available. Everyone starts by playing "Helicopter".

You are now going to choose another game. In order to choose another game, click on "Main page" in the top left-hand corner of the screen, choose "Computer game" and then choose the game that you would like to try.

Now return to the main page on the games page. Now try to go to the task page and then back to the games page. When you get back to the games page, click on "Funny commercials". You are not allowed to start any of the commercials yet.

We have now finished with the introduction and are ready to start. Remember that you can ask questions at any time by raising your hand. We now have to wait a little while for the computer that controls the experiment and both rooms to be ready to start the experiment.

You may now start doing what you like on the games page. If you want to hear the sound on the videos and games, you must use the ear phones.

Now it is also possible to go to the task page and earn points. You may move backwards and forwards between these two pages as you wish.

It is now 20/10/1 minute(s) left before we close the games page and the task page.

It is now 20 seconds left and everyone must press SUBMIT before the time is up. When the time is up, it will not be possible to register any more tables.

The time is now up, and everyone must press SUBMIT to go to the next page. Our assistants will now come round and close the games page. You are not allowed to open it again.

I am now going to explain the next phase of the experiment, so everyone must sit still and listen to what I am saying. You will now be starting the division phase. The first page you are going to see in the division phase is a page that shows you how many points you have earned on the task page. Here is an example of what this page may look like.

Screen shot 3

Result:

You worked with the task for 32 minutes.

You earned 250 points.

You were unlucky and get 0.20 krone for each point.

Your points are worth 50 kroner.

Press the button to continue:

CONTINUE

This page tells you:

- How long you have worked with the task
- How many points you have earned
- Whether you were lucky and earned 40 øre per point or unlucky and earned 20 øre per point
- And on the last line you will see the total value of your points

When you have finished reading this page, you move on to the first choice that you need to make. Here is an example of such a choice situation:

Screen shot 4

Choice 1/5

Together with another participant you have earned a total of 170 kroner.

How much of this do you wish to give to yourself?

(The amount will be rounded off to the nearest 10 kroner.)

How did you earn the money?

YOU	THE OTHER PARTICIPANT
Worked for 32 minutes	Worked for 36 minutes
Earned 250 points	Earned 300 points
Were unlucky (20 øre per point)	Were lucky (40 øre per point)
Earned 50 kroner	Earned 120 kroner

What you are going to decide, is how much you want to give to yourself. In each situation you will be linked to another pupil, either in this room or in the other room. You will be told:

- how many minutes the other person worked with the task
- how many points the other person earned
- whether he or she was lucky or unlucky
- and, at the bottom, the total value of the other person's points

You will also receive the same information about yourself.

What you are going to do is to decide how much of your joint earnings you want to give to yourself. The other person will receive the rest.

When you have made your choice in this situation, a new page that shows your choice will come up. It looks like this:

Screen shot 5

Confirmation

Choice 1/5

Together with another participant you have earned a total of 170 kroner.

You chose to keep xxx kroner yourself.

This means that the other participant gets xxx kroner.

How did you earn the money?

YOU	THE OTHER PARTICIPANT
Worked for 32 minutes	Worked for 36 minutes
Earned 250 points	Earned 300 points
Were unlucky (20 øre per point)	Were lucky (40 øre per point)
Earned 50 kroner	Earned 120 kroner

Press the button to confirm your choice or try again

CONFIRM

TRY AGAIN

This page tells you how much you have decided to give to yourself and to the other person.

If you are happy with your choice, press CONFIRM CHOICE. If you wish to change your decision, press TRY AGAIN.

When you have confirmed your choice in the first situation, you will come to a new situation. Here, you will receive information about another pupil who is taking part in the experiment and about how much you have earned together. Here you must also decide how much you want to give to yourself.

You may get questions about up to 5 such situations.

It is very important that you think of all your choices as real, because it may be one of these choices that decides how much you and another participant will earn from part I here today. At the end of the experiment, the computer that controls the experiment will randomly pick out one of the situations where you have made a choice. In the chosen situation the computer will randomly pick either your choice or the choice of the other participant. The choice that is picked out, whether it is yours or that of the other person, will decide how much you will actually earn in this part of the experiment.

Don't be afraid to make mistakes when you make your choices. Firstly, you will see immediately what you have chosen and will be asked if your choice is ok. In addition, when you have made all your choices, you will get an overview of all the situations. If there are any choices that you are not happy with, then you can make them again. If you are happy with all your choices, then you confirm them.

If you find some of this difficult, you can just raise your hand and we will come and help you.

One thing is very important: you must work with your choices right until you reach this page.

Screen shot 6

You have now completed the first part of the experiment

Wait for new instructions.

When you have come this far, you have completed part I. Please sit quietly and wait until everyone has reached this page.

We now have to wait a little while for the computer that controls the experiment and both rooms to be ready.

We are now ready to start with the division. First, you will see the results from your work with the task. When you have finished looking at this, you continue and start by making your first choice. Remember to raise your hand if you need help. And remember to continue until you reach the screen shot that shows that you have finished the first part of the experiment.

Now everyone has done a good job and has completed the first part of the experiment. We will not tell you how much you have earned in the first part before the whole experiment is completed, but what happens next will not affect the payment you receive for part I. And what you have done in part I will not affect what happens in part II.

We are now ready for part II. I will first explain what is going to happen, so please do not continue until you are told to do so.

Part II

In part II of the experiment you will be making choices in some new situations. You will receive a number of points without having to earn them by doing tasks. These points you may keep for yourself or give to someone else.

The first page you come to will tell you how many points you have received. When you have looked at it, you continue to the first choice where you will be linked to someone either in this room or in the other room.

I am now going to show you an example of such a choice.

Screen shot 7

Division Choice 1/1

You have received 50 points and must decide how many you wish to keep for yourself.

	YOU	THE OTHER PARTICIPANT
Value per point (kr)	1	1

How many points out of the 50 do you want to keep for yourself? SUBMIT DECISION

(The machine will round off to the nearest 25 points.)

Here you will see:
- How many points you have to divide
- How much the points are worth to you and how much they are worth to the other person

9

Let me explain the last point in more detail. It will always be the case that if you keep 1 point for yourself, then it will be worth 1 krone to you, which means that you will receive 1 krone. This is what it means when it says in the table that value per point for you is 1 krone.

But you can also choose to give the point to the other participant. It is the same as giving the other person money, but how much money the other person will receive for the point will vary and can seen from the table. If it says that value per point for the other person is 1 krone, then it means that the other person will receive 1 krone when you give him or her 1 point. But in some situations it will say that the value per point for the other person is 2 kroner, 3 kroner or 4 kroner. If it says 4 kroner, that means that if you give him or her 1 point, then he or she will receive 4 kroner. So that in such a situation the points are worth more to the other person than to you. You give away 1 point that is worth 1 krone to you, the other person receives 1 point that is worth 4 kroner to him or her, and, correspondingly, if it says 2 or 3 kroner in this part of the table.

You may get questions about up to 4 such situations.

As in part I it is very important that you think of all your choices as real, because it may be one of these choices that will determine how much you and another participant are going to earn from part II here today. At the end of the experiment the computer that controls the experiment will randomly pick out one of the situations where you have made a choice. In the chosen situation the computer will randomly pick out either your choice or the choice of the other participant. The choice that is picked out, whether it is yours or that of the other participant, will determine how much you will actually earn in this part of the experiment.

Also this time, you must not be afraid to make a mistake when you are making your choices. As in part I, you will immediately see what you have chosen and will be asked if this is ok, and when you have made all your choices you will get an overview of all the situations. If there are any choices that you are not happy with, you may do them again – if you are happy with all your choices, you confirm them.

And, remember, you can always raise your hand and we will come and assist you.

When you have confirmed your choices in part II, you will be asked a few questions. You have not completed part II until you have answered these questions and the following page has come up.

Screen Shot 8

You have now completed part II of the experiment

Wait for new instructions.

When you have come this far, please sit quietly and wait until everyone else has also reached this page.

We now have to wait a little while for the computer that controls the experiment and both rooms to be ready to start with the division.

We are now ready to start with the division. You will now see how many points you have to divide. When you have finished looking at this, you continue and start by making your first choice. Remember to raise your hand if you need help. And remember to continue right until you reach the screen shot that shows that you have completed the second part of the experiment.

When you have finished, please sit quietly and wait for everyone in both rooms to be finished.

Now, everyone has done a good job and has completed part II of the experiment.

You will soon see a page that tells you how much you have earned in each part of the experiment. Here I will show you an example of such a page:

In both parts of the experiment the computer has randomly picked out one of the situations you were in, and either your choice or the choice of the other player to decide how much you are going to earn.

- Here you can see how much you earned in part I and part II
- In addition you receive 50 kroner for participating in the experiment
- Here you can see your total earnings

You now have to wait while the computer prepares the payment page. Please face the screen while you are waiting.

The payment page has now come up. Everyone must sit quietly while looking at this page.

You will now receive an envelope that you must look after very carefully. In the envelope there is a form which contains a code that shows which computer you have been using. This code will be forwarded to the school's finance department. When the form is returned to the school's finance department together with a bank account number, then the money you have earned will be transferred to this bank account number.

If you lose the envelope or do not return it to us with a bank account number, we will not be able to transfer the money to you. So you must bring it home, fill in the form and send the envelope back to us as soon as possible. The money you have earned will then be transferred to the bank account number that we have been given.

Please remain seated until everyone has received their envelope.

Finally, we would like to thank everyone for participating in the experiment and for doing such a good job. There is one more important thing that we need to tell you about. We will be carrying out this experiment with more pupils this week, including pupils from your school. It is very important to us that these pupils do not know what is going to happen. We therefore ask you not to talk to anyone about the experiment or tell anyone how much you have earned before the week is over. You may of course talk to those you have been with here today and to your parents, but not to anyone else. You must not talk about this to your siblings either, as they themselves may be taking part in the experiment or they may know someone who is going to take part. If you talk about this to others, you may ruin the whole research experiment for us. So this is a very important message which we hope you will respect. Next week you may of course talk to whoever you like about it, and there will then also be an article about it in the newspapers.

Now it is time for something to eat and in the meantime we will also tell you a little bit about what you have participated in today and about our school. You may now follow our assistant.

COMPLETE OVERVIEW OF SCREEN SHOTS – EXPERIMENT

Welcome to the experiment

Please remain seated and wait for instructions.

Task

Find all the places where the number 826 appears in the table.

Click in the box on the right-hand side of these numbers.

You earn one point for each correct number

You lose one point for each wrong number

When you wish to continue to the next task, click the submit button underneath the table.

SUBMIT

Time is up!

Wait for instructions.

Result:

- You worked with the task for 32 minutes

- You earned 250 points

- Were unlucky and earned 0.20 kroner for each point

Your points are worth 50 kroner.

Press the button to continue.

CONTINUE

Choice 1/5

You and another player have together earned 170 kroner

How much of this do you wish to give to yourself?   SUBMIT

(The amount will be rounded off to the nearest 10 kroner.)

How did you earn the money?

YOU   THE OTHER PLAYER

- Worked for 32 minutes   Worked for 36 minutes

- Earned 250 points   Earned 300 points

- Were unlucky (20 øre per point)   Were lucky (40 øre per point)

- Earned 50 kroner   Earned 120 kroner

Confirmation

Choice 1/5

You and another player have together earned 170 kroner

You chose to keep xxx kroner

This means that the other player gets xxx kroner

How did you earn the money?

YOU   THE OTHER PLAYER

- Worked for 32 minutes   Worked for 36 minutes

- Earned 250 points   Earned 300 points

- Were unlucky (20 øre per point)   Were lucky (40 øre per point)

- Earned 50 kroner   Earned 120 kroner

Press the button to confirm your choice or tray again

CONFIRM CHOICE

TRY AGAIN

Are your choices ok?

You will now see your choices again

If you think they are ok, press ALL OK.

If you want to change any of your choices, tick off and press CHANGE

GO TO OVERVIEW

Overview of your choices

Below is an overview of your choices

ALL OK

CHANGE

Choice

Choice 1/5

You and another player have together earned 170 kroner

You chose to keep xxx kroner.

This means that the other player gets xxx kroner.

How did you earn the money?

YOU	THE OTHER PLAYER
• Worked for 32 minutes	Worked for 36 minutes
• Earned 250 points	Earned 300 points
• Were unlucky (20 øre per point)	Were lucky (40 øre per point)
• Earned 50 kroner	Earned 120 kroner

You have now completed the first part of the experiment

Wait for new instructions.

Part II

We give you 100 points to share between yourself and another player.

Press the button to make your first choice.

CONTINUE

Choice 1/4

You have received 100 points

How many points do you wish to give to yourself?   SUBMIT

(Your choice will be rounded off to the nearest 10 points)

YOU   THE OTHER PLAYER

Each point is worth 1 krone   Each point is worth 4 kroner

Confirmation 1/4

You have received 100 points

You chose to keep xxx points for yourself. This means that you get xxx kroner (since each point is worth 1 krone)

You chose to give xxx points to the other player. This means that he or she gets xxx kroner (since each point is worth 4 kroner to him or her).

Press the button to confirm your choice or tray again

CONFIRM CHOICE

TRY AGAIN

Are your choices in part II ok?

You will now see your choices again

If you think they are ok, press ALL OK.

If you want to change any of your choices, tick off and press CHANGE

GO TO OVERVIEW

Overview of your choices

Below is an overview of your choices

ALL OK

CHANGE

Choice

Choice 1/4

You have received 100 points

You chose to keep xxx points for yourself. This means that you get xxx kroner.

The other player gets xxx kroner.

YOU   THE OTHER PLAYER

Each point is worth 1 krone   Each point is worth 4 kroner

A few questions:

Before we finish we would like you to answer a few questions:

1.

Are you a boy or a girl?

Boy

Girl

2.

Imagine two secretaries who are both the same age and are both doing the same job. One of them finds out that the other earns a lot more than she does. The best paid secretary is better at her job in many ways. Do you think it is fair or unfair that one secretary earns more than the other?

Fair

Unfair

3.

Choose a point on the scale below:

Those who work hard   1 2 3 4 5 6 7 8 9 10   Hard work does not help, it is luck

normally have a better life   and connections that are important

SUBMIT ANSWER

You have now completed the second part of the experiment

Wait for new instructions.

How much did you earn?

Part I

One of the other player's choices was picked out.

You earned 70 kroner, the other player earned 100 kroner.

Part II

One of the other player's choices was picked out.

You earned 80 kroner, the other player earned 60 kroner.

You also get 50 kroner for participating.

All in all you get 200 kroner.

The amount will be transferred to the bank account that you enter in the form.

Please remain seated until you are given new instructions.

Thank you very much for participating in this experiment.

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19/14 May, **Elias Braunfels**, "How do Political and Economic Institutions Affect Each Other?"

20/14 May, Arturo Ormeño and **Krisztina Molnár**, "Using Survey Data of Inflation Expectations in the Estimation of Learning and Rational Expectations Models"

21/14 May, **Kurt R. Brekke**, Luigi Siciliani, and Odd Rune Straume, "Hospital Mergers with Regulated Prices".

22/14 May, **Katrine Holm Reiso**, "The Effect of Welfare Reforms on Benefit Substitution".

23/14 June, Sandra E. Black, Paul J. Devereux, and **Kjell G. Salvanes**, "Does grief transfer across generations? In-utero deaths and child outcomes"

24/14 June, Manudeep Bhuller, Magne Mogstad, and **Kjell G. Salvanes**, «Life Cycle Earnings, Education Premiums and Internal Rates of Return".

25/14 June, **Ragnhild Balsvik**, **Sissel Jensen**, and **Kjell G. Salvanes**, "Made in China, sold in Norway: Local labor market effects of an import shock".

26/14 August, **Kristina Bott, Alexander W. Cappelen, Erik Ø. Sørensen**, and **Bertil Tungodden**, "You've got mail: a randomized field experiment on tax evasion"

27/14 August, **Alexander W. Cappelen, Sebastian Fest, Erik Ø. Sørensen**, and **Bertil Tungodden**, "The freedom to choose undermines the willingness to redistribute."

28/14 August, Marianne Bertrand, Sandra Black, **Sissel Jensen**, and Adriana Lleras-Muney, "Breaking the Glass Ceiling? The Effect of Board Quotas on Female Labor Market Outcomes in Norway."

29/14 August, **Astrid Kunze**, "The family gap in career progression".

30/14 September, **Ragnhild Balsvik** and **Morten Sæthre**, "Rent Sharing with Footloose Production. Foreign Ownership and Wages Revisited".

31/14 October, **Nicola D. Coniglio** and Giovanni Pesce, "Climate Variability and International Migration: an empirical analysis"

32/14 November, **Kurt R. Brekke**, Armando J. Garcia Pires, Dirk Schindler, and Guttorm Schjelderup, "Capital Taxation and Imperfect Competition: ACE vs. CBIT"

33/14 November, **Jan I. Haaland** and Anthony J. Venables, "Optimal trade policy with monopolistic competition and heterogeneous firms".

34/14 December, Rolf Aaberge, **Kai Liu**, and Yu Zhu, "Political Uncertainty and Household Savings".

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01/15 January**,** Antonio Mele**, Krisztina Molnár,** and Sergio Santoro, "On the perils of stabilizing prices when agents are learning".

02/15 March, **Liam Brunt**, "Weather shocks and English wheat yields, 1690-1871".

03/15 March, **Kjetil Bjorvatn, Alexander W. Cappelen**, Linda Helgesson Sekei, **Erik Ø. Sørensen**, and **Bertil Tungodden**, "Teaching through television: Experimental evidence on entrepreneurship education in Tanzania".

04/15 March**, Kurt R. Brekke**, **Chiara Canta**, Odd Rune Straume, "Reference pricing with endogenous generic entry".

05/15 March, Richard Gilbert and **Eirik Gaard Kristiansen**, "Licensing and Innovation with Imperfect Contract Enforcement".

06/15 March, **Liam Brunt** and Edmund Cannon, "Variations in the price and quality of English grain, 1750-1914: quantitative evidence and empirical implications".

07/15 April, Jari Ojala and **Stig Tenold**, "Sharing Mare Nostrum: An analysis of Mediterranean maritime history articles in English-language journals".

08/15 April, **Bjørn L. Basberg**, "Keynes, Trouton and the Hector Whaling Company. A personal and professional relationship".

09/15 April, Nils G. May and **Øivind A. Nilsen**, "The Local Economic Impact of Wind Power Deployment".

10/15 May, **Ragnhild Balsvik** and Stefanie Haller, "Ownership change and its implications for the match between the plant and its workers".

11/15 June, **Kurt R. Brekke**, **Chiara Canta**, Odd Rune Straume, "Does Reference Pricing Drive Out Generic Competition in Pharmaceutical Markets? Evidence from a Policy Reform".

12/15 June, **Kurt R. Brekke**, Tor Helge Holmås, Karin Monstad, and Odd Rune Straume, "Socioeconomic Status and Physicians'Treatment Decisions".

13/15 June, **Bjørn L. Basberg**, "Commercial and Economic Aspects of Antarctic Exploration - From the Earliest Discoveries into the 19th Century".

14/15 June, **Astrid Kunze** and Amalia R. Miller, "Women Helping Women? Evidence from Private Sector Data on Workplace Hierarchies"

15/15 July, **Kurt R. Brekke**, Tor Helge Holmås, Karin Monstad, Odd Rune Straume, «Do Treatment Decisions Depend on Physicians Financial Incentives?"

16/15 July, **Ola Honningdal Grytten**, "Norwegian GDP by industry 1830-1930".

17/15 August, **Alexander W. Cappelen**, Roland I. Luttens, **Erik Ø. Sørensen**, and **Bertil Tungodden**, «Fairness in bankruptcy situations: an experimental study».

18/15 August, **Ingvild Almås, Alexander W. Cappelen, Erik Ø. Sørensen**, and **Bertil Tungodden**, "Fairness and the Development of Inequality Acceptance".