Homo Moralis: Personal Characteristics, Institutions, and Moral Decision-Making

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This paper studies how individual characteristics, institutions and their interaction influence moral decisions. We explore how moral behaviour varies with individual characteristics using a real moral task that focuses on the willingness to harm third parties for money. The data demonstrate that in line with scenario and questionnaire studies, a moral type – a "homo moralis" – exists: intelligence, female gender and the existence of siblings positively affect moral decisions. Furthermore, religiousness and vegetarianism positively correlate. This holds in individual contexts as well as market environments. Fluid intelligence even has an over-proportional effect in protecting against moral erosion in markets.

Keywords: homo moralis, moral type, real moral task, trade and morals

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1. Introduction

This paper explores the relationship between individual characteristics, institutions and moral behaviour, focusing on the willingness to accept harming third parties. The consequences of moral decisions are real. We study how moral behaviour varies with individual characteristics, as well as how these characteristics interact with institutions, comparing individual situations to market environments. We find that generally moral behaviour is higher among females, more intelligent people and people with siblings, and positively correlates with religiousness and vegetarianism. This is true for individual as well as market situations. Therefore, a moral type – a homo moralis – exists. There are individuals who tend to follow higher moral standards compared to others. Our data from a real decision context thereby confirms findings from hypothetical studies, as we discuss in detail below.

Following, e.g., Falk and Szech (2013) and Ziegler, Romagnoli and Offerman (2020), moral values are overall much lower in market trading than in individual decision-making. Nonetheless, differences across personalities have not been investigated in detail in these real contexts. Therefore, in the present paper we focus on personal characteristics. We find that homo moralis characteristics exist, which help in keeping higher moral standards, real individual decisions and market trading. Looking into interaction effects between personal characteristics and markets, high fluid intelligence even proves to have an over-proportionally protecting impact. It helps people to keep exceptionally high moral standards in an overall morals-eroding institution.

While investigating the influence of individual characteristics on levels of morality is an interesting topic in itself, it also holds political relevance. Depending on what kind of moral outcome organisations aim to implement, they may target people with specific individual characteristics. Such targeted subgroups could be males or females, the old or the young, people of high or low intelligence, the rich or the poor. Individual characteristics may play important roles in committee decisions on morally-relevant questions, thereby affecting ethical judgements of various boards. Likewise, work ethics may be shaped by the kind of personalities who run a company. If a glass ceiling or other kinds of discrimination prevent certain – e.g. specifically moral – subgroups from climbing job ladders, the business ethics of a company could suffer. Societies may develop in different moral directions depending on whether socio-demographics matter for political representation or not. The effects may be further amplified by self-selection if morally corruptible personalities self-select into corrupting institutions.

Research in the social sciences suggests that moral behaviour and social responsibility is malleable by institutional design.[1] It can make a huge difference whether people decide individually about a morally-relevant issue, or whether they decide in groups or as market participants. Falk and Szech (2013) document that markets can cause drastic moral transgression, seducing people to support immoral outcomes to which they would individually object. Kirchler et al. (2016) confirm this effect and demonstrate its robustness for a variety of institutional details. Ziegler, Romagnoli and Offerman (2020)

[1] For a comprehensive overview of the literature, see Haidt and Kesebir (2010).

show that moral erosion becomes even stronger in multi-unit markets. Bartling, Weber and Yao (2015) show that consumers in markets exhibit less social concern compared to individual choices. The findings raise the question of where markets are morally appropriate, and in which form. The topic of markets and morality has recently received strong attention, including in public debate (compare, e.g., Bowles 2016, Sandel 2012, Satz 2010). If markets erode moral standards, discussing policy interventions may become important.

Little to nothing is known about a potential heterogeneity in institutional effects on moral behaviour in real situations. Do markets affect all kinds of individuals in comparable ways, or do certain characteristics in humans render them more or less prone to influences of market activity? Understanding which individuals are specifically tempted by markets could inform debates on market regulation and alternative policies, such as campaigns targeted at specific subgroups of market participants. For example, it may require a high level of intelligence to understand market mechanisms to resist their effects on moral behaviours. If this is the case, policy intervention could help in making market forces more transparent and understandable for less-reflected market participants.

Previous work in the social sciences provides evidence on the relevance of not only institutional factors, but also emotional and situational factors for moral decision-making. For example, randomly-varied emotional states shape moral judgement in the well-known Trolley problem (e.g. Valdesolo and DeSteno 2006) or the judgement of characters in vignette studies (Schnall et al. 2008). The power of situational and institutional factors in affecting moral behaviours has been repeatedly documented and discussed in various contexts, e.g. in the large bystander effect literature (Darley and Latané 1968, Latané and Nida 1981, Fischer et al. 2011), or as a consequence of authority (Milgram 1963). Furthermore, delegation (Hamman et al. 2010, Bartling and Fischbacher 2012), market institutions (Falk and Szech 2013, Kirchler et al. 2016, Ziegler, Romagnoli and Offerman 2020), exogenous or endogenous diffusion of the notion of being pivotal (Bandura 1977 and 1999, Falk and Szech 2014, Rothenhäusler, Schweizer and Szech 2018, Falk, Neuber and Szech 2020, Fees, Kerzenmacher and Muehlheusser 2020) and other forms of "moral wiggle rooms" and information avoidance (Dana et al. 2007, Hertwig and Engel 2016, 2020, Golman, Hagmann and Loewenstein 2017, Serra-Garcia and Szech 2020) have been found to erode moral behaviour. It also seems that fulfilling one ethical aspect suffices to ease moral conscience in static decisions (Engel and Szech 2020) as well as over time (Monin and Miller 2001, Gneezy, Imas and Madarász 2014). However, while researchers have uncovered intuitive, emotional and situational factors, little is known about the role of individual characteristics as key drivers of moral decision-making in real situations. Therefore, in this paper we explore differences at the level of the individual as a systematic source of variation in moral outcomes. We study how individual characteristics affect the level of morality in general as well as how they help in explaining the effects of markets as one omnipresent and specifically important institution on moral behaviour.

In order to study the role of individual-specific moral decision-making, we relate data from Falk and Szech (2013) to personal characeristics of participants. The decision data comes from real, incentivised tasks, which differentiates our study from a vast body of

literature in business ethics that explores the relation between morality and personal characteristics using questionnaires and hypothetical scenarios (see Ford and Richardson 1994, Loe et al. 2000, and O'Fallon and Butterfield 2005 for overviews). In the experiments, subjects faced the decision of receiving money and killing versus receiving no money and saving the life of an animal.[2] The consequences of decisions taken by subjects were implemented exactly as stated in the instructions of the experiments. Killing an animal for money implies supporting harm for purely selfish reasons. Harming others for selfish reasons is an essential aspect of immoral behaviour. According to prominent views, this includes harming other humans, harming other species and harming the environment (compare e.g. Bandura, 2016). The fact that a third party is effectively harmed not only differentiates our paradigm from survey-based research and staged experiments in social psychology, but also from experiments that involve monetary consequences alone.

We proceed in two steps. First, we study whether individual differences predict variations in moral decision-making. We focus on four characteristics that are plausibly exogenous to moral behaviour: gender, intelligence (both fluid and crystallised), age and being a single child. The dependent variable is immorality, namely the willingness to kill a mouse for ten euros. We find that women are significantly less willing to kill their mouse for money in comparison to men. Likewise, more intelligent subjects display a lower propensity to kill than subjects with a lower IQ. Moreover, subjects without brothers or sisters are more likely to kill than other subjects. While there is a tendency for older subjects to kill less, the effect is small. However, given the condensed age distribution of our student sample, the effect of age is most likely not well identified in our data. Gender, IQ and being a single child significantly predict moral outcomes, both individually as well as in multivariate regressions where we also include additional potentially related variables. Of course, in case of gender, the question remains whether nature, nurture or an interaction of the two cause the results.

Two further individual characteristics that are likely associated with moral disposition but do not allow for a straightforward causal interpretation are religiousness and being a vegetarian. Religious inclinations as well as being a vegetarian are potential expressions of normative concerns, unless e.g. the decision to become a vegetarian is solely determined by health considerations. Therefore, we hypothesise that both facets should positively correlate with moral behaviour. In multivariate regressions where we include the exogenous drivers of morality (gender, IQ, single child and age) together with these variables, religiousness and being a vegetarian are significantly associated with a lower propensity to kill.

In sum, our analysis reveals a systematic pattern of individual characteristics contributing to explain heterogeneity in moral behaviour. The overall explained variance is about

[2] After the study, participants were informed that the animals involved were so-called "surplus mice" from animal laboratories. They were bred for animal studies but turned out to be unnecessary. They would all have been killed without our research projects. See the next section for details.

18.0%[3] and the observed effects are sizeable. For example, relative to female subjects, male subjects are 13.0 percentage points[4] more likely to kill a mouse. Likewise, a one standard deviation increase in fluid IQ reduces the likelihood of killing by 8.3 percentage points.

Conceivably, individual characteristics not only affect the level of moral decision-making in a given context, but they might also shape the extent to which situational or institutional factors affect moral outcomes. Therefore, in a second step we move beyond documenting level effects and show how individual characteristics contribute to moral decisions in market versus non-market situations. Markets are omnipresent in our societies, thus representing institutions of specific importance. In the markets investigated, buyers and sellers negotiate prices to trade an item. Using the mouse paradigm described above, Falk and Szech (2013) show that markets erode moral values: significantly more subjects are willing to trade and kill their mouse in markets (double auctions) compared to the individual – i.e. non-market – conditions. Reanalyzing their data, we were interested in how individual differences affect the influence of markets on moral behaviour. Interacting a set of individual characteristics with randomised market participation, we find that the moral-eroding effect of markets exists for essentially all individuals. The only characteristic that helps to protect from the moral-eroding impact of markets is fluid intelligence, referring to logical reasoning and problem-solving abilities in novel situations. Thus, one explanation might be that these more intelligent individuals can better understand principles of markets and how these may facilitate acting immorally.

The individual characteristics analysed in this paper hold particular interest. For example, documenting a gender effect on moral disposition adds to the mounting evidence on systematic gender differences in economic preferences and behaviours, such as risk preferences (Dohmen et al. 2011, Croson and Gneezy 2009), social preferences (Croson and Gneezy 2009), egalitarianism (Andreoni and Vesterlund 2001, Fehr et al. 2008, Croson and Gneezy 2009), competitiveness (Gneezy et al. 2003, Niederle and Vesterlund 2007, Dohmen and Falk 2011) or overconfidence (Lundeberg et al. 1994, Barber and Odean 2001). A gender difference in moral behaviour[5] may serve as an explanation why firms that are predominantly run by female managers tend to be more open to adopting ethical standards and products (Smith and Oakley 1997, Weeks et al. 1999, Dollar et al 2001). In a related vein, Chonko and Hunt (1985) find in a questionnaire study that male managers are less morally concerned than female managers. Further support for higher moral standards in females comes from Barnett and Karson (1989), studying ethical views in insurance company employees.[6] Furthermore, in a study by Jones and Gautschi (1988) focusing on MBA students, females are found to be less loyal

[3] R^2 refers to a linear probability model with the specification of Table 2 Column (3).
[4] Average marginal effect after Probit, see Table 2 Column (3).
[5] Psychologists such as Carol Gilligan have argued for including a feminine perspective in moral development (compare Gilligan 1982, Gilligan, et al. (Eds.) 1988).
[6] Additional support for gender influences on moral behaviour comes from Bellizzi and Hite (1989) looking at sales managers and executives.

to ethically questionable organisations than males. However, again this study does not involve a real moral decision task with real consequences.

Our findings on single children complement work showing that being a single child is associated with being more egocentric and less cooperative (Jiao et al. 1986). Regarding age, looking at findings from questionnaire studies, the effects on moral behaviour seem to be mixed. While Shafer et al. (2001), Ross and Robertson (2003) and Larkin (2000) find no significant effect of age on ethical decision-making, Razzaque and Hwee (2002), Latif (2000) and Eynon et al. (1997) observe a negative relationship. In line with the latter studies, we find that older subjects tend to behave less morally. However, of course this finding has to be handled with caution as age does not strongly vary among our student sample. Note also that there is some evidence pointing in the other direction. For example, Lund (2000) and Karcher (1996) find that older participants tend to be more ethical in questionnaire studies. Regarding religiousness, several studies relying on questionnaires suggest that religious beliefs positively correlate with higher ethical standards (e.g. McNichols and Zimmerer 1985, Wagner and Sanders 2001, see O'Fallon and Butterfield 2005 for an overview).[7] Our study confirms this finding in a real decision context, suggesting that rather religious participants are significantly less likely to agree to kill.

To the best of our knowledge, surprisingly little research has focused on the relation between intelligence and moral behaviour. In a study with sixth and seventh graders, Nelsen et al. (1969) find that children with a higher IQ cheat less in a resistance-to-temptation task. In addition, they observe that more intelligent children score higher in a Kohlberg moral judgement test. In a related vein, concerning IQ, we find a significant correlation between moral behaviour and intelligence. Remarkably, fluid intelligence proves to have specific "protective power", helping subjects to resist influences of markets. People with higher fluid intelligence are good in solving unfamiliar problems and logical thinking, which may help them to understand (and therefore resist) complex market mechanisms.

Our results suggest that intelligence is not only beneficial from a human capital or productivity perspective (e.g. Hanushek and Woessmann 2008) but also regarding morality. The IQ effect is also informative from a bounded rationality perspective (Simon 1955), suggesting that the level of complexity associated with a given decision context contributes to moral transgression. Increasing complexity in daily decision-making could therefore favour immoral outcomes at both the individual and societal level. If decision-makers are *tempted* into immoral activities as a consequence of complex environments, such environments not only harm third parties, but also the decision-makers themselves. Feelings of guilt and bad conscience from decisions considered as wrong ex post may be reduced by offering people decision contexts that are easily understandable. Policies designed to highlight the consequences of decision-making – e.g. consumption decisions – may thus easily improve overall welfare. Nudges, information campaigns or

[7] However, Giacalone and Jurkiewicz (2003) observe a positive correlation between spirituality and low standards in business ethics.

improved choice architectures could help to align values and actions (Thaler and Sunstein 2008, Johnson 2012).

The remainder of the paper is organised as follows. Section 2 explains the experimental design and measures of individual characteristics. Section 3 presents our main results on the level effects of individual characteristics, before section 4 discusses the effects of individual differences on the impact of markets on moral outcomes. Finally, section 5 concludes.

2. Data description

2.1 Experimental design We use data from Falk and Szech (2013) to relate moral behaviour to institutions and individual characteristics. This study introduced the Mouse Paradigm to elicit moral decision-making: subjects chose between receiving money and agreeing to kill a mouse versus receiving no money and saving the life of a mouse. All mice involved were so-called "surplus mice". Despite being perfectly healthy, these mice had proven unnecessary for current animal studies. They would all have been killed following animal experimental protocols as keeping them alive would have been costly. The killing of surplus animals is a standard procedure in animal laboratories. Thus, many mice that would have otherwise all been killed were saved as a consequence of the experiment. Subjects were informed about the fact that mice were surplus mice in a post-experimental debriefing.[8]

Falk and Szech (2013) study four main different treatments that involve the same consequences for mice. Respectively, two of them are individual and market treatments. In **Individual Binary**, subjects faced a simple binary choice between either taking 10 euros and agreeing to kill a mouse or receiving no money and saving the life of the mouse (n=124). In a second individual decision treatment – **Individual Price-List** – subjects faced essentially the same decision context but instead of simply taking a binary decision, they chose various monetary amounts between money and agreeing to kill versus saving the mouse (n=96). Subjects knew that one of their decisions was randomly drawn and implemented with all consequences. The monetary amounts increased from 2.50 euros to 50 euros in steps of 2.50 euros. These two individual conditions were contrasted with decisions from two market treatments, where each subject took the role of either a buyer or seller. Both markets were organised as continuous double auction markets, either bilaterally (with one buyer and one seller, **Bilateral Market**) or multilaterally (with seven buyers and nine sellers, **Multilateral Market**). In both markets, buyers and sellers bargained over trading and killing a mouse for a total gain of 20 euros, which the two parties could split up between themselves as negotiated. The seller was initially endowed with a mouse. If a buyer and a seller agreed on a price, the buyer received 20 euros minus the price while the seller received the price. As another consequence if a price was agreed upon, the mouse was traded and killed. No trader

[8] The study was ethically approved by the University of Bonn (reference no. 066/12).

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was forced to make a price offer. Subjects knew that each mouse that was not traded and killed was saved. Traders who did not conclude a trade did not earn any money in the market. There were ten trading rounds in both markets, whereby one was randomly selected and implemented. If a seller agreed to trade for 10 euros or less, we classify him/her as being willing to agree to kill a mouse for 10 euros (or less). Sample sizes of sellers were n=36 in the bilateral and n=54 in the multilateral double auction. Hence, our total sample comprises 310 subjects.

To allow for an identical measure of immoral behaviour between treatments, we define a subject as acting immorally if he/she is willing to kill a mouse for 10 euros or less. The variable *immorality* takes on the value of one if a subject agreed to kill a mouse for 10 euros or less and zero otherwise. Respective shares for our four treatment conditions are 43% for Individual Binary, 46% for Individual Price-List, 72% for Bilateral Market and 76% for Multilateral Market. For a validation of the measure for morality, refer to Appendix A1.

2.2 Measures of individual characteristics As part of the experiment, all subjects answered a detailed questionnaire, including items on fluid and crystallised IQ, socio-demographics and general values such as religiousness. These measures will be used to study individual determinants of morality. Table 1 shows the descriptive statistics of all variables. In the following, we describe each item in detail.

Fluid and crystallised intelligence: Following standard procedures, we measured both fluid and crystallised intelligence. Fluid intelligence is associated with logical reasoning in new and unfamiliar situations, as well as general intellectual capacity. By contrast, crystallised intelligence refers to knowledge that has been acquired during life – e.g. vocabulary – and is thus considered to be more malleable. These two components constitute general intelligence or IQ (Cattell 1971). To measure *fluid intelligence*, we used ten items of Raven's Advanced Progressive Matrices Plus (APM). The ten items were selected to achieve maximal discriminatory power in a ten-minute timeframe. In the APM, subjects had to choose one out of eight possible symbols that fits best into the missing cell of a matrix filled with black and white symbols. The standardised number of correctly-selected items is our measure of fluid intelligence. *Crystallised intelligence* was elicited using a vocabulary test, called MWT[9] (Lehrl 2005). The MWT contains 37 items, each comprising five words. Out of those five words, four are fake words, while only one word actually exists in the German language. Subjects had to indicate the correct word. The standardised number of correct items is our measure of crystallised intelligence.

Single Child: Subjects had to indicate whether they have siblings or not. The variable takes the value of one if subjects do not have siblings.

Religiousness: We asked subjects to rate themselves on a Likert scale from 1 (not at all) to 7 (very much) concerning how religious they are.

[9] MWT is a German abbreviation and stands for „Mehrfachwahl-Wortschatz-Intelligenztest" which translates into "Multi-option Vocabulary Intelligence Test".

Vegetarian: The variable equals one if the subject is a vegetarian and zero otherwise.[10]

Variable	Mean/Share	Standard Deviation
Fluid Intelligence (10 items)	5.306	1.842
Crystalised Intelligence (37 items)	30.400	3.239
Male	0.490	0.501
Age (in years)	24.145	3.647
Single Child	0.158	0.365
Religiousness (7-point Likert scale)	3.281	1.961
Vegetarian	0.110	0.313
Observations	310	

Table 1: Descriptive statistics of individual characteristics.

3. Individual differences in moral decision-making

Our primary focus in the following analysis is on the impact of four central personal characteristics: fluid and crystallised intelligence, gender, being a single child and age. These characteristics are plausibly exogenous with respect to individual morality and moral behaviour, thus allowing for a causal interpretation of correlations and regression results. Figure 1 shows the effect of each individual characteristic on moral decision-making. First, less intelligent people are more likely to act immorally. This holds for fluid intelligence (Spearman rank correlation, $p<0.05$, two-sided) as well as crystallised intelligence (Spearman rank correlation, $p=0.057$, two-sided). While subjects in the first tercile of fluid intelligence display a killing rate of above 58%, the respective rate is only 50.8% for the second and 45.1% for the third tercile, respectively.[11] Second, men are more willing to engage in immoral behaviour than women. While the fraction of women who are trading off life for money is 44.9%, the respective fraction is 61.8% for men. The difference is statistically significant at any conventional level ($p<0.01$, two-sample test of proportions, two-sided). Third, there is a striking difference between single children vs. subjects with siblings. While the share of willingness to agree to kill is 50.2% for the latter, the share for single children is 69.4% ($p<0.01$, two-sample test of proportions, two-sided). Fourth, we find a weakly statistically significant effect of age (Spearman rank correlation, $p<0.1$, two-sided). In tendency, older subjects behave more morally. The

[10] There are many different definitions for being vegetarian (pesco-vegetarian, ovo-lacto-vegetarian, etc.), and we did not explicitly ask subjects whether they were vegans. We assume that all these subjects opted for vegetarian.

[11] The correlation between overall IQ (i.e., the score of standardized fluid and standardized crystallized IQ) and willingness to kill rate is highly significant (Spearman rho = -0.152, $p<0.01$, two-sided).

weakness of the effect is unsurprising given the fairly condensed age distribution typical for a student sample.[12]

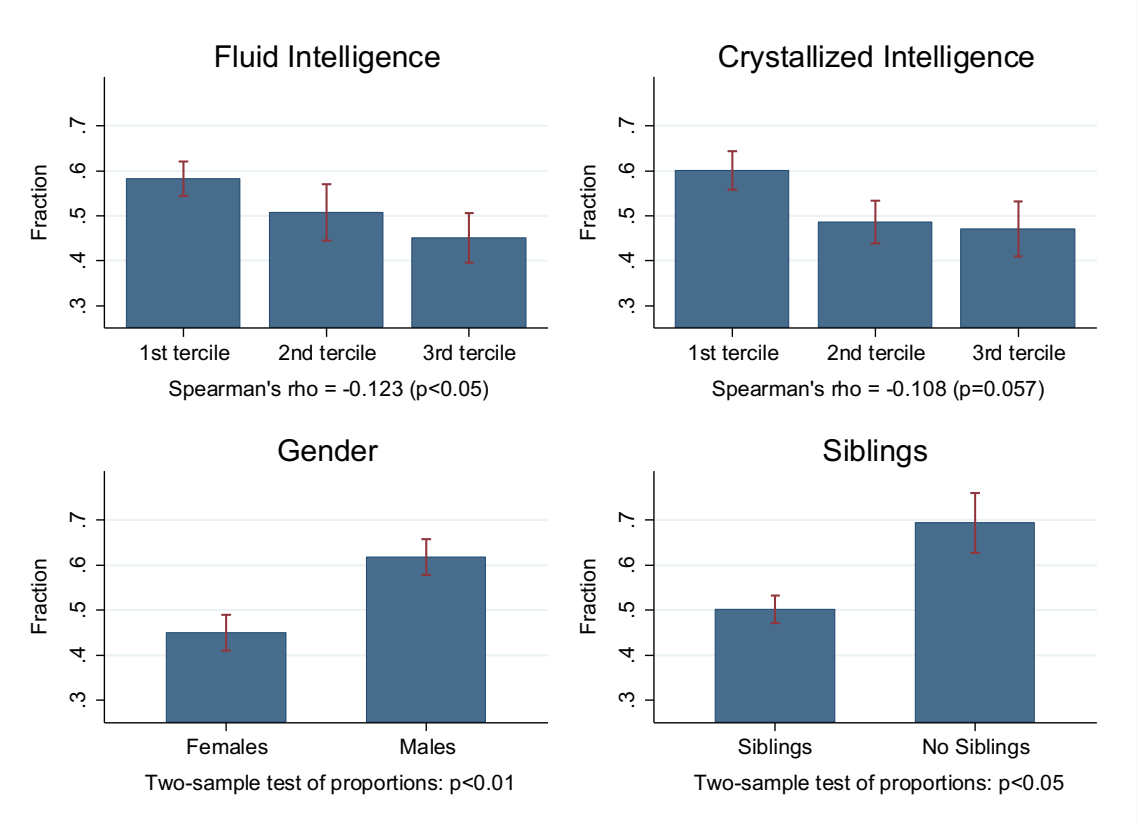

Figure 1: Individual differences in moral decision-making. The fractions of individuals who are willing to agree to kill their mouse for ten euros is displayed. n=310, error bars show standard errors of the means (SEM).

To determine the joint role of these four characteristics simultaneously, we estimated Probit regressions with an individual's immorality as the dependent variable. All regressions include treatment dummies. Column (1) in Table 2 reports the respective coefficients on fluid and crystallised IQ, gender, age and single children as explanatory variables. The resulting coefficient estimates show that the unconditional results remain robust, with the exception of age. Higher levels of both fluid and crystallised intelligence are associated with higher moral standards. Likewise, women are significantly less willing to engage in morally problematic activity than men. The effect on age is positive but insignificant. Single children are significantly less moral in comparison to subjects with siblings.

[12] It would be interesting to investigate the role of age for moral behavior in better-suited data sets.

Column (2) adds further plausible correlates of moral decision-making, i.e. the degree of religiousness and vegetarianism. These factors are potentially endogenous to moral dispositions, e.g. if the decision to become a vegetarian is driven by moral rather than health concerns. The data reveal that more religious people as well as vegetarians show significantly higher moral concerns. On average, being a vegetarian reduces the willingness to kill by about 25%. Nevertheless, adding these attitudes leaves the coefficients of fluid and crystallised IQ, gender and single children essentially unchanged. Thus, the main effects remain robust. To further rule out potential effects that are related to the paradigm but not to moral concerns, column (3) adds further controls, including disposable income, having a pet and being exposed to animal experiments. Our results remain virtually unchanged (compare Table 2). In sum, the descriptive results from Figure 2 are confirmed in a multivariate regression analysis. In addition, we find significant effects for religiousness and being a vegetarian.

Average Marginal Effects after Probit	Immorality (0/1)		
	(1)	(2)	(3)
Fluid IQ (standardised)	-0.063**	-0.083***	-0.083***
	(0.026)	(0.026)	(0.026)
Crystallised IQ (standardised)	-0.062**	-0.066**	-0.068**
	(0.031)	(0.029)	(0.029)
Male	0.154***	0.119**	0.130**
	(0.054)	(0.054)	(0.054)
Age (in years)	0.009	0.009	0.009
	(0.008)	(0.008)	(0.008)
Single child	0.176**	0.153**	0.156**
	(0.068)	(0.067)	(0.067)
Religiousness (standardised)		-0.071***	-0.071***
		(0.026)	(0.026)
Vegetarian		-0.252***	-0.254***
		(0.079)	(0.079)
Treatment dummies	Yes	Yes	Yes
Additional controls	No	No	Yes
Log likelihood	-190.29	-183.49	-182.88
Observations	310	310	310

Table 2: Individual differences in moral decision-making. Probit regression coefficient estimates (marginal effects), with binary outcome (Immorality: Agreeing to kill the mouse for 10 euros (or less) vs. not willing to kill) as dependent variable and robust standard errors in parentheses. ***, **, * indicate significance at the 1-percent, 5-percent and 10-percent level, respectively. Additional controls in column (3) include disposable income, having a pet and being exposed to animal experiments.

4. Interaction of individual differences and market institutions

In the final step of the analysis, we investigate whether the effects of institutions on moral behaviour are uniform, or whether they depend on individual characteristics. As shown by Falk and Szech (2013), Kirchler et al. (2016) and Ziegler, Romagnoli and Offerman (2020), markets can erode moral behaviour compared to individual decision environments. Nevertheless, little is known about the individual-specific effects of market institutions. It may be the case that individuals with specific characteristics react strongly to market exposure, while others remain close to their moral levels from individual decision-making. The latter individuals would then be morally more consistent across institutions. An understanding is informative for policies designed to limit moral transgression. For example, targeting specific groups of people who are particularly responsive to market exposure could become possible.

In order to simplify the analysis and to obtain sample sizes that allow testing for interactions of markets and individual characteristics, in the analysis we distinguish between "Individual" treatment (Individually Binary and Individually Price-List) on the one hand and "Market" treatment (Bilateral Market and Multilateral Market) on the other.[13] In Individual, 44.5% (n=220) of the participants are willing to agree to kill their mouse for 10 euros. In Market, 74.4% (n=90) are willing to kill the mouse for 10 euros. The difference of 29.9 percentage points is highly significant ($p < 0.001$, two-sample test of proportions, two-sided).

To explore how markets affect decision-makers with different characteristics, we present multivariate between-subject-comparisons. In order to identify potential individual-specific responses to institutional differences, we estimate models including interaction terms as follows.

$$E\big[y|x_j,d\big] = Prob\big(y=1|x_j,d\big) = G\left(\beta_0 + \beta_{treat}\, d + \sum_{j=1}^{k} \beta_j\, x_j + \sum_{j=1}^{k} \beta_{treat*j}\, d\, x_j\right) = G(A)$$

Equation 1: Estimation model including interaction effects.

y is the binary outcome (Immorality: Agreeing to kill the mouse for 10 euros (or less) vs. not willing to kill), x_j with $j = 1, \dots, k$ are the individual-specific variables, and d is a treatment dummy indicating Market vs. Individual treatment. $G(A)$ Is the standard normal cumulative distribution function ($G(A) = \Phi(A)$, Probit).

To identify potential individual-specific responses to the market environment, we analyse cross derivatives with respect to individual characteristics and the treatment dummy $\frac{\Delta(\partial E[y|x_j,d]/\partial x_j}{\Delta d}$. Estimation results concerning these interaction effects are presented in Table 3. Since we are interested in the general mechanism, we focus on average

[13] Note that the willingness to kill does neither differ within individual nor market treatments ($p > 0.6$ respectively, two-sample test of proportions, two-sided).

interaction effects, which are calculated as differences in average marginal effects (see Appendix A1 for details). The interpretation of the coefficients is straightforward. A positive coefficient indicates that an increase (for continuous variables) in the characteristic implies on average an enforced moral-transgressing effect of the market. A negative coefficient indicates that an increase in the characteristic implies a weakened transgressing effect.

Individual characteristics x_j:	**Average interaction effects:** $\frac{\Delta(\partial E[y \mid x_j, d]/\partial x_j}{\Delta d}$ Probit
Fluid IQ (standardised)	-0.088*
	(0.051)
Crystallised IQ (standardised)	0.051
	(0.050)
Male	-0.094
	(0.107)
Age (in years)	0.018
	(0.019)
Single child	0.090
	(0.118)
Religiousness (standardised)	-0.024
	(0.056)
Vegetarian	-0.112
	(0.178)

Table 3: Average Interaction Effects of Individual Characteristics and Market treatment. The Model is specified as described in Equation (1) and is estimated using Probit. The outcome variable is binary (Immorality: Agreeing to kill the mouse for 10 euros (or less) vs. not willing to kill), robust standard errors in parentheses. ***, **, * indicate significance at the 1-percent, 5-percent and 10-percent-level, respectively.

Table 3 shows that the fluid component of intelligence – i.e. the one that refers to logical reasoning – results in a significant negative average interaction effect ($p<0.1$, two-sided t-test). Fluid intelligence thus tends to attenuate the moral-transgressing effect of markets. The effect size of the interaction effect is -0.088, which means that on average an increase of one standard deviation in fluid intelligence results in a reduction of moral transgression by about one-third (compare to the 29.9 percentage points reported above). A possible explanation for this effect could be that more intelligent individuals – especially those who have a higher capacity for solving novel problems and thinking logically – can better understand principles of markets and how these may facilitate acting in immoral, selfish ways (e.g. via diffusion of responsibility, social information, shared guilt and a focus on money and profit-making). Being aware of such market mechanisms may make it easier to resist the temptations that markets provide. For

example, understanding that one may tend to focus on prices and profits in markets (Vohs et al. 2006) or that markets also provide social information that may render it easier to behave immorally could be key to behaving in a more reflected way and remaining moral.[14] All other characteristics under study have average interaction effects that are not statistically significantly different from zero at any conventional level. This indicates that apart from fluid intelligence, the characteristics under study have an equally strong effect in individual and market situations. Thus, their importance for moral behaviour remains robust across different institutions. Fluid intelligence over-proportionally protects from the moral-eroding effect of markets. These types of people remain closest to their moral values from individual decisions, and behave most consistently in this sense.

To explore the interaction between market environment and fluid intelligence in more detail, we estimate kernel-weighted local polynomial regressions. This flexible non-parametric approach allows us to explore potential non-linearities in the relations between morally problematic behaviour, fluid intelligence and market environment. Figure 2 presents the results of regressions of morally problematic behaviour on fluid intelligence separately for the Individual and the Market treatments. The estimations confirm the above-presented results of a general reduced likelihood of willingness to agree to kill for more intelligent individuals and a pronounced moral transgression effect for less intelligent individuals in the market environment. The figure also indicates that the estimated average interaction effect of -0.088 is a lower bound since there is little to no variation in the immoral variable for relatively little fluid intelligent subjects in the market treatment. Moreover, the interaction effect is especially pronounced for the lower part of the observed intelligence distribution. Repeating the previous analysis but excluding the most fluid intelligent third of subjects results in a highly significant negative interaction effect ($p=0.015$, $N=228$, two-sided t-test). The effect size is -0.187. Our data thus document that fluid intelligence attenuates the moral-transgressing effect of markets especially for subjects of relatively poor intelligence in our study.

Besides a high capacity in thinking logically and solving problems in novel situations as measured by the fluid intelligence score, we cannot identify any factor that over-proportionally helps people to resist the influences of market trading: females are equally seduced as males, while individuals with siblings react equally compared with single children. This shows that markets can be very powerful institutions causing moral transgression. Nonetheless, different subgroups start from different moral levels in individual contexts. Therefore, moral differences between different personalities remain relevant in market conditions: Homo moralis remains more moral than other people, yet overall morals are lower in markets than in individual decisions.

[14] For the impact of social information on social behaviour, see, e.g. Weber et al. (2004).

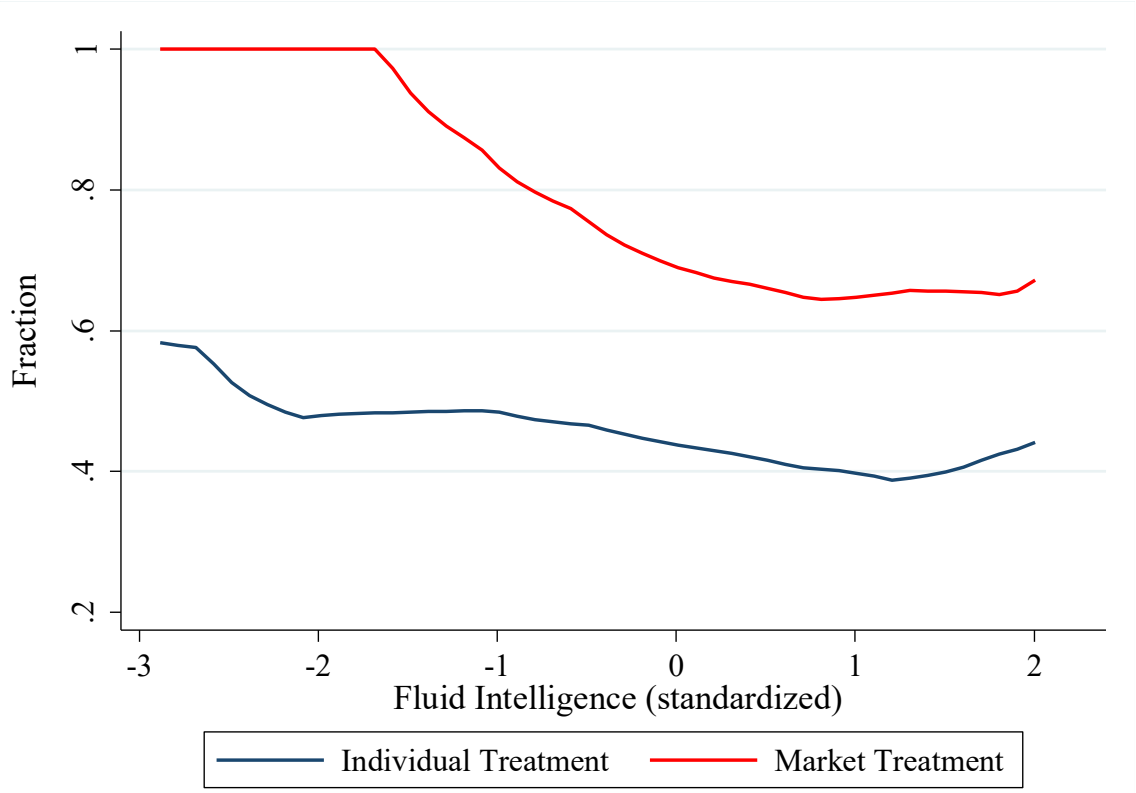

Figure 2: Fluid Intelligence and the probability to agree to kill for Individual and Market Treatment. This figure shows kernel-weighted local polynomial regressions using local-mean smoothing, Epanechikov kernels and bandwidth selections via the plug-in estimator of the asymptotically optimal constant bandwidth N=310.

5. Concluding remarks

Understanding the determinants of morality holds central importance for the social sciences and society as a whole. In a real task, we identify individual differences as well as the institutional setup as fundamental determinates of moral decision-making. Several characteristics – such as having siblings, a high crystallised or fluid intelligence, religiousness, vegetarianism or being female – help to remain moral in a real, morally-relevant decision context. These characteristics contribute to higher moral standards in individual decision-making and market environments. Therefore, our data suggest that a comparatively moral type – a homo moralis – exists.

Our findings contribute to the validation of findings from related disciplines such as business ethics and psychology, where typically questionnaires or staged scenarios are used to elicit moral inclination (see also section A2). For example, as has been highlighted for the development of moral judgement already decades ago (compare e.g. Gilligan 1982), a female perspective on morals seems to play important roles. Our data conform this for real individual decisions as well as behaviour in markets.

Markets causally erode moral behaviour, affecting many kinds of personalities to severe extents. This informs models of how institutions affect moral decision-making: populations display heterogeneous moral attitudes, but institutions can causally influence the moral standards of most participants. The fact that a high capacity in solving problems and thinking logically helps to partly overcome market forces suggests that policy intervention or customer protection should try to render market mechanisms more transparent. Accordingly, people with lower levels of intelligence may also become capable of resisting market forces and overthinking their behaviour.

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Appendix

A1: Average Marginal Effects after Probit

Given the following model including interaction terms

$$E[y|x_j, d] = Prob(y = 1|x_j, d) = \Phi\left(\beta_0 + \beta_{treat}\, d + \sum_{j=1}^{k} \beta_j x_j + \sum_{j=1}^{k} \beta_{treat*j}\, d\, x_j\right) = \Phi(A)$$

where y is the binary outcome (Immorality: Agreeing to kill the mouse for 10 euros (or less) vs. not willing to kill), x_j with $j = 1, \ldots, k$ are the individual-specific variables, t is a treatment dummy indicating market vs. individual treatment, and $\Phi(A)$ is the standard normal cumulative distribution function. To explore whether the effect of institutions on moral behaviour differs for individuals with certain characteristics, we are interested in the interaction effects:

$$\frac{\partial(\Delta E[y|x_j, d]/\Delta d}{\partial x_j} = \frac{\Delta(\partial E[y|x_j, d]/\partial x_j}{\Delta d} = (\beta_j + \beta_{treat*j})\Phi'(A|d = 1) - \beta_j \Phi'(A|d = 0).$$

These can easily be calculated as differences in the marginal effects of the respective variables conditional on the market dummy being one, minus the marginal effects conditional on the dummy being zero.[15] The marginal effects and thereby the interaction effects depend on the individuals' levels of all explanatory variables. Since we are interested in the general mechanism, we focus on average interaction effects which are calculated by differences in average marginal effects. Estimation results are displayed in Table 3.

[15] Estimations can easily be performed with standard statistical software, e.g. Stata 13, in the form of testing linear combinations of coefficients.

A2: Validation of our measure of morality

As we have argued above, our measure of morality involves the decision to kill an animal for purely selfish reasons, i.e. money. This qualifies as immoral behaviour according to a widely-held conception of immorality. Here, we provide two validation checks for our measure. The first refers to convergent validity, i.e. the degree to which our measure is correlated with other measures that are theoretically predicted to be correlated. The two measures that we use for testing convergent validity are Agreeableness and Machiavellianism. Agreeableness is one of the facets of the Big Five, the most widely-used taxonomy of personality traits.[16] It refers to the tendency to be compassionate and cooperative rather than suspicious and antagonistic towards others.[17] Machiavellianism describes a person's tendency to be unemotional and therefore able to detach oneself from conventional morality. Convergent validity with our immorality measure would call for a negative correlation with Agreeableness and a positive correlation with Machiavellianism, which is indeed what we find. Table A1 reports the respective average marginal effects from Probit regressions with our measure of immorality as dependent variable. The two coefficients for Agreeableness and Machiavellianism have the predicted sign and are highly significant (see columns (1) and (2)). In all estimations, we include treatment dummies for the four experimental conditions.

A potential concern with our measure could arise if it merely measured a resistance to kill a mouse for reasons unrelated to moral concerns. Therefore, we test for discriminant validity, i.e. we test whether concepts that are supposed to be unrelated with our measure are in fact unrelated. A potential candidate is disposable income. Subjects who dispose of more money could simply find it easier to forgo money and save the life of a mouse. Likewise, it could be argued that students who are professionally involved with animal research or animal experiments (such as medical students) perceive the decision problem as morally less relevant. Finally, we do not seek to measure a simple preference for animals, as expressed by having a pet at home. In column (3) of Table A1, we report respective marginal effects for these three items. It emerges that none of the items is significantly related with our measure of morality, neither separately nor jointly (Wald

[16] The Big Five or Five-factor model is the most widely-used taxonomy of personality traits. It originates from the lexical hypothesis of Allport and Odbert (1936), which postulates that individual differences are encoded in language (see Borghans et al. 2008). After years of research in this tradition, psychologists have arrived at a hierarchical organization of personality traits with five traits at the highest level. These Big Five facets – which are commonly labeled as openness to experience, conscientiousness, extraversion, agreeableness and neuroticism – capture personality traits at the broadest level of abstraction. Each of the Big Five traits condenses several distinct and more narrowly defined traits. It has been argued that the bulk of items that personality psychologists have used to measure personality can be mapped into the Big Five taxonomy (see, e.g. Costa and McCrae 1992). We elicited the Big Five facets using the standardised scores concerning 12 items, respectively (60 items in total) of the NEO Five Factor Inventory (NEO-FFI) of McCrae and Costa (1989).

[17] See Table A2 for an analysis of all Big Five facets.

test: p=0.891). In sum, the results from Table A1 confirm the convergent and discriminatory validity of our measure.

Average Marginal Effects (Probit)	Immorality (0/1)		
	(1)	(2)	(3)
Agreeableness (standardised)	-0.106***		
	(0.028)		
Machiavellianism (standardised)		0.085***	
		(0.027)	
Available money (standardised)			0.015
			(0.026)
Studies related to animal experiments			-0.004
			(0.075)
Having a pet			0.031
			(0.056)
Treatment dummies	Yes	Yes	Yes
Log likelihood	-194.25	-197.22	-201.84
Observations	310	310	310

Table A1: Validation of morality measure. Probit regression estimates (marginal effects), with binary outcome (Immorality: Agreeing to kill the mouse for 10 euros (or less) vs. not willing to kill) as the dependent variable and standard errors in parentheses. *** indicate significance at the 1-percent level.

Average Marginal Effects Probit	Immorality (0/1)					
	(1)	(2)	(3)	(4)	(5)	(6)
Openness to Experience	-0.069***					-0.062**
	(0.027)					(0.027)
Conscientiousness		0.039				0.038
		(0.027)				(0.027)
Extraversion			-0.001			0.023
			(0.027)			(0.029)
Agreeableness				-0.106***		-0.117***
				(0.028)		(0.029)
Neuroticism					-0.033	-0.028
					(0.027)	(0.029)
Treatment dummies	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood	-198.92	-201.15	-202.14	-194.25	-201.42	-188.79
Observations	310	310	310	310	310	310

Table A2: Immoral Behaviour and the Big Five. Probit regression estimates (marginal effects), with binary outcome (Immorality: Agreeing to kill the mouse for 10 euros (or less) vs. not willing to kill) as the dependent variable and standard errors in parentheses. *** indicate significance at the 1-percent level.