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Predicting norm enforcement: the individual and joint predictive power of economic preferences, personality, and self-control — Source link

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Predicting Norm Enforcement: The Individual and Joint Predictive Power of Economic Preferences, Personality, and Self-Control

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July 2017

Abstract

This paper explores the individual and joint predictive power of concepts from economics, psychology, and criminology for individual norm enforcement behavior. More specifically, we consider economic preferences (patience and attitudes towards risk), personality traits from psychology (Big Five and locus of control), and a self-control scale from criminology. Using survey data, we show that the various concepts complement each other in predicting self-reported norm enforcement behavior. The most significant predictors stem from all three disciplines: stronger risk aversion, conscientiousness and neuroticism as well as higher levels of self-control increase an individual's willingness to enforce norms. Taking a broader perspective, our results illustrate that integrating concepts from different disciplines may enhance our understanding of heterogeneity in individual behavior.

JEL-Codes: K42, D81, D90, C21, Z02

Keywords: norm enforcement, economic preferences, personality traits, self-control

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1. Introduction

Norms guide individual behavior in many circumstances. This is particularly important when individual and social objectives are in conflict. Without effective enforcement, norm violations are frequent and often impose substantial costs on society (e.g., Douhou et al. 2011). In most scenarios, formal law enforcement and social norm enforcement (by acquaintances, peers, and others) jointly deter norm violations (e.g., Ellickson 1998, McAdams and Rasmusen 2007). The importance of social norm enforcement is by now well documented in the literature (e.g., Fehr and Fischbacher 2004). Importantly, individuals' willingness to enforce norms varies markedly in the general population (e.g., Balafoutas and Nikiforakis 2012, Fischbacher et al. 2013), calling for a better understanding of the underlying drivers of heterogeneity in norm enforcement behavior.

This paper studies which individuals are more likely to enforce norms by combining concepts from economics, psychology, and criminology. Specifically, we investigate the individual and joint predictive power of risk and time preferences, personality traits from psychology (Big Five, locus of control), and a self-control scale developed by criminologists (Grasmick et al. 1993) in predicting self-reported norm enforcement. Thereby, we build on the theoretical framework by Almlund et al. (2011) that integrates personality traits and economic preferences into the same models in order to advance our understanding of individual differences in behavior.

We show that economic preferences, personality traits, and self-control complement each other in predicting self-reported norm enforcement behavior. The most significant predictors of more pronounced norm enforcement behavior are high levels of risk aversion, conscientiousness, neuroticism, and self-control. Thus, our paper contributes by informing us about who is willing to enforce norms even when this comes at a personal cost. Other contributions have presented related results for aspects such as gender, age, income, education, or beliefs about the frequency of norm violations (e.g., Douhou et al. 2011, Traxler and Winter 2012), whereas we analyze the role of character traits in norm enforcement.

Following Traxler and Winter (2012), we analyze vignette-style survey data on norm enforcement behavior. Specifically, respondents were asked how they would react if they

learned that a close acquaintance had taken one of the following actions: drunk driving, evading taxes, or fare dodging in public transport. The possible responses ranged from positive reactions like expressing approval to negative reactions like expressing disapproval and/or social exclusion. Traxler and Winter (2012) use this research design to show that the probability and severity of norm enforcement decrease in the belief about the frequency of the violation in the general population.[3]

In economics, individual norm enforcement behavior has been studied in the field and in the lab. In a seminal contribution, Fehr and Gächter (2000) present results from a public-good experiment in which subjects may punish their peers ("second-party punishment"). Punishment is mainly imposed on free-riders by conditional cooperators to enforce the norm of conditional cooperation. The results highlight that the opportunity to punish free-riders enables subjects to successfully enforce that norm and to overcome the social dilemma of public-good provision. While reviewing the extensive literature on second- and third-party punishment (i.e., unaffected parties' punishment behavior) is beyond the scope of this paper, several papers explicitly explore correlates of punishment as a form of norm enforcement behavior in different settings. Examples for such correlates include the gender of the potential norm enforcer in Balafoutas and Nikiforakis (2012), the presence of group reciprocity in Carpenter and Matthews (2012), cooperation norms in Fehr and Fischbacher (2004), distributional aspects in Falk et al. (2005) and Leibbrandt and Lopez-Perez (2012), and the possibility of deterrence in Tan and Xiao (2014). However, individual differences in norm enforcement have not yet been related to heterogeneity in preferences, personality, and self-control.

Moving to our independent variables, risk and time preferences are of overriding importance for individual decision-making in general and in the domain of norm violations and crime in particular (e.g., Becker 1968, Davis 1988, Eisenhauer 2008, Nagin and Pogarski 2004). In the present paper, we are concerned with the readiness of individuals to enforce norms vis-à-vis peers, which might depend on their attitudes towards these norms and their

[3] We analyze norm enforcement behavior self-reported in the laboratory instead of actual norm enforcement behavior in the laboratory or the field. There is lots of evidence, on risky or intertemporal choice, for example, that self-reports are well aligned with incentivized decisions in experiments and good predictors of actual behavior in the field (e.g., Dohmen et al. 2011, Falk et al. 2016, Vischer et al. 2013). Moreover, findings in experiments about cheating, for instance, are consistent with choices in the field (e.g., Dai et al. 2016, Potters and Stoop 2016).

own propensity to violate norms. However, the empirical evidence regarding the link between attitudes towards norms and the propensity for own norm violations is surprisingly weak, see Engels et al. (2004), Megens and Weerman (2010), Zhang et al. (1997), for example. By including covariates that have a clear bearing on norm violations – such as risk and time preferences and particularly the self-control measure explained below – we may add new evidence on the link between norm enforcement and norm violations.

In order to analyze individual norm enforcement behavior, we also include self-control as a measure from criminology. In criminology, the highly influential *General Theory of Crime* argues that low self-control is the primary characteristic causing norm disobedience and describes people with low self-control as, inter alia, impulsive, insensitive, physical (as opposed to mental), and non-verbal (Gottfredson and Hirschi, 1990). According to Gottfredson and Hirschi (1990), self-control is learned, usually early in life, and a rather stable character trait afterwards. Empirical research generally finds that individuals with low self-control are indeed more likely involved in various criminal behaviors (see the meta-analysis by Pratt and Cullen 2000). Grasmick et al. (1993) construct a widely used self-control scale that directly builds on the work of Gottfredson and Hirschi (1990).[4] Some of its items such as short-sightedness or risk proclivity are conceptually related to economic preferences, other items such as being physical do not have any conceptual similarity to the economic preferences or personality traits considered here. In our empirical analysis, we will use this scale as a proxy for the individual's level of self-control.

Recent empirical evidence strongly suggests that economic preferences and personality traits are complements in explaining individual behavior and life outcomes (Becker et al. 2012), giving reason to incorporate personality traits in our study. In psychology, traits are broad domains used to describe individual differences in personality that are considered to be relatively stable throughout adulthood (Cobb-Clark and Schurer 2012). We include the Big Five and the locus of control. The Big Five are the most widely used taxonomy of personality traits, encompassing the traits openness, conscientiousness, extraversion,

[4] We use the Grasmick et al. (1993) scale as opposed to other also well-established scales for measuring self-control (Tangney et al. 2004 or Rosenbaum 1980) since it is the only scale that specifically conceptualizes self-control as a predictor of norm violations. Already by the year 2000, it had been employed by more than 40 studies (see the meta-analysis by Pratt and Cullen 2000).

agreeableness, and neuroticism (Costa and McCrae, 1992).[5] In brief, individuals may be more or less *open* to new experiences and more or less *conscientious* (i.e., responsible, controlled, and hardworking). *Agreeable* individuals show the tendency to act in a cooperative and unselfish manner, and *neuroticism* describes a chronic level of emotional instability and proneness to psychological distress.[6] Even though the Big Five are intended to be an all-encompassing taxonomy of personality traits, it is well-established that locus of control (Rotter 1966) is a further personality trait that is independent from the Big Five (e.g., Becker et al. 2012) and thus an important addition to our set of covariates. Locus of control represents an individual's belief about the relationship of own behavior and consequences. Individuals with a high internal locus of control believe they have a strong impact on what happens in their lives, whereas others attribute incidents to sources outside of their influence, such as chance, fate, or powerful others (Rotter 1966).

Based on the work of Almlund et al. (2011), there is a recent, quickly growing literature in economics on the relationship between personality traits and individual behavior. In this line of research, some contributions analyze cooperation, negative reciprocity, or norm violations which are all somewhat related to norm enforcement. Norm enforcement can often be considered as providing a second-order public good by inducing a more cooperative behavior. Volk et al. (2011, 2012), Proto and Rustichini (2014), and Kagel and McGee (2014) study the relationship of cooperation and personality traits in different games, highlighting that agreeableness and conscientiousness appear particularly relevant in predicting cooperation. Similarly, the relationship between negative reciprocity and personality traits is studied in Becker et al. (2012) and Dohmen et al. (2008). The latter reports that negative reciprocity is negatively (positively) correlated with conscientiousness and agreeableness (neuroticism). Whereas negative reciprocity refers to situations in which the unkind behavior directly concerns the individual at hand, the willingness to enforce norms is a more general concept that also applies when an individual is not directly affected by a norm violation. In addition, some studies focus on the relationship between personality traits and norm violations, that is, the behavior that is provoking norm enforcement which is studied here (see Almlund et al. 2011 for a survey). The evidence suggests that

[5] Borghans et al. (2008) provide a detailed description of research on the development of the Big Five.
[6] See, for example, Almlund et al. (2011) for a more extensive description of the Big Five.

conscientious and agreeable individuals are less likely to be involved in norm violations (Almlund et al. 2011).

The remainder of the paper is structured as follows: In section 2, we describe our data and outline the empirical strategy. Section 3 presents results. We conclude in section 4.

2. Data and Empirical Strategy

Lacking data sources that contain measures of norm enforcement, economic preferences, personality traits, and the Grasmick self-control scale at the same time, we collected information in a post-experimental survey from 180 students of the University of Bonn, Germany. Students were recruited randomly from all fields of study using the recruitment software ORSEE (Greiner, 2015) for participation in an experiment using z-Tree (Fischbacher, 2007). The choices made during the experiment are described and analyzed in detail in Friehe and Schildberg-Hörisch (forthcoming). A brief description of the experiment is included in Appendix A, in which we also test whether the different experimental conditions may have influenced subjects' responses in the survey data that we use in the analysis to come. We are able to reject this hypothesis.

For norm enforcement, we use vignette-style survey questions inquiring an individual's willingness to sanction others' norm violations. Following Traxler and Winter (2012), we asked participants how they would react if they learned that a close acquaintance had taken one of the following actions: fare dodging ("Traveling on public transport without a ticket."), drunk driving ("Driving a car although one is aware of the fact that one has drunk too much."), or evading taxes ("Hiring craftsmen from the shadow economy without paying taxes."). For each action, participants selected one of five responses: [1] approval ("I would be impressed and show it to him/her"), [2] benevolently ignoring it ("I would advise him/her better not to be caught"), [3] ignoring it ("I would not care or react"), [4] expressing disapproval ("I would seriously talk with him/her about this behavior and would try to convince him/her to stop doing it"), or [5] expressing disapproval and social exclusion ("I would seriously talk with him/her and would cool down the contact with him/her").[7] Following Traxler and Winter (2012), responses are coded such that a higher number

[7] On the screen, the response categories were always displayed in reversed order, i.e., [5] at the top and [1] at the bottom but without numbers attached to them.

represents stronger norm enforcement. Table B.1 in Appendix B displays the distribution of reactions to each of an acquaintance's norm violation. It shows that respondents rarely approve norm violations, but also shy away from reacting with social exclusion on top of expressing disapproval. Only in case of drunk driving more than 4% of respondents react by cooling down the contact. The majority of reactions encompass the three intermediate reactions [2]-[4]. Moreover, Table B.1 and Table 1 document that - on average - drunk driving is judged as the most severe norm violation and that the associated norm is enforced strongest, which is in line with the results obtained by Traxler and Winter (2012). Fare dodging and evading taxes are ranked similarly. Attitudes towards fare dodging and tax evasion have also been measured in the European Value Survey (EVS) in 1999 and 2008, using a scale from 1 (never justifiable) to 10 (always justifiable). As our university student sample, respondents of the EVS rank fare dodging and tax evasion to be similarly severe norm violations.[8]

Our *independent variables* encompass age, gender, risk and time preferences, personality traits, and the self-control scale. The risk attitude question is taken from the German Socioeconomic Panel (SOEP) survey: "How do you see yourself: Are you generally a person who is fully prepared to take risks, or do you try to avoid risks?" using a scale from 0 ("not at all willing to take risks") to 10 ("fully prepared to take risks"). The question has been validated using incentivized experiments in representative samples as well as through behavioral evidence (Dohmen et al., 2011). We recode the risk attitude variable such that higher numbers correspond to stronger risk aversion. The time preference question reads: "How would you assess your willingness to give up something today in order to benefit from that in the future when it comes to financial decisions?" with a scale from 0 to 3, where higher values indicate higher levels of patience (Falk et al., 2016). Again, we standardize this variable. To obtain measures of the Big Five, we used the inventory of Rammstedt and John (2007). Each personality trait is constructed from two items answered on a scale ranging from 0 ("disagree strongly") to 4 ("agree strongly"). Additionally, we measure the locus of control using 10 different items that have been adapted from Rotter (1966) and have been

[8] In 1999, the mean (standard deviation) for avoiding a fare in public transport is 2.79 (2.21) and 2.74 (2.22) for tax evasion. In 2008, the corresponding numbers are 2.58 (2.10) for fare dodging and 2.28 (1.96) for tax evasion. These numbers are quoted from Douhou et al. (2011) who additionally find similar results for a representative sample of the Dutch adult population in 2008.

used in the 2005 wave of the SOEP. Higher values represent a stronger belief that individuals can influence their life outcomes. In order to aggregate items into a single measure of locus of control or a facet of the Big Five, we standardize items, sum them up, and standardize the overall measure. For each personality trait, a higher value represents a stronger intensity of that trait (e.g., being more conscientious). Finally, we measure self-control as proposed by Grasmick et al. (1993). The scale reflects six components of low trait self-control that are discussed by Gottfredson and Hirschi (1990) in their *General Theory of Crime*: risk-seeking behavior, self-centeredness, impulsivity, a preference for simple tasks, a preference for physical rather than cognitive activities, and volatile temper. Each component is measured by four items. The overall measure of trait self-control is the sum of standardized answers to each item. Originally, a high score indicates low self-control, but we recode it such that higher numbers indicate stronger self-control. In order to make the relative importance of all independent variables for predicting norm enforcement behavior easy to grasp, we standardize the remaining unstandardized variables to have zero mean and a standard deviation of one (risk attitudes, time preferences, and self-control). Table 1 provides basic summary statistics for all variables employed in this paper.

Table 1: Summary statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Norm enforcement behavior	180	0	1	-2.53	3.23
Fare dodging	180	2.69	0.88	1	5
Drunk driving	180	4.03	0.60	2	5
Tax evasion	180	2.86	0.92	1	5
Risk preferences	180	0	1	-2.35	2.21
Time preferences	180	0	1	-3.28	1.20
Extraversion	180	0	1	-2.62	1.46
Agreeableness	180	0	1	-2.35	2.09
Conscientiousness	180	0	1	-2.24	1.69
Neuroticism	180	0	1	-1.96	2.25
Openess	180	0	1	-2.70	1.23
Locus of control	180	0	1	-4.12	2.31
Self-control	180	0	1	-3.43	2.10
Age (in years)	180	22.21	2.38	18	33
Male	180	0.43	0.50	0	1

Notes: The variables Drunk driving, Fare dodging, and Tax evasion are coded from 1-5 such that higher numbers indicate stronger norm enforcement. The variable norm enforcement behavior is the standardized sum of the three variables Drunk driving, Fare dodging, and Tax evasion. All independent "trait" variables (risk and time preferences, personality traits, and self-control) are standardized and higher values indicate a stronger intensity of the respective trait. The dummy variable Male is equal to one for male subjects.

Empirical Strategy: Our paper is of exploratory nature and aims at studying the individual and joint predictive power of economic preferences, personality traits, and self-control for an individual's propensity to enforce norms - as opposed to providing causal evidence on these individual traits as determinants of norm enforcement behavior. Causal evidence would require exogenous variation in individual traits and preferences, which is hard to obtain or observe.

We will display results both for an aggregate measure of norm enforcement behavior as well as separate results for each of the three vignettes on fare dodging, drunk driving, and evading taxes. On the one hand, factor analysis using the three vignettes retains a single factor, i.e., the different vignettes capture a unidimensional underlying concept "norm enforcement behavior". On the other hand, the internal consistency of an aggregate measure is rather low (correlations of the answers to the three vignettes range from 0.08 to 0.35 and Cronbach's alpha is 0.43), which implies that the three different types of norm

often trigger different types of enforcement behavior for a given individual. Our aggregate measure of *norm enforcement behavior* is constructed as the standardized sum of the standardized responses to the three vignettes. The results of our analysis are very similar if we aggregate information from the three vignettes into a single measure of norm enforcement using factor analysis.

For the three vignettes, we estimate ordered probit models to investigate how norm enforcement behavior differs between individuals when using respondents' answers to the single vignettes as dependent variable. We assume that individual i has propensity $\tilde{y}_{ij}$ to sanction a norm violation $j \epsilon \{1, 2, 3\}$. These propensities are latent variables that we do not observe in our data. The observed dependent variable, the individual norm enforcement reactions, are determined by the model

$$y_{ij} = \begin{cases} 1 \quad if \quad \tilde{y}_{ij} \leq c_{1j} \\ 2 \quad if \quad c_{1j} < \tilde{y}_{ij} \leq c_{2j} \\ \quad\quad ... \\ 5 \quad if \quad c_{4j} < \tilde{y}_{ij} \end{cases}$$

with $\tilde{y}_{ij} = X_i \beta_j + \varepsilon_{ij}$, where the vector X_i contains all independent variables and ε_{ij} is a random component which is assumed to be i.i.d. normal across individuals i and norm violations j, conditional on the independent variables. c_{1j} to c_{4j} represent cut-off values. For the aggregate measure of *norm enforcement behavior*, we display OLS estimates.

Our empirical strategy follows the prevailing approach in the emerging field that integrates personality traits and economic preferences in the same models in order to advance our understanding of differences in individual behavior: we simultaneously consider the predictive power of the whole array of standard economic preferences (risk and time preferences) and personality traits (Big Five, locus of control).[9] Additionally, we aim at comparing the individual predictive power of economic preferences, personality traits, and self-control, respectively, and at assessing whether they complement or substitute each other in predicting norm enforcement. For that reason, we display five specifications for each dependent variable. In Specifications (1) and (2), we include either economic preferences or personality traits as independent variables, respectively. In Specification (3),

[9] See Becker et al. (2012) or Burks et al. (2015) as examples for similar empirical approaches.

we incorporate them simultaneously into the empirical model. Specification (4) only uses self-control as independent variable. Finally, we combine the concepts from economics, psychology, and criminology to predict individual norm enforcement in Specification (5). Moreover, we always include age and gender as control variables. Besides reporting the individual coefficients and significance of our covariates in the different specifications, we use McFadden's Adjusted Pseudo R^2 to compare their overall predictive power. Higher values indicate higher predictive power. McFadden's Adjusted Pseudo R^2 can take negative values. Its values tend to be considerably lower than those of R^2 in OLS regressions and should not be judged by the standards for a "good fit" in ordinary regression analysis (McFadden et al., 1977).

3. Results

We start the results section by studying the correlation structure of the three types of independent variables: economic preferences, personality traits, and self-control. The lower the correlations we observe, the higher is their potential to complement each other in predicting individual behavior. In Section 3.2, we analyze their predictive power for norm enforcement and discuss which individual characteristics make norm enforcement more likely.

3.1 Correlation structure of economic preferences, personality traits, and self-control

Table 2 displays Pearson's correlation coefficients of our independent variables of interest.[10] Following the classification by Cohen (1988) and conventions in social sciences, we do not observe any medium-sized (i.e., between 0.3 and 0.5), or even large correlations (greater than 0.5) between personality traits and economic preferences. This result suggests that economic preferences and personality traits largely measure distinct characteristics and have the potential to complement each other in predicting individual behavior. Moreover, it

[10] For clarity and conceptual reasons, Table 2 does not display correlations between the different Big Five personality traits. They are assumed to be independent factors by construction and their pairwise Pearson correlations are indeed small (i.e., always below 0.3), in 8 out of 10 cases even below 0.1 and not significant. The exceptions are significant correlations between agreeableness and extraversion (positive) and between neuroticism and extraversion (negative). In contrast, the locus of control is a further personality trait that has originated outside the Big Five taxonomy and is significantly correlated with extraversion (positive) and neuroticism (negative), see Table 2.

replicates the findings of Becker et al. (2012) that are based on various comprehensive data sets for our data.

Table 2: Correlation structure of economic preferences, personality traits, and self-control

	Extra-version	Agree-ableness	Conscien-tiousness	Neuro-ticism	Openess	Locus of control	Self-control	Time pref.
Risk pref.	-0.239***	0.070	0.240***	0.251***	-0.160**	-0.054	0.443***	0.071
Time pref.	0.018	-0.135*	0.128*	-0.037	0.006	0.218***	-0.185**	-
Self-control	-0.030	0.172**	0.429***	-0.146*	0.010	0.350***	-	-
Locus of control	0.323***	0.033	0.186**	-0.338***	0.123	-	-	-

Notes: Entries are Pearson correlation coefficients. Using Spearman's correlation coefficients instead yields similar results in terms of size and significance. All variables are standardized and coded such that higher values indicate a stronger intensity of the respective trait. *** p<0.01, ** p<0.05, * p<0.1.

Among the eight correlations of self-control with personality traits and economic preferences, three are medium-sized, namely the correlations with risk preferences, conscientiousness, and the locus of control. In contrast to economic preferences and personality traits, the self-control measure is multi-faceted by construction. Two of its six subscales are risk-seeking behavior and impulsivity, which are conceptually related to risk preferences and conscientiousness, respectively, but more narrowly defined. Given the correlation structure documented in Table 2 and the fact that the self-control scale was specifically tailored to predict norm violations, it will be interesting to investigate whether its predictive power for norm enforcement exceeds the one of the very general and broadly applied concepts of economic preferences and personality traits.

3.2 Predicting norm enforcement

Results for the separate vignettes concerning norm enforcement reactions to drunk driving, fare dodging, and tax evasion are displayed in Tables 3a-c. Table 4 present results for the aggregate measure of self-reported norm enforcement behavior. While the detailed results differ slightly across dependent variables, the overall emerging picture is rather consistent.

Table 3a: The relationship between reactions to an acquaintance's drunk driving and economic preferences, personality traits, self-control (ordered probit)

Independent variables	(1)	(2)	(3)	(4)	(5)
Risk preferences	0.355***		0.282**		0.289**
	[0.102]		[0.113]		[0.119]
Time preferences	-0.096		-0.150*		-0.148*
	[0.079]		[0.088]		[0.088]
Extraversion		-0.157	-0.108		-0.109
		[0.119]	[0.122]		[0.124]
Agreeableness		0.083	0.045		0.047
		[0.109]	[0.108]		[0.113]
Conscientiousness		0.393***	0.375***		0.379***
		[0.119]	[0.123]		[0.132]
Neuroticism		0.223**	0.190*		0.186*
		[0.099]	[0.103]		[0.106]
Openess		0.058	0.122		0.122
		[0.118]	[0.119]		[0.119]
Locus of Control		0.009	0.026		0.031
		[0.122]	[0.134]		[0.145]
Self-control				0.170	-0.017
				[0.112]	[0.169]
Age	0.831**	0.787**	0.862**	0.701**	0.862**
	[0.328]	[0.400]	[0.380]	[0.332]	[0.378]
Age²	-0.017***	-0.017**	-0.018**	-0.014**	-0.018**
	[0.007]	[0.008]	[0.008]	[0.007]	[0.008]
Male	-0.203	-0.013	0.104	-0.305	0.104
	[0.222]	[0.230]	[0.242]	[0.215]	[0.242]
N	180	180	180	180	180
Pseudo R^2	0.074	0.112	0.141	0.038	0.141
Adjusted Pseudo R^2	0.032	0.036	0.049	0.004	0.040

Notes: The dependent variable is self-reported norm enforcement behavior concerning drunk driving, coded such that higher numbers indicate stronger norm enforcement behavior. All independent variables are standardized and higher values indicate a stronger intensity of the respective trait. Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1.

Table 3b: The relationship between reactions to an acquaintance's fare dodging and economic preferences, personality traits, self-control (ordered probit)

Independent variables	(1)	(2)	(3)	(4)	(5)
Risk preferences	0.318***		0.314***		0.204*
	[0.091]		[0.094]		[0.107]
Time preferences	0.025		0.006		-0.021
	[0.082]		[0.086]		[0.090]
Extraversion		-0.027	0.047		0.071
		[0.093]	[0.094]		[0.097]
Agreeableness		-0.078	-0.104		-0.137
		[0.083]	[0.087]		[0.090]
Conscientiousness		0.172**	0.118		0.050
		[0.082]	[0.083]		[0.085]
Neuroticism		0.119	0.069		0.122
		[0.095]	[0.097]		[0.104]
Openess		-0.003	0.057		0.054
		[0.084]	[0.087]		[0.084]
Locus of Control		-0.027	-0.056		-0.135
		[0.092]	[0.093]		[0.099]
Self-control				0.276***	0.283**
				[0.083]	[0.119]
Age	-0.140	-0.278	-0.216	-0.260	-0.250
	[0.317]	[0.355]	[0.330]	[0.332]	[0.357]
Age²	0.004	0.007	0.005	0.006	0.006
	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]
Male	0.046	0.004	0.142	-0.034	0.147
	[0.173]	[0.179]	[0.190]	[0.163]	[0.191]
N	180	180	180	180	180
Pseudo R^2	0.038	0.023	0.048	0.030	0.062
Adjusted Pseudo R^2	0.013	-0.021	-0.006	0.011	0.003

Notes: The dependent variable is self-reported norm enforcement behavior concerning fare dodging, coded such that higher numbers indicate stronger norm enforcement behavior. All independent variables are standardized and higher values indicate a stronger intensity of the respective trait. Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1.

Table 3c: The relationship between reactions to an acquaintance's tax evasion and economic preferences, personality traits, self-control (ordered probit)

Independent variables	(1)	(2)	(3)	(4)	(5)
Risk preferences	0.150*		0.112		0.012
	[0.087]		[0.089]		[0.103]
Time preferences	-0.004		-0.031		-0.053
	[0.082]		[0.086]		[0.087]
Extraversion		-0.064	-0.041		-0.021
		[0.087]	[0.089]		[0.092]
Agreeableness		0.119	0.109		0.081
		[0.080]	[0.080]		[0.082]
Conscientiousness		0.169**	0.154*		0.097
		[0.082]	[0.081]		[0.086]
Neuroticism		0.225**	0.208**		0.256**
		[0.102]	[0.101]		[0.107]
Openess		0.102	0.124		0.121
		[0.078]	[0.081]		[0.080]
Locus of Control		0.127	0.128		0.066
		[0.079]	[0.082]		[0.083]
Self-control				0.240***	0.237**
				[0.074]	[0.106]
Age	-0.304	-0.339	-0.328	-0.373	-0.356
	[0.449]	[0.374]	[0.394]	[0.439]	[0.377]
Age²	0.006	0.006	0.006	0.008	0.007
	[0.010]	[0.008]	[0.008]	[0.009]	[0.008]
Male	0.065	0.289	0.338*	0.076	0.350*
	[0.164]	[0.187]	[0.197]	[0.160]	[0.199]
N	180	180	180	180	180
Pseudo R^2	0.009	0.034	0.037	0.020	0.047
Adjusted Pseudo R^2	-0.013	-0.005	-0.010	0.003	-0.005

Notes: The dependent variable is self-reported norm enforcement behavior concerning tax evasion, coded such that higher numbers indicate stronger norm enforcement behavior. All independent variables are standardized and higher values indicate a stronger intensity of the respective trait. Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1.

Table 4: The relationship between reactions to an acquaintance's norm violation (aggregate measure) and economic preferences, personality traits, self-control (OLS)

Independent variables	(1)	(2)	(3)	(4)	(5)
Risk preferences	0.311***		0.257***		0.158*
	[0.080]		[0.084]		[0.087]
Time preferences	-0.005		-0.038		-0.058
	[0.069]		[0.071]		[0.073]
Extraversion		-0.081	-0.027		-0.008
		[0.078]	[0.080]		[0.081]
Agreeableness		0.047	0.025		-0.007
		[0.077]	[0.077]		[0.076]
Conscientiousness		0.278***	0.237***		0.177**
		[0.073]	[0.072]		[0.074]
Neuroticism		0.227***	0.185**		0.229***
		[0.084]	[0.084]		[0.087]
Openess		0.076	0.128		0.124
		[0.082]	[0.083]		[0.080]
Locus of Control		0.053	0.045		-0.019
		[0.081]	[0.083]		[0.088]
Self-control				0.303***	0.237**
				[0.081]	[0.101]
Age	0.062	-0.046	-0.004	-0.053	-0.033
	[0.256]	[0.238]	[0.233]	[0.245]	[0.244]
Age^2	-0.001	0.001	0.000	0.002	0.001
	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]
Male	-0.037	0.125	0.233	-0.085	0.240
	[0.150]	[0.154]	[0.161]	[0.150]	[0.159]
Constant	-1.080	0.369	-0.140	0.311	0.270
	[3.100]	[2.905]	[2.852]	[3.016]	[3.001]
N	180	180	180	180	180
R^2	0.106	0.146	0.198	0.105	0.228
Adjusted R^2	0.081	0.101	0.145	0.084	0.172

Notes: The dependent variable is an aggregate measure of self-reported norm enforcement behavior that is constructed as the standardized sum of the standardized responses to the three vignettes. A higher number of the dependent variable indicates stronger norm enforcement behavior. All independent variables are standardized and higher values indicate a stronger intensity of the respective trait. Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1.

With regard to economic preferences, Columns (1) in Tables 3a-c and 4 document that risk preferences are a significant predictor of self-stated norm enforcement behavior, while time preferences are not. More risk-averse individuals report to sanction norm violations of others more strongly. In terms of effect size, a one standard deviation increase in risk aversion is associated with a 0.31 standard deviation increase in our aggregate measure of norm enforcement behavior in Table 4. A possible reason for more risk averse individuals to sanction norm violations more strongly is that they fear to suffer harm from others' norm violations (such as, e.g., drunk driving), and therefore seek to reduce the risk of being exposed to the adverse consequences of norm violations. In line with this argument, the role of risk preferences with regard to norm enforcement is strongest for drunk driving and weakest in the domain of tax evasion, as it is unlikely that one may directly and personally suffer from that offense. This heterogeneity of effects underlines the importance of distinguishing between different kinds of norm violations. Moreover, our results mirror empirical evidence that more risk-averse individuals are, *ceteris paribus,* less likely to engage in norm violations (e.g., Eisenhauer 2008) since they suffer more strongly from probabilistic punishment.

Result 1*: Stronger risk aversion is positively associated with norm enforcement. The predictive power of risk aversion regarding norm enforcement is stronger for norm violations that expose others to a risk of being directly harmed by the violation.*

With respect to personality traits, we find that more conscientious and more neurotic individuals report to sanction others' norm violations more strongly (see Columns (2) of Tables 3a-c and 4). According to the results in Table 4 (that refer to our aggregate measure of norm enforcement behavior), a one standard deviation increase in conscientiousness or neuroticism is associated with an 0.28 or an 0.23 increase in norm enforcement behavior. Only for fare dodging, neuroticism is not significant, but still positively related to norm enforcement. In contrast, openness, extraversion, agreeableness, and locus of control are not significantly related to the propensity to enforce norms for any domain of norm enforcement behavior and their coefficients are substantially smaller than those of conscientiousness and neuroticism. While we are not aware of other results on personality traits and norm *enforcement*, it is interesting to compare our results to findings on the relationship between personality traits and norm *violations* (Almlund et al. 2011, Ozer and

Benet-Martinez 2006): conscientiousness and agreeableness have been repeatedly shown to be negatively related to norm violations, while openness does not predict norm violations. Previous results for neuroticism and extraversion are less clear-cut. With regard to the locus of control, Shaw and Scott (1991) and Heckman et al. (2006) document a significant negative correlation with norm violations. Thus, our result that higher conscientiousness increases self-reported norm enforcement resembles results for norm violations. In addition, the empirical results with regard to negative reciprocity also highlight a positive relationship with neuroticism (e.g., Dohmen et al. 2008) and a positive correlation between cooperation and conscientiousness (Proto and Rustichini 2014).

***Result 2**: Conscientiousness and neuroticism are positively associated with norm enforcement.*

Columns (3) in Tables 3a-c and 4 use both economic preferences and personality traits as independent variables. Risk preferences, conscientiousness, and neuroticism largely remain significant predictors of reported norm enforcement behavior. The magnitude of their coefficients decreases slightly as one would expect from their correlation patterns in Table 2. Moreover, Adjusted (Pseudo) R^2 are higher in Columns (3) than for Columns (1) and (2) for our aggregate measure of norm enforcement behavior and for reactions to drunk driving, suggesting that economic preferences and personality traits are complements in predicting norm enforcement behavior.[11]

***Result 3**: Economic preferences and personality traits tend to complement each other in predicting norm enforcement.*

In a next step, Columns (4) of Tables 3b-c and 4 document that the self-control scale from criminology is a further significant predictor of reported norm enforcement behavior. The exception is reactions to drunk driving (see Table 3a). In general, individuals with higher self-control have a higher propensity to enforce norms: e.g., for the aggregate measure of norm enforcement behavior, a one standard deviation increase in self-control is predicted to increase norm enforcement behavior by 0.30 standard deviations. In contrast to economic preferences and personality traits – both very general concepts that aim at explaining all

[11] The explained share of the overall variation may be considered relatively low. However, comparing the Adjusted R^2 from our Table 4 to those found in Burks et al. (2015), for example, there is no stark divergence.

kinds of individual behavior - the multi-faceted self-control scale was especially designed to explain behavior in the context of norm violations. For that reason, one might have expected its predictive power to clearly exceed the one of preferences or personality traits. Comparing Adjusted (Pseudo) R^2 in Columns (4) to those for economic preferences and personality traits in Columns (1) and (2) shows that this is not the case.

***Result 4**: Self-control is positively associated with norm enforcement.*

Finally, in Columns (5) of Tables 3a-c and 4, we combine economic preferences, personality traits, and the self-control scale from criminology as independent variables. Overall, results are somewhat mixed for our different dependent variables. The correlations between risk preferences and self-control as well as conscientiousness and self-control are both about 0.43, reflecting their conceptual similarity. As a consequence the coefficients of these three variables and in some cases also their significance decrease when they are combined in the same specification. However, they still complement each other; for example, self-control is never the only significant variable. Considering the aggregate measure of norm enforcement behavior in Table 4, risk attitudes, conscientiousness, neuroticism, and self-control remain significant predictors of self-stated norm enforcement behavior. Furthermore, overall predictive power as measured by Adjusted R^2 is highest when they are combined in Specification (5). Both findings suggest that economic preferences, personality traits, and the self-control scale from criminology tend to complement each other in predicting individual norm enforcement behavior.

***Result 5**: Economic preferences, personality traits, and self-control tend to complement each other in predicting norm enforcement.*

Before concluding our study, we briefly discuss the results from a robustness check. An alternative way of using the norm enforcement information for empirical analysis is to group the responses into two categories, namely disapproval or no disapproval. When we run probit regressions (for specifications as in Tables 3a-c) using binary dependent variables that are equal to 1 for answers in category [4] “expressing disapproval” or [5] “expressing disapproval and social exclusion” and that are equal to 0 otherwise, we find that the overall pattern of results is very similar: risk attitudes, self-control, conscientiousness, and neuroticism are the main predictors of norm enforcement behavior. The probit regression

results are slightly less significant however, especially with respect to risk aversion in the model from Column (5).

4. Conclusion

Individuals differ in their willingness to enforce norms. To the best of our knowledge, our paper is the first to investigate *which individuals* are more likely to enforce norms by combining concepts from economics, psychology, and criminology that are all considered as stable character traits of an individual and drivers of individual behavior. The few previous contributions with a similarly integrative set of independent variables focused on other types of behavior and outcomes such as educational outcomes, labor market success, health outcomes, or life satisfaction (e.g., Becker et al. 2012, Burks et al. 2015, Heckman et al. 2006). Previous contributions on norm enforcement typically do not focus on explaining individual differences (but instead differences in average levels across treatments; see, e.g., Leibbrandt and Lopez-Perez 2012) and, if they do, include other independent variables such as demographics or beliefs about the frequency of norm violations (e.g., Douhou et al. 2011, Traxler and Winter 2012).

Our results suggest that our integrative approach is fruitful. We find that the various concepts tend to complement each other in predicting self-reported norm enforcement behavior. The most significant predictors - risk aversion, conscientiousness, neuroticism, and self-control - originate from all three disciplines. Of course, our analysis is just a very first step towards a truly integrative viewpoint on norm enforcement behavior and there is a lot of scope for extending it, for instance, by collecting data on other types of norm enforcement behavior or data for more representative populations. It would also be very interesting to jointly study norm enforcement and norm violations in order to better understand to which extent they are aligned at the individual level, i.e., whether norm enforcers do not violate norms themselves and to which extent compliance to norms and norm enforcement are driven by the same traits**.**

Our results regarding the most decisive personality traits for norm enforcement – namely, conscientiousness and neuroticism – lend further support to the summary statement by Almlund et al. (2011) that, among the Big Five, conscientiousness and, to a lesser extent, neuroticism seem to be the most powerful predictors of a wide range of outcomes.

Our findings might be of practical importance in the corporate context, for example. Firms often know a lot about the personality of their employees, for instance, by collecting the corresponding information in an assessment center. The correlations reported in the paper at hand might help to predict the implications of different organizational designs (e.g., relying more or less on formal monitoring as opposed to monitoring by the peers of the same team) for employees' behavior. Knowledge about high levels of conscientiousness or neurotic tendencies of employees in the firm may be used when composing work teams, for instance, in order to ensure that some norm enforcement will take place. Additionally, firms may use the reported correlations as information in their hiring process. For example, more conscientious applicants may be valuable hires due to their tendency to act against norm violations.

Taking a broader perspective, our results illustrate that integrating concepts from various disciplines may enhance our understanding of individual behavior and, thus, is a promising avenue for future research.

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Appendix A: More information on data collection

The sequence of each session of our experiment was as follows: introductory task – decision 1 – decision 2 – survey questionnaire. We used a 2x2 design. The introductory task was aimed at inducing ego-depletion or no ego-depletion. Subjects then made one decision in a take game and one in a risky investment task. The order of the two decisions varied across sessions. Further details of the experiment are described in Friehe and Schildberg-Hörisch (forthcoming). In our analysis in the main part of the paper, we use all 180 participants' responses to the survey questionnaire.

In order to document that the variables we use in our analysis are not affected by treatment variations in the introductory task or by order effects concerning decisions 1 and 2, Table A.1 displays results of a Kruskal-Wallis test for each variable.

Table A.1: Results of Kruskal-Wallis tests

Variable	Chi-squared test statistic	p-value	Chi-squared test statistic adjusted for ties	p-value adjusted for ties
Norm enforcement	1.81	0.61	1.84	0.61
Fare dodging	0.41	0.94	0.50	0.92
Drunk driving	3.63	0.30	7.32	0.06
Tax evasion	0.66	0.88	0.73	0.86
Risk preferences	2.59	0.46	2.64	0.45
Time preferences	0.44	0.93	0.55	0.91
Extraversion	2.87	0.41	2.92	0.40
Agreeableness	7.58	0.06	7.63	0.05
Conscientiousness	5.21	0.16	5.25	0.15
Neuroticism	2.47	0.48	2.48	0.48
Openess	4.36	0.23	4.41	0.22
Locus of control	2.07	0.56	2.07	0.56
Self-control	1.15	0.76	1.15	0.76

Results in Table A.1 show that we cannot reject the hypothesis that data from the four different experimental treatments are drawn from the same population with $p<0.05$ for any variable. For most variables, p-values are substantially larger than 0.05. To judge the overall result of Table A.1, one should keep in mind that if all 13 variables were statistically

independent and each of the four treatment groups was drawn from the same underlying population, we would still expect to reject 5% (about 1) of the hypotheses at the 5% level.

As a further robustness check we run the same regressions as in Tables 3a-c and Table 4 with treatment dummies as additional covariates (the omitted baseline category is ego-depletion and risky investment task played before take game). Compared to our baseline results reported in Tables 3a-c and Table 4, the results with treatment dummies as additional controls are stable, qualitatively very similar, and only 1 out of 12 treatment dummies is significant. The results are available from the authors upon request.

Appendix B: Additional Tables

Table B.1: Reactions to an acquaintance's norm violation (in percentages, N = 180)

	Fare dodging	Drunk driving	Tax evasion
[1] approval	1.11	0.00	2.78
[2] benevolently ignoring it	53.33	5.00	38.33
[3] ignoring it	22.78	1.11	32.22
[4] expressing disapproval	20.56	79.44	23.33
[5] expressing disapproval and social exclusion	2.22	14.44	3.33

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