

# Fairness Spillovers – The Case of Taxation

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## Abstract

It is standardly assumed that individuals adjust to perceived unfairness or norm violations in precisely the same area or relationship where the original offense has occurred. However, grievances over being exposed to injustice may have even broader consequences and also spill over to other contexts, causing non-compliant behaviour there. We present evidence that such 'fairness spillovers' can incur large economic costs: A belief that there is unfairness in taxation in the sense that the rich don't pay enough taxes is associated with a twenty percent higher level of paid absenteeism from work.

JEL-Code: H31, H26, D63.

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# 1 Introduction

It is widely documented that fairness perceptions matter for economic behavior. Various experiments have suggested that people who find themselves in situations which they perceive to be inconsistent with their moral standards or expectations show behavioral responses that entail economic costs. Agents receiving “unkind” wage offers have been shown to react by cutting back work effort (Fehr and Schmidt, 2005), the belief that others don’t contribute to charitable funds induces a lower willingness to donate to charity (Frey and Meier, 2004), and people who think that there is injustice in taxation respond by increasing their own level of tax evasion (Alm et al. 1993; Andreoni et al., 1998). This literature shares the premise that individuals adjust to perceived unfairness or norm violations in precisely the same area or relationship where the original event has occurred.

Social psychologists on the other hand have proposed that the behavioral consequences of perceived norm violations may be less direct. In a series of field experiments, Keizer et al. (2008) find that “when people observe that others violated a certain social norm or legitimate rule, they are more likely to violate other norms [...]”: Pedestrians are more likely to steal an envelope from a mailbox when the area around the mailbox is arranged to be littered with trash, and customers outside a shopping mall are more likely to disobey a “no throughway” sign when bicycles were illegitimately parked nearby. Similarly, Mullen and Nadler (2008) find that when they have experiment participants read a newspaper article which reports on a court decision that is inconsistent with their core values, they show higher rates of stealing the pen they were given to fill out the experiment questionnaire.

The latter examples show that a perception of norm-deviant behavior can have consequences for other contexts and make individuals feel less obliged to show compliant behavior there, even if this comes at cost of third parties. While the evidence gathered by social psychologists is intriguing, the economic relevance of such cross-norm or cross-relationship adjustments – a phenomenon we label ‘fairness spillovers’ – has not been assessed so far. To do so, we look at two genuinely economic norms of conduct which are at the heart of modern industrialized societies: the obligations to work hard and to pay taxes.<sup>1</sup> We evaluate whether individuals who believe that there is a norm violation in taxation exhibit a lower willingness to comply with the norm to exert effort at work. As a specific setup, we analyze whether the belief that the rich do not pay their fair share in taxes comes with higher levels of shirking.

Our suggested fairness spillover meets the conditions which social psychologists say make

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<sup>1</sup>Hard work is seen as a virtue almost universally across cultures, religions and political regimes (Lipset 1992). Likewise, once a state is brought into existence, paying taxes is considered as a citizens’ duty and hence constitutes a widely accepted norm (Locke, 1690).

the occurrence of cross-norm adjustments likely (Austin and Walster, 1975; Mullen and Nadler, 2008): (i) people’s fundamental or core values must be at stake; (ii) a direct response is difficult; (iii) some degree of anonymity should be involved such that own deviant behavior cannot be easily detected or punished. Consider condition (i): The opinion that the top income brackets should contribute a substantial share to the funding of public affairs is widely held in societies that adhere to the principle of progressive taxation. Mankiw (2010) even goes so far as to state that “[t]he question, ‘Do the rich pay their fair share in taxes?’ is one of [the] defining issues of our time”. Consequently, the idea that the rich may pay too little in taxes can let emotions run high. A recent *Economist* poll on US public opinion inquired how angry people get when they think about “Tax Breaks for the Rich”. Almost half of the respondents answered “Very Angry”, about one fifth get “Somewhat Angry” while only one out of ten said they “Don’t think about it”.<sup>2</sup> When it comes to criterion (ii), it could be argued that tax evasion is a natural reaction to perceived injustice in taxation. This direct adjustment measure has been analyzed in tax evasion experiments (Spicer and Becker 1981, Kinsey et al. 1991). However, it has also been argued in the tax evasion literature that evasion often is not a viable option, as the opportunities for manipulating tax returns are slim for the employed population: Taxable income is often directly reported to the authorities by employers or other third-party institutions such as banks, investment and pensions funds (Kleven et al. 2010). While Kleven et al. (2010) find lower rates of tax evasion in the presence of such reduced evasion opportunities, it is reasonable to assume that this lack of a direct adjustment measure makes the occurrence of spillovers to other spheres of life more likely. Instead of evading taxes, agents may turn to non-compliant behavior in surrogate areas, where adjustment is less difficult – in our case by reducing work morale. We consider condition (iii) to be met because exertion of effort at work is hardly ever fully contractible and therefore entails various elements of “quasi-voluntary” contributions.

That fairness spillovers may indeed exist can be inferred from situations where agents utter that they refuse to make any effort above and beyond the call of duty at work as long as those in charge do not contribute their fair share. This is obviously only anecdotal evidence for the existence of the hypothesized spillovers and a rigorous way of testing for their existence is more difficult to come up with, because such individual ‘work-to-rule’ strategies are notoriously hard to observe and measure. We therefore propose the following setup. As a measure of work morale which is easy to observe, and that at the same time allows us to put a price tag on the suggested fairness spillover from taxation, we use the number of days that German employees spend on sickness leave. In Germany, there is no reduction of earnings associated with sickness spells of up to six weeks’ duration and, for the first three days of each period of leave, employees are usually not even obliged to provide a doctor’s note. In addition, there are high levels of

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<sup>2</sup>Economist/YouGov Poll, conducted March 22-24, 2009.

job protection, and we assume that ultimately this legal generosity provides incentives to utilize it as a means of shirking one's duty when the wealthy are suspected of not fulfilling the norm of paying ample taxes.<sup>3</sup> The German Socio-Economic Panel (GSOEP) provides data on absenteeism and also inquires about the belief that the rich don't pay their fair share in taxes. A perceived violation of this tax fairness norm is surprisingly strongly connected to work morale: On average, employees who harbor the perception that managers pay too little in taxes accrue 20 percent more sick days, which translates to 1.5 more days absent from work per year. This results holds, even when carefully conditioning on health status and a rich set of income, personal and job related variables. The extremely diverse set of control variables that the GSOEP provides also allows us to test and reject a variety of alternative explanations. While we believe the control variable strategy to go a long way in correcting potential biases, our research design additionally implements Rosenbaum-type sensitivity tests. They reveal that any remaining omitted variable would need to have implausibly strong associations with absenteeism and fairness beliefs in order to spuriously generate our results – given the large set of covariates, the existence of such an important unobserved variable is rather unlikely.

While the possible existence of what we label 'fairness spillovers' has gone largely unnoticed by economists, the general phenomenon that individuals may use apparently unrelated outlets in response to external emotional cues is enjoying increasing interest in the recent economics literature: Upset losses by the home football team have been shown to induce higher levels of domestic violence (Card and Dahl, 2009); similarly the incidence of offenses against police officers (Rees and Schnepel, 2009) as well as vandalism (Priks, 2010) have been found to be especially high whenever home teams suffer an upset loss. Our result parallels these findings in that they can all be interpreted to be consistent with the frustration-aggression hypothesis – deviation from a reference point of expectation leads to anger which in turn results in adverse behavior. There are, however, several important differences. First, the reference point we have in mind is genuinely moralistic or ethical in nature, thus distinguishing the 'fairness spillover' from the above mechanisms, which following our terminology could be labeled 'emotional spillovers'. Second, in our case the suspected triggering event is not a real event but rather a belief. Third, because beliefs about justice in the world can be considered to form slowly over time, the decision to reduce work morale because of suspected injustice in taxation is not very likely to be an immediate and spontaneous reaction to a single event. Finally, our dependent variable, a proxy for work effort, is a core variable of economic analysis.

The remainder of the paper is organized as follows. Section 2 explains the choice of variables, describes the data and gives some descriptive statistics. Section 3 presents

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<sup>3</sup>This is not to say that everyone on sick leave is a shirker. However, that absence due to illness is not purely a response to medical conditions is widely accepted in the labor economics literature (Barmby et al. 2002; Johannsen and Palme 2005; Puhani and Sonderhof 2010).

the empirical results. Section 4 discusses alternative explanations for the findings, and section 5 concludes.

## 2 Data and descriptive statistics

How do individuals react when their sense of tax fairness is violated? In early 2010 a man deliberately crashed his airplane into an Austin tax office, killing himself and an employee. The suicide note was described by the New York Times as a 'rant against the government, big business and particularly the tax system [...]'.<sup>4</sup> Such drastic violent acts are rare, but each year the US tax authorities are faced with a substantial number of threats against employees.<sup>5</sup> The problem is so serious that there even is an Internal Revenue Service (IRS) database of 'Potentially Dangerous Taxpayers', and every year a number of individuals receive jail sentences as a consequence of making such threats.<sup>6</sup> These are without a doubt very direct responses to perceived unfairness in taxation and fortunately most people will not go to such extremes. However the violent outbursts may be only be the tip of the iceberg, indicative of a more widespread disgruntlement with the tax system. Indeed, opinion polls show that taxation is an emotionally charged issue for most, especially when it comes to the taxation of wealthy individuals. In April 2009, between 51% and 74% of respondents were in favor of increasing tax rates for those earning more than \$250,000.<sup>7</sup> When explicitly asked about the fairness of the tax system, in a 2007 Gallup poll 66% of respondents said they felt that 'upper-income people' paid less than their fair share in taxes. An even higher share of people (71%) believed that corporations didn't contribute adequately.<sup>8</sup> Given the large share of individuals that is discontent with the current state of taxation, we suspect that these people don't just bottle up their frustrations, but rather employ more subtle and indirect measures of adjustment than the ones described above.

Specifically, we test whether the belief that there is injustice in taxation of the rich is associated with lower work morale. Testing this idea is challenging, as real-world data on

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<sup>4</sup>See <http://www.nytimes.com/2010/02/19/us/19crash.html>.

<sup>5</sup>The Treasury Inspector General for Tax Administration (TIGTA) has investigated more than 1,000 threats against IRS employees in 2009. See the article in the Wall Street Journal at <http://online.wsj.com/article/SB10001424052748704757904575077381781219798.html>, and the TIGTA website at <http://www.treas.gov/tigta>.

<sup>6</sup>Guidelines for identifying Potentially Dangerous taxpayers are laid out in Part 25.4.1 of the Internal Revenue Service's (IRS) Internal Revenue Manual (IRM), accessible at <http://www.irs.gov/irm>.

<sup>7</sup>See the Rasmussen report [http://www.rasmussenreports.com/public\\_content/business/taxes/february\\_2009/51\\_say\\_tax\\_hike\\_on\\_those\\_earning\\_over\\_250\\_000\\_is\\_a\\_good\\_move](http://www.rasmussenreports.com/public_content/business/taxes/february_2009/51_say_tax_hike_on_those_earning_over_250_000_is_a_good_move), a CBS/NY Times poll at [http://www.cbsnews.com/htdocs/pdf/poll\\_0bama\\_040609.pdf](http://www.cbsnews.com/htdocs/pdf/poll_0bama_040609.pdf), and a Fox News poll at [http://www.foxnews.com/projects/pdf/030509\\_Poll.pdf](http://www.foxnews.com/projects/pdf/030509_Poll.pdf).

<sup>8</sup>See <http://www.gallup.com/poll/27199/americans-say-federal-income-taxes-too-high-unfair.aspx>. As an interesting aside, 60% of individuals felt that their own tax burden was fair.

beliefs towards justice in taxation and on work morale are usually not readily available. An exception is the 2005 wave of the German Socio-Economic Panel (GSOEP), a large nationally representative household panel data set.<sup>9</sup> This survey includes questions on tax fairness perceptions and on absenteeism from the workplace, which we use as a proxy for work morale.

The 2005 questionnaire of the GSOEP asked respondents how they perceive the tax burden of individuals at the upper end of the income distribution, exemplified by "managers". The introduction to the question reads: "In Germany, everyone has to pay taxes in relation to his or her income. Those who earn more have to pay higher taxes (also known as 'progressive taxes')". Respondents are then asked: "[...] what do you think about the taxes paid by a manager on the board of directors of a large company? Does he/she pay too much, too little, or an exactly appropriate amount in taxes compared to other groups?". There are four categories among which respondents could choose: 'too much', 'too little', 'appropriate', 'don't know'.

The framing of the question alludes to the principle of progressive taxation, which postulates that the individuals' average tax rate should increase as income increases. Yet the question does not explicitly ask 'is there enough progression in the German tax system?', and so there is scope for individuals to apply fairness principles other than that of sufficient progression. The feeling that the rich pay too little in taxes compared to other groups may stem from the belief that the rich do not contribute adequately to the tax pool by taking advantage of loopholes or by flat out evading taxes in an illegal manner. Yet the blame need not be on the rich themselves: agents may just as well feel that politicians fail to implement tax policies that sufficiently strain the rich and thus deem the tax system unfair. In the end, while we cannot say which tax fairness principle respondents actually have in mind, we assume that individuals apply *some* tax fairness principle when answering the question.

In table 1 we present the distribution of the belief that managers are taxed too little. We exclude those who answered 'don't know' and coded the variable to zero when managers' taxation was deemed 'too high' or 'appropriate'. Hence, the reference group is composed of people who do not think that managers are taxed too little.<sup>10</sup> The first column of the table shows that an overwhelming 72% of respondents think that managers are taxed too little. One might suspect that this view is more strongly held by individuals at the lower end of the income distribution. In the remaining columns of the table we therefore break this figure up by income quartiles, by worker class (blue/white collar) and by three different skill-related hierarchy levels within an individual's broad occupation. It is striking how

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<sup>9</sup>See Wagner et al. (2007) for a description of the panel survey.

<sup>10</sup>Perhaps not surprisingly, the view that managers pay too much in taxes is only held by 6% of the respondents.

TABLE 1: ARE MANAGERS BEING TAXED TOO LITTLE?

	full sample	income quartiles				hierarchy in occupation			worker class	
		Q1	Q2	Q3	Q4	low	med	high	blue	white
Yes (%)	72.1	78.5	76.8	75.3	61.1	80.3	75.5	60.1	81.4	68.0
<i>N</i>	3647	680	968	1091	908	602	2228	817	1191	2057
No (%)	27.9	21.5	23.2	24.7	38.9	19.7	24.5	39.9	18.6	32.0
<i>N</i>	1413	186	292	357	578	148	723	542	273	970
Total	5060	866	1260	1448	1486	750	2951	1359	1464	3027

*Note:* Data is taken from the 2005 wave of the German Socio-Economic Panel. Sample restricted to those observations used in the full specifications in table 3. The question reads: "In Germany, everyone has to pay taxes in relation to his or her income. Those who earn more have to pay higher taxes (also known as 'progressive taxes').[...]And what do you think about the taxes paid by a manager on the board of directors of a large company? Does he/she pay too much, too little, or an exactly appropriate amount in taxes compared to other groups?" There are four categories among which respondents could choose: 'too much', 'too little', 'appropriate', 'don't know'. The indicator variable used in this paper drops all individuals that answered 'don't know'. In addition, all individuals that answered either 'too much' or 'appropriate' are coded as zero, i.e. they do not think that managers are being taxed too little. The total number of observations is lower in the final two columns, as some individuals cannot be classified as blue or white collar individuals.

strongly the belief that managers are taxed too little is also held by individuals from the higher income and occupation groups. It is held by 61% of the respondents in the 4th income quartile (compared to 78.5% of individuals in the first income quartile) and by 68% of white-collar workers (compared to 81.4% of blue-collar workers). We conclude from these numbers that the belief that managers do not pay their fair share in taxes is indeed not confined to individuals from low-income groups.<sup>11</sup> Quite the contrary, this view is held by a wide range of individuals from different social backgrounds.

TABLE 2: DAYS ABSENT BY ANSWER TO 'ARE MANAGERS TAXED TOO LITTLE?'

	managers taxed too little		difference in days absent
	yes	no	
managers taxed too little (%)	72.1	27.9	
Days absent by answer category	8.34 (.31)	5.58 (.32)	2.76*** (.54)
<i>N</i>	3647	1413	

*Note:* Percentage of respondents who think that managers are being taxed too little. Mean days absent by opinion on manager taxation and t-test of difference in means of absenteeism (standard errors in parentheses). \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

If individuals react to perceived unfairness by reducing work morale, they are most likely to choose an easily manipulable margin of adjustment with low cost and low probability of detection. In Germany, the number of days absent from work due to illness meets these requirements, because employees are usually not obliged to produce a doctor's note for the first three days of each sickness spell and there is no reduction of payments for spells of up to six weeks. The analysis will thus use employee absenteeism due to sickness as the dependent variable. The GSOEP provides the self-reported annual number of days absent from work due to illness. This question reads "How many days were you not able to work [last year] because of illness?" Because of the retrospective nature of the question

<sup>11</sup>Interestingly, even the billionaire Warren Buffett publicly points out that his own average tax rate is much lower than that of his receptionist, a first indicator that believing the tax system to be unfair at the top is not confined to working class individuals. See [www.nytimes.com/2007/07/15/business/yourmoney/15view.html](http://www.nytimes.com/2007/07/15/business/yourmoney/15view.html) Similarly, in the YouGov/Economist Poll cited in the introduction, around forty percent of college graduates declare to get 'Very Angry' when thinking about tax breaks for the wealthy. The same is true for those with a household income above \$100,000.



we draw the information on work absence from the 2006 GSOEP wave so that we can relate it to the fairness perceptions collected in the 2005 wave. We exclude self-employed individuals since our argument for using absenteeism as a work morale proxy does not apply to them. Figure 1 in the appendix shows the distribution of days absent from work. It shows that about 45% of the individuals had no absent days in 2005 (the mean is 7.57, the standard deviation 17.3 and the median 2 days). The second row of table 2 shows that those who think that managers are taxed too little are absent from work 8.34 days, while those who think that managers are appropriately or excessively taxed are absent for only 5.58 days. This “fairness gap” of 2.76 days is highly statistically significant, and in relative terms amounts to 36% of the average number of days absent. While highly suggestive, these observations are consistent with the idea that individuals not only ‘get angry’ when thinking about tax breaks for the rich – as implied by the Economist poll mentioned above – but that behavioral consequences to perceived unjust taxation of the rich may manifest at the workplace.

### 3 Estimation results

The descriptive statistics presented in section 2 show a positive correlation between the belief that managers pay too little in taxes and days absent from work – a first indicator that there may indeed be spillovers from tax fairness perceptions to work morale. The GSOEP provides a vast array of control variables, far beyond what is usually available in survey data, and this section provides estimates of the association between fairness perceptions and absenteeism after netting out these possibly confounding factors. Table 8 in the appendix gives descriptions of all variables used in the analysis, with the corresponding summary statistics displayed in table 9 in the appendix. Our benchmark estimation is the linear OLS case, but due to the nature of the dependent variable, we also use count-data and Quasi-Maximum-Likelihood methods. These estimates give an idea of the magnitude of the ‘fairness gap’, the difference in sick days between two individuals who only differ in their assessment of whether or not the rich pay their fair share in taxes.

#### 3.1 Baseline results

The main explanatory variable in all regressions of this subsection is the indicator variable for whether an individual believes that ‘managers are being taxed too little’, which we take as a measure of whether taxation at the top of the income distribution is in line with a respondent’s concept of tax fairness. We expect people holding this belief to respond by increasing their days absent from work and thus the dependent variable is the number

of sick days in the year of the survey.<sup>12</sup>

Table 3 provides the results from linear OLS estimations. Column (1) reproduces the raw differential presented in table 2 by using a bivariate regression model: People who think that managers are taxed too little report on average 2.9 more days of staying away from work due to illness.<sup>13</sup> A first natural candidate to control for is a person's individual health.<sup>14</sup> It might be argued that the correlation in column (1) is driven by reverse causality: Those who stay at home due to illness may become aware that they are net beneficiaries of the social security system and therefore always think that taxation levels are too low. Column (2) therefore adds two indicators of respondents' health status. Health score is a self-reported assessment of an individual's objective health status. Respondents can rate their health on a scale ranging from 'poor' [1] to 'very good' [5]. However, there may be vast differences in the health threshold that needs to be reached before a person decides to call in sick. Hence, we also control for the subjective satisfaction with health status. This variable is coded on an 11-point scale ranging from 'totally unhappy' [0] to 'totally happy' [10]. Both variables are significant and the coefficients bear the expected negative sign. They imply that better objective health leads to lower levels of absenteeism, and that at fixed objective health, higher levels of satisfaction with this particular level of well-being are associated with lower absenteeism.<sup>15</sup> Most interestingly, the difference in absenteeism after controlling for health is still two full days, compared to the 2.9 days difference in absenteeism without any controls.

Individual income is also an important control variable. One can argue that low-income earners may systematically want higher tax levels for the rich, and that they also have a higher probability of shirking, as they have less at stake when getting caught. Since this would bias our coefficient of interest upwards, income is included in column (3) along with other personal characteristics, some of which would be included in a standard Mincer equation. It turns out that a higher level of education is associated with fewer sick days, as is advanced age and having children. However, the belief that the tax system at the upper end of the income distribution is unfair is still associated with significantly higher levels of absenteeism, despite the gap being cut down to one sick day. Adding job and firm related variables in columns (4) and (5) does not further diminish the tax fairness coefficient, the difference in absenteeism now actually increases somewhat. Longer job tenure and larger firm size are both associated with higher levels of absenteeism. A possible explanation

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<sup>12</sup>We exclude individuals who report more than 250 sick days, the maximum number of workdays per year.

<sup>13</sup>The only reason that these numbers diverge slightly is that the descriptives in table 2 are based on the smaller sample which is used in the full specification (6).

<sup>14</sup>In fact, if everyone used sick days the way one is supposed to, there should not be any systematic predictors of absenteeism other than actual health.

<sup>15</sup>Obviously, both these variables are of a subjective nature, even if the health score variable asks for an objective level of well-being. We would of course prefer to have a really objective measure, such as the results from getting a physical at a doctor's office. Unfortunately, such data are not available in the GSOEP.

would be that longer tenure makes it harder for employers to punish shirking due to lay-off protection laws, while a larger firm size reduces the probability of getting caught while shirking. From column (4) on, the specifications also include 16 indicators for the German regions and 9 indicators representing an individual’s rank in occupational hierarchy – the former for netting out regional differences in work attitudes among others, the latter as further controls for socio-economic status.

The GSOEP allows us to account for some personal attitudes and mental states directly, rather than using proxies for them. After adding these variables in column (6) the absenteeism difference increases somewhat to 1.5 days and remains highly significant. We control for whether someone is satisfied with their job, since the job related and firm related variables we included above may not fully capture workplace characteristics driving both work morale and attitudes towards taxing the rich. Lower job satisfaction can reduce an individual’s work morale and may be the result of antipathy against own superiors, whom individuals may equate with the “rich” or the “managers”. We also include fear of job loss, although perceived job security should already be at least partly covered by the dummies for part-time and marginally employed. Finally, we take into account self-reported laziness as well as a person’s degree of risk aversion, as shirking is still a risky behavior even under the high job protection levels in Germany. Remarkably, none of these additional “soft”, or subjective, variables show a significant association with absenteeism, and the fairness gap remains the same.

In sum, the gap associated with differing perceptions of tax fairness appears very robust to the specification chosen and hardly changes at all after the inclusion of health and personal characteristics. The main message of these estimates is that the connection between tax fairness beliefs and absenteeism, described in section 2, does not seem to be an artefact of failing to control for these observable characteristics.

The fact that the dependent variable can only take on non-negative integer values means that OLS is not the preferred method of estimation and count-data methods are a better fit. This is why table 4 presents results from a Poisson model, a Negative Binomial (Negbin II) model, and a two-step Negative Binomial Quasi Maximum Likelihood Estimator (QMLE). While the first two of these models are fairly standard count-data models, the third was proposed by Wooldridge (2002) and has desirable robustness properties. The QMLE estimator is a fully robust estimator in the sense that it does not rely on the distributional assumption and the variance assumption of the Negbin II model. Only the conditional mean assumption is needed for consistency.<sup>16</sup> In the Poisson model shown in column (1) all control variables have significant coefficients. However, due to overdispersion in the dependent variable – which can be seen from the estimate of  $\eta^2$  in the two other models – the standard errors produced by the Poisson model systematically

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<sup>16</sup>See Wooldridge (2002) for details.

TABLE 3: OLS, DEPENDENT VARIABLE DAYS ABSENT.

	(1)	(2)	(3)	(4)	(5)	(6)
managers taxed too little	2.915*** (0.394)	2.013*** (0.372)	1.171*** (0.409)	1.277*** (0.436)	1.357*** (0.453)	1.541*** (0.447)
health score		-3.392*** (0.413)	-3.382*** (0.453)	-3.283*** (0.470)	-3.473*** (0.490)	-3.317*** (0.486)
health satisfaction		-.8846*** (0.186)	-.9287*** (0.201)	-.9905*** (0.208)	-.9619*** (0.215)	-1.051*** (0.238)
<b>Personal characteristics</b>						
gross income			.0439 (0.109)	-.0871 (0.124)	-.2121 (0.132)	-.1621 (0.130)
age			-.3146** (0.140)	-.3523 (0.228)	-.4602* (0.250)	-.2535 (0.238)
agesq			.0037** (0.002)	.0047 (0.003)	.0062* (0.003)	.0032 (0.003)
male			-.7615 (0.511)	-.99 (0.630)	-1.19* (0.662)	-.7492 (0.642)
children			-1.165** (0.461)	-.6608 (0.508)	-.5138 (0.533)	-.5237 (0.537)
foreign			1.799 (1.269)	1.983 (1.321)	1.913 (1.392)	.8479 (1.198)
schooling			-.3972*** (0.083)	-.3582*** (0.134)	-.3166** (0.138)	-.3312*** (0.125)
<b>Job related variables</b>						
tenure			.2354*** (0.082)	.2179*** (0.084)	.2179*** (0.084)	.1966** (0.084)
tenure sq			-.0067*** (0.002)	-.0068*** (0.002)	-.0068*** (0.002)	-.0062*** (0.002)
full time experience			-.1406 (0.137)	-.1693 (0.142)	-.1693 (0.142)	-.1914 (0.135)
full time experience sq			.0029 (0.003)	.0029 (0.003)	.0032 (0.003)	.0049 (0.003)
part time experience			.0848 (0.161)	.0848 (0.161)	.054 (0.165)	.0822 (0.139)
part time experience sq			-.0054 (0.004)	-.0054 (0.004)	-.0049 (0.004)	-.004 (0.004)
part time <sup>(a)</sup>			-1.694* (0.965)	-1.449 (1.032)	-1.449 (1.032)	-1.407 (1.015)
marginally employed			-6.492*** (1.167)	-6.459*** (1.201)	-6.459*** (1.201)	-6.31*** (1.223)
<b>Firm level variables</b>						
20<=employees<200 <sup>(b)</sup>			1.546** (0.699)	1.546** (0.699)	1.546** (0.699)	1.579** (0.714)
200<=employees<2000			3.696*** (0.808)	3.696*** (0.808)	3.696*** (0.808)	3.224*** (0.796)
employees>=2000			3.079*** (0.708)	3.079*** (0.708)	3.079*** (0.708)	2.849*** (0.712)
agriculture <sup>(c)</sup>			-3.385** (1.530)	-3.385** (1.530)	-3.385** (1.530)	-3.224** (1.521)
mining/energy			4.606 (2.865)	4.606 (2.865)	4.606 (2.865)	5.25* (2.967)
processing			-.4616 (0.924)	-.4616 (0.924)	-.4616 (0.924)	-.0545 (0.900)
traffic/media			.8531 (1.079)	.8531 (1.079)	.8531 (1.079)	.7244 (1.033)
construction			1.819 (1.565)	1.819 (1.565)	1.819 (1.565)	2.045 (1.610)
wholesale			1.368 (1.075)	1.368 (1.075)	1.368 (1.075)	1.641 (1.087)
services			-.473 (0.762)	-.473 (0.762)	-.473 (0.762)	-.3028 (0.743)
banking/insurance			-.1163 (0.945)	-.1163 (0.945)	-.1163 (0.945)	-.3499 (0.946)
public sector			.2814 (0.803)	.2814 (0.803)	.2814 (0.803)	.6824 (0.752)
<b>Personal attitudes</b>						
afraid to lose job						-.0953 (0.507)
satisfied w/ job						.0476 (0.172)
lazy						-.102 (0.157)
risk taker						.0538 (0.124)
constant	5.425 (0.270)	24.44 (1.519)	37.34 (3.421)	36.99 (4.814)	37.46 (5.301)	33.54 (5.307)
16 region dummies	No	No	No	Yes	Yes	Yes
9 occupation dummies	No	No	No	Yes	Yes	Yes
log-Likelihood			-2.4e+04	-2.4e+04	-2.2e+04	-2.1e+04
R <sup>2</sup>	0.01	0.057	0.071	0.080	0.088	0.088
N	7327	7304	5773	5535	5217	5060

Note: Standard errors in parentheses allow for clustering at the household level. Reference categories are: (a) full-time for 'job status', (b) less than 20 employees for 'firm size', (c) manufacturing for 'sectoral dummies'. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

underestimate the true standard errors. Inference should therefore be based on the Negative Binomial and QMLE models.<sup>17</sup> Coefficients must be interpreted as in a log-linear regression, and the preferred QMLE model estimates the difference in absenteeism at 26 log points (corresponding to an effect of 30%), which translates to roughly 2 days of absenteeism – somewhat more than the OLS estimates in column (6) of the previous table suggested. This again emphasizes the very robust nature of the fairness spillover and establishes that individuals who perceive manager taxation to be unfair have a much higher level of absenteeism, even after conditioning on a vast array of possible confounders.

TABLE 4: COUNT DATA METHODS.

	(Poisson)	(Negative Binomial)	(2-step NegBin QMLE)
managers taxed too little	.2262*** (0.013)	.2575*** (0.064)	.2558*** (0.061)
health score	-.4058*** (0.009)	-.3562*** (0.049)	-.3566*** (0.047)
health satisfaction	-.1116*** (0.004)	-.1067*** (0.022)	-.1067*** (0.022)
<i>Personal characteristics</i>			
gross income	-.0502*** (0.006)	-.0527** (0.025)	-.0524** (0.023)
age	-.0316*** (0.005)	-.0433 (0.031)	-.043 (0.028)
agesq	4.2e-04*** (0.000)	4.4e-04 (0.000)	4.4e-04 (0.000)
male	-.0772*** (0.014)	-.0882 (0.076)	-.089 (0.070)
children	-.0834*** (0.012)	-.0766 (0.065)	-.0769 (0.061)
foreign	.0927*** (0.022)	.0244 (0.125)	.0257 (0.107)
schooling	-.0524*** (0.003)	-.0357** (0.015)	-.0361** (0.015)
<i>Job related variables</i>			
tenure	.0257*** (0.002)	.0191* (0.010)	.0192* (0.010)
tenure sq	-7.8e-04*** (0.000)	-5.9e-04** (0.000)	-6.0e-04** (0.000)
full time experience	-.02*** (0.003)	-.013 (0.015)	-.0132 (0.015)
full time experience sq	4.7e-04*** (0.000)	4.4e-04 (0.000)	4.4e-04 (0.000)
part time experience	.007** (0.003)	-.008 (0.018)	-.0077 (0.017)
part time experience sq	-4.7e-04*** (0.000)	2.6e-04 (0.001)	2.3e-04 (0.001)
part time <sup>(a)</sup>	-.1634*** (0.020)	-.178* (0.103)	-.1785* (0.099)
marginally employed	-1.195*** (0.050)	-.9221*** (0.182)	-.9255*** (0.231)
<i>Firm level variables</i>			
20<employees<200 <sup>(b)</sup>	.2614*** (0.017)	.3001*** (0.082)	.2994*** (0.084)
200<=employees<2000	.4618*** (0.018)	.4746*** (0.090)	.4742*** (0.087)
employees>2000	.4096*** (0.018)	.411*** (0.091)	.4114*** (0.087)
agriculture <sup>(c)</sup>	-.5878*** (0.063)	-.3999 (0.278)	-.3995 (0.288)
mining/energy	.6023*** (0.037)	.6524*** (0.242)	.6521*** (0.245)
processing	.0055 (0.026)	.1097 (0.137)	.1074 (0.125)
traffic/media	.0724*** (0.024)	.2004 (0.131)	.1983 (0.128)
construction	.2495*** (0.026)	.1472 (0.143)	.1479 (0.156)
wholesale	.2196*** (0.020)	.2161** (0.109)	.2152* (0.112)
services	-.1115*** (0.022)	-.0843 (0.105)	-.084 (0.099)
banking/insurance	.0606** (0.027)	.0298 (0.140)	.031 (0.118)
public sector	.0815*** (0.018)	.2036** (0.096)	.2018** (0.092)
<i>Personal attitudes</i>			
afraid to lose job	.0041 (0.012)	-.0196 (0.063)	-.0187 (0.059)
satisfied w/ job	.0064** (0.003)	-.0171 (0.016)	-.0165 (0.016)
lazy	-.0038 (0.004)	-.0024 (0.019)	-.0023 (0.019)
risk taker	.0155*** (0.002)	.0118 (0.013)	.0121 (0.014)
constant	4.933*** (0.119)	5.166*** (0.657)	5.157*** (0.588)
16 region dummies	Yes	Yes	Yes
9 occupation dummies	Yes	Yes	Yes
$\eta^2$		3.48 (0.09)	2.52 (0.13)
log likelihood	-4.3e+04	-1.3e+04	-1.3e+04
N	5060	5060	5060

Note: The dependent variable is the number of days absent due to illness. Reference categories are: (a) full-time for 'job status', (b) less than 20 employees for 'firm size', (c) Manufacturing for 'sectoral dummies'. Column (1): standard Poisson regression. Column (2): Negative Binomial regression. Column (3) is a negative binomial two-step quasi-maximum likelihood estimator (QMLE) implying fully robust standard errors. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

<sup>17</sup>That a Negative Binomial model gives a better fit to our data than a Poisson model is also illustrated in Figure 1 in the appendix, which plots the predicted distributions from both models alongside with the observed distribution of absenteeism.

## 4 Discussion

So far, we have observed a quite robust and stable association between perceived unfairness in taxing the rich and absenteeism. We have interpreted this finding as evidence that fairness spillovers are relevant in economic contexts, and non-negligibly so. In this section we discuss to what extent the presented connection may be explained by mechanisms other than the hypothesized fairness spillovers. Several objections can be rejected on plausibility grounds, and we also provide Rosenbaum-type sensitivity tests, showing that in order to annihilate our main result, any remaining omitted factors would have to exhibit implausibly strong associations with absenteeism and fairness beliefs.

### 4.1 'Selfish' explanations

A reasonable objection to the spillover mechanism we have proposed would be that the link between beliefs on manager taxation and work morale can be a result of individuals pursuing standard selfish preferences. This would render the label 'fairness spillovers' inappropriate, since the underlying mechanism would be independent of agents' fairness perceptions. The plausibility checks presented in table 5 help us shed some light on this issue. Only the coefficient of manager taxation and regressors in excess of the full QMLE specification from table 4 are shown in this table – column (1) reproduces the coefficient from this full specification as a reference point.

Assume that a belief that managers pay too little in taxes is positively related to one's own tax burden. Then, the coefficient on manager taxation may be confounded with the following standard neoclassical mechanism: a higher tax rate reduces an individual's net income or, equivalently, the expected loss from being detected, which calls for higher levels of shirking. We calculate an individual's average tax rate by taking the difference between reported gross income and net income and divide it by gross income. When including this variable in column (2), the coefficient of the tax unfairness indicator remains virtually unaltered. In a similar vein, the belief that those in charge pay too little in taxes could be just another way of expressing frustration about one's own career opportunities. In that case the hypothesized fairness spillover boils down to the notion that expecting low returns to effort is detrimental to work incentives – a rather selfish argument, too. Column (3) adds a variable measuring the self-evaluated opportunities of rising up within the firm hierarchy. As expected, a perceived lower chance of advancing in the ranks of the company is associated with a higher number of days absent. However, the coefficient on manager taxation remains very similar to the reference specification in column (1). Expectations of low returns from effort may also arise when one thinks that hard work generally does not pay in life, e.g. when one believes that success is matter of luck. In the GSOEP, respondents

were asked the question 'What a person achieves in life is above all a question of fate or luck'. We use an indicator taking on the value 1 if the respondent chose at least value (5) on a (7)-point scale ('disagree' (0) – 'agree' (7)). This regressor is added in column (4) and its coefficient is statistically significant with the expected positive sign.<sup>18</sup> Again, the fact that the coefficient of the tax unfairness indicator does not change allows us to counter the objection that we are just measuring a response to the belief that spending effort at work is fruitless. Finally, we reconsider the redistribution argument from section 3.1: Perhaps those who are sick often become aware that they are net beneficiaries of the social security system, creating a very self-interested motive to favor higher levels of redistribution. To the extent that income and risk aversion don't already pick up this redistributive motive, in column (5) we add a control for the respondent's position within the political spectrum. Lower values indicate a leftist stance, which can be assumed to go with a high preference for redistribution, yet such political inclinations do not seem to be correlated with absenteeism.

## 4.2 'Complainers' and general pessimism

Another objection is the idea that believing in an unjust world – and the belief the rich don't pay their fair share may just be a special instance of this wider view – can go with a general pessimism or complainer attitude which in turn may be correlated with lower intrinsic work motivation. In this case, the presented results would not be a manifestation of 'fairness spillovers' but should rather be interpreted as evidence for 'emotional spillovers', if any (which would be interesting on its own since evidence for the relevance of the frustration-aggression hypothesis in economic contexts are scarce). Column (6) in table 5 adds a variable which indicates whether the respondent is 'pessimistic about the future'. From the coefficient, it seems that such a disposition is unrelated to absenteeism and tax fairness. Other individuals may loosely be termed 'complainers' – these are people who lament about everything. To the extent that such attitudes are not fully captured in the 'pessimist' control variable, they can still bias our estimates. As a further robustness check we therefore use a GSOEP question on general life satisfaction. The question reads: "How satisfied are you with your life, all things considered? [scale 0-10]". The results after including this additional regressor are shown in column (7), where the coefficient on manager taxation remains stable and precise.

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<sup>18</sup>This is interesting in its own right. Alesina and Angeletos (2005) introduce the disutility stemming from the perception that luck determines income in an additive-separable manner, and hence, as having no behavioral affects. However, our results can also be seen as evidence for justifying incentive shaping variants.

TABLE 5: ROBUSTNESS CHECKS.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
managers taxed too little	.2558*** (0.061)	.241*** (0.061)	.2628*** (0.060)	.2532*** (0.061)	.2572*** (0.061)	.2532*** (0.061)	.2534*** (0.061)	.2566*** (0.061)	.1783** (0.073)	.2463*** (0.062)	.1705** (0.075)	.2259*** (0.072)
effective average tax rate		-.1152 (0.292)								-.1298 (0.297)	-.3533 (0.365)	
unfavorable job prospects			.0841** (0.041)							.0857** (0.042)	.1499*** (0.049)	
achievements determined by luck				.1442** (0.063)						.1687*** (0.063)	.0565 (0.079)	
leftist/right					-.0067 (0.016)					-.0033 (0.016)	-.0264 (0.018)	
pessimist						-.0014 (0.062)				-.0233 (0.063)	-.0955 (0.076)	
life satisfaction							-.0087 (0.021)			-.0007 (0.022)	.0181 (0.025)	
own income unfair								-.0042 (0.059)		-.0123 (0.059)	.0097 (0.070)	
manager income unfair									.1936** (0.077)		.1798** (0.078)	
59 controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	5060	4983	5043	5049	5048	5056	4978	5045	3391	4854	3258	3391

Note: All estimations are two-step quasi-maximum likelihood estimators (QMLE) implying fully robust standard errors. The dependent variable is the number of days absent due to illness and various additional controls are added to the full specification in the count data models. Column (1) shows the reference coefficient from table 4. Column (2) adds the respondent's effective average tax rate, column (3) adds a variable that measures future job prospects from 1 (good) to 4 (bad), column (4) adds an indicator for whether the respondent believes that achievement in life is mostly determined by luck, column (5) adds a variable that measures the respondent's position within the political spectrum (lower values indicate a leftist stance), column (6) includes an indicator for whether the respondent is pessimistic about the future, column (7) adds a variable that measures how satisfied the respondent is with life overall (higher values indicate higher satisfaction levels), column (8) adds an indicator for whether the individual perceives his own income to be unfair, column (9) adds an indicator for whether the individual perceives managers' incomes to be unfair, due to the varying sample sizes columns (10) and (11) include the additional variables to varying degrees. Because the inclusion of the 'managers' income' question significantly reduces the sample size, column (9) cannot be compared to column (1). To allow for a comparison, we add reference column (12), which shows the reference coefficient when the specification from column (1) is estimated on this smaller sample from column (9). \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .



TABLE 6: DIRECT RECIPROCITY. SAMPLE SPLIT BY FIRM SIZE.

	(< 20)	(20 – 199)	(200 – 1999)	(≥ 2000)
managers taxed too little	.3211** (0.139)	.3116*** (0.109)	.3019*** (0.109)	.0663 (0.095)
<i>N</i>	1043	1537	1156	1324

*Note:* The full sample is split by firm size as measured by the number of employees. All estimations are two-step quasi-maximum likelihood (QMLE) implying fully robust standard errors. The dependent variable is 'number of days absent'. All regressions include the same control variables as model (6) of table 3. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

### 4.3 Direct reciprocity

There is also some concern that the statement 'managers of large companies don't pay enough taxes' may be an expression of a negative attitude individuals may have towards managers at their own workplace and that makes them want to 'get even'. Recall that the survey question asked about the fairness of taxes for managers 'on the board of directors of a large company', i.e. CEOs. Only a minor fraction of people work for large companies that actually have CEOs. Consequently, if the fairness beliefs about manager taxes were merely driven by dissatisfaction with CEOs, we would expect only a small fraction of workers to believe that managers 'on the board of directors of a large company' pay too little in taxes. However, more than two thirds of the employees in our sample believe that managers contribute too little. In the same vein, if our effect were largely driven by direct reciprocity, we would expect it to be bigger in large companies, which are more likely to have CEOs. However, splitting up the sample by firm size, we find the exact opposite. The coefficient is quite strong for the smaller companies, while it is much smaller and insignificant for the largest companies (see table 6).

An objection to our argument could be that respondents might equate 'CEO' with their own employer, regardless of the size of their company. If this were the case, then showing that the effect is strong for employees in small companies is not enough to rule out direct reciprocity. However, there are more reasons why directly reciprocal behavior is unlikely to be the driving force behind our results: Above all, we do already control for job satisfaction which should net out many negative job aspects that could trigger reciprocal actions against the own employer. We also rule out that feelings of being underpaid may trigger reciprocal actions against the employer by including a variable which inquired "Is the income that you earn at your current job just, from your point of view? [Yes/No]" in column (8) of table 5. While it is surprising that the coefficient is insignificant, the main message is that the mechanism we label a spillover is not merely directly reciprocal in the sense of being a reaction to employers offering unfair wages.

In the end, we find little evidence that direct reciprocal behavior is the main driving force behind our results and therefore stick with the fairness spillover interpretation.

## 4.4 Tax versus income fairness

The aim of this paper is to provide evidence that a perception of norm-deviant behavior can have consequences for other contexts and make individuals feel less obliged to show compliant behavior there. While we focus on the perceived fairness of manager taxation, the GSOEP also asked its participants "How high on average is the monthly net income of a manager on the board of directors of a large company? Would you say that this income has a just relation to the job demands? [Yes/No]". If this belief can be shown to matter for shirking, then this can be seen as a fairness spillover, too, in the sense that abstract beliefs about how incomes are distributed within a society matter for micro-economic behavior. As can be seen in column (9), the perception of manager incomes as unfair is also associated with a higher number of days absent, yet the coefficient on manager taxation still suggests a roughly 20% higher level of absenteeism for those who believe the tax system to be unfair. The coefficient is not as precisely estimated as before, yet still significant at the 5% level. The imprecision stems in part from a drop in the number of observations by roughly one third. This is due to the fact that the manager income questions were only asked if respondents could exactly specify how much they think managers earn. Due to the differing samples, the coefficient on manager taxation should not be compared to the benchmark in column (1). Rather, in column (12) we show a benchmark coefficient from a QMLE estimation of the specification shown in column (1), estimated on the restricted sample that results from the non-responses to the 'manager income fairness' question. This coefficient in column (12) is 0.22, and so the drop to 0.18 in column (9) suggests that 78% of the original spillover remain, even when including another potential spillover.

The fact that tax and income fairness perceptions simultaneously bear a significant coefficient is interesting beyond the idea of fairness spillovers in economics. It allows us to contribute to the debate whether the tax fairness has any significance apart from other normative concepts such as income justice or the principle of efficiency.<sup>19</sup> Our results suggest that, while tax fairness and income fairness may well have some overlap, they seem to be distinct concepts, each of which is associated with behavior at work. What is more, our results suggest that irrespective of the philosophical question of how these fairness concepts relate to the concept of overall economic efficiency, both concepts may be related to specific individual productivity losses: beliefs that these concepts are violated

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<sup>19</sup>A discussion of the principles of just taxation is found in many textbooks of public finance. For example, in what could be called the epitome of public economics textbooks, Musgrave (1959) devotes two entire chapters to tax equity issues. An example that illustrates how dedicated these discussions can be is the so called Musgrave/Kaplow Exchange. Starting in one, then continued in another journal, Musgrave and Kaplow debated over four years on whether the concept of horizontal tax equity has any normative significance aside from vertical tax equity and on how these equity concepts relate to the goal of efficiency. (The Musgrave/Kaplow Exchange refers to Kaplow, 1989, Musgrave, 1990, Kaplow, 1992 and Musgrave 1993.)

are associated with higher levels of worker absenteeism.

## 4.5 Sensitivity Test: Simulated confounder

Columns (10) and (11) of table 5 show results when in addition to 59 base specification controls, we add all the variables from the robustness checks at the same time. This leaves the coefficient on manager taxation unaltered, yet one might worry that there still remain endogeneity issues due to omitted variables. We therefore conduct a robustness check based on a simulated confounder in the spirit of Rosenbaum and Rubin (1983). The idea is to simulate a confounder that is correlated with absenteeism and with fairness beliefs about manager taxes, and to check the sensitivity of the results to various strengths of that simulated confounder. Rosenbaum and Rubin (1983) developed this method for the case of a binary outcome, a categorical regressor, and a binary simulated confounder. In order to use this method for a multi-valued outcome, we follow the suggestion of Nannicini (2007) of transforming the outcome variable into a dummy variable for the purpose of the simulation of the confounder. Let  $Y$  denote a binary variable indicating whether absenteeism is above the mean ( $Y = 1$ ) or below the mean ( $Y = 0$ ), and let  $T$  denote our binary regressor of beliefs about manager taxes. The simulated confounder is a binary variable  $U$  that has a joint distribution with  $T$  and  $Y$  which can be described by the four parameters:  $p_{00} = P(U = 1|T = 0, Y = 0)$ ,  $p_{10} = P(U = 1|T = 1, Y = 0)$ ,  $p_{01} = P(U = 1|T = 0, Y = 1)$  and  $p_{11} = P(U = 1|T = 1, Y = 1)$ . Nannicini (2007) and Ichino et al. (2008) show that the strength of the correlation of the confounder with  $Y$  and  $T$  depends on the parameters  $d = p_{01} - p_{00}$  and  $s = p_{11} - p_{10}$ , with  $p_{1\cdot} = P(U = 1|T = 1)$  and  $p_{0\cdot} = P(U = 1|T = 0)$ . As suggested by Nannicini (2007) we simulate the confounder for different combinations of  $d$  and  $s$ , holding the unconditional probability  $P(U)$  and the difference  $d' = p_{11} - p_{10}$  constant at predefined values. We then include it into the full specification shown in column (6) in table 3.<sup>20</sup>

Table 7 shows that even after including very strong confounders we still find a significant fairness spillover. The borderline case is the entry for  $s = 0.3$  and  $d = 0.5$  in the table. Here, we still find a positive effect of unfairness beliefs on absenteeism of 0.84 days. In this case the confounder has a partial effect on the probability of having above-average absenteeism of 34 percentage points, and on unfairness beliefs about manager taxes of 24 percentage points. To put this extremely strong confounder into perspective: the 'health

<sup>20</sup>Our procedure is based on the Stata module `sensatt` by Nannicini (2007). The difference is that we do not introduce the simulated confounder into a matching estimator, but into a linear OLS regression. We also present our results in a slightly different way than Nannicini (2007) or Rosenbaum and Rubin (1983). We express the strength of the correlation of the simulated confounder with the outcome and the regressor not in terms of log odds ratios but in terms of partial effects. As values for the parameters  $P(U)$  and  $d'$  we chose 0.6 and 0.05. These values maximised the range of  $d$  and  $s$  yielding parameters  $p_{00}$ ,  $p_{01}$ ,  $p_{10}$  and  $p_{11}$  that were meaningful (i.e., bounded between 0 and 1).

TABLE 7: SENSITIVITY CHECKS.

		d = 0.1	d = 0.2	d = 0.3	d = 0.4	d = 0.5	d = 0.6
s = 0.1	$\beta$	1.45***	1.41***	1.39***	1.37***	1.33***	1.31***
	s.e.	0.45	0.45	0.45	0.45	0.45	0.45
	$\delta_A$	0.07	0.13	0.19	0.25	0.31	0.36
	$\delta_M$	0.08	0.08	0.08	0.07	0.07	0.07
s = 0.2	$\beta$	1.35***	1.28***	1.23***	1.16**	1.09**	1.03**
	s.e.	0.46	0.47	0.47	0.47	0.48	0.47
	$\delta_A$	0.06	0.13	0.19	0.26	0.32	0.38
	$\delta_M$	0.16	0.16	0.16	0.16	0.16	0.16
s = 0.3	$\beta$	1.23**	1.16**	1.05**	0.93*	0.84*	0.75
	s.e.	0.50	0.50	0.50	0.50	0.50	0.50
	$\delta_A$	0.07	0.13	0.20	0.27	0.34	0.41
	$\delta_M$	0.25	0.24	0.24	0.24	0.24	0.24
s = 0.4	$\beta$	1.07**	0.97*	0.82	0.68	0.56	0.38
	s.e.	0.53	0.54	0.54	0.55	0.55	0.55
	$\delta_A$	0.07	0.15	0.22	0.30	0.38	0.45
	$\delta_M$	0.32	0.32	0.33	0.32	0.32	0.32

*Note:* The table shows the results of sensitivity checks in which a simulated confounder has been added to the baseline regression model (6) of table 3. The strength of the confounder rises with the parameters  $d$  and  $s$  (see text for details). In the table, the rows labeled  $\beta$  show the estimated effects of beliefs about manager taxes on absenteeism after the confounder has been introduced into the regression. The rows labeled 's.e.' show the associated standard errors.  $\delta_A$  denotes the partial effect of the confounder on the probability of having above-average absenteeism,  $\delta_M$  denotes its partial effect on fairness beliefs about manager taxes. With rising  $\delta_A$  and  $\delta_M$  the confounder becomes stronger and it is to be expected that the estimated effect becomes weaker. For each combination of  $d$  and  $s$  we implemented 100 repetitions of the simulation. The standard errors are computed as an average of the within-imputation variance and the between-imputation variance, see Nannicini (2007, eq. 11). \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

score' variable has to increase from 1 (its lowest value) to 5 (its highest value) in order to generate the same effect on the probability of having above-average absenteeism, and the health satisfaction variable does not even generate this effect when it moves from 0 (its lowest value) to 10 (its highest value). When it comes to the effect of the confounder on beliefs about manager taxation (24 percentage points), consider again the descriptive results from table 1: There, the largest observed difference between the proportion of people saying that managers pay too little in taxes was that between individuals with a 'low' and a 'high' hierarchy in their occupation, and that difference was roughly 20 percentage points, hence less than the effect of our confounder on fairness beliefs about manager taxes. We conclude from this exercise that if our result was purely due to an omitted variable this omitted variable would need to have an effect on absenteeism as strong as a move from poor health to excellent health, and it would at the same time need to generate variation in beliefs about manager taxation larger than the differences between low-hierarchy and high-hierarchy workers. Given our broad range of included control variables, we find it hard to think of any omitted variable that could drive our results to such an important extent.

## 5 Conclusion

What are the behavioral correlates of perceived unfairness in taxation? It has been proposed that people who believe the tax system to be unfair tend to withhold their

contributions to the tax system, i.e. to cheat on taxes. Building on the argument that opportunities for evading taxes are rather slim for most individuals, we go one step further and ask whether people may then try and find alternative ways of adjustment – specifically, we analyze whether people start to cheat at work when they feel that there is injustice in taxation. Using a large-scale German dataset, we find that this link between tax fairness beliefs and work morale is surprisingly strong. The belief that the top income earners don't pay their fair share in taxes is associated with at least an 17 percent increase in absenteeism. The results prove robust to adding standard labor market controls as well as a wide variety of individual attitudes that may affect absenteeism but that are not generally available in other data sets. In addition, Rosenbaum-type sensitivity tests provide evidence that any remaining omitted variable would have to exhibit implausibly strong associations with absenteeism and fairness beliefs in order to spuriously generate our results.

The main contribution of this paper is that it adds a new angle to the literature on fairness in economics. It is standardly assumed that people adjust to perceived unfairness in precisely the same area or relationship where the fairness violation is considered to have occurred, yet our results suggest that behavioral adjustments to perceived violations of what is considered to be a 'just' outcome may be rather indirect, i.e. the cue may elicit responses across spheres and across certain relationships. Our results indicate that these 'fairness spillovers' are relevant in a genuinely economic context, and may come with large economic costs. If we tentatively interpret the association as causal, the smallest coefficient we find (0.17) corresponds to a monetary cost of 5 billion euros per year in continued wage payments associated with the spillover.<sup>21</sup>

More narrowly, our results also raise new aspects concerning the welfare costs of taxation. Traditionally, welfare effects of taxation are assessed in terms of distorting monetary incentives. However, our analysis revealed that there are other channels through which tax policy may have an impact on economic behavior. People have beliefs about fairness in taxation, and it is these beliefs that may provide an incentive on their own. While neglecting these fairness-induced costs of taxation bears the risk of arriving at misleading policy recommendations, it is also important to realize that the implication of this research cannot simply be higher tax rates for managers or the wealthy in order to avoid this "extra" excess burden. First, it is unclear whether beliefs about fairness in taxation correspond to real tax burdens of the wealthy at all. Even if the fairness beliefs emerge from correct beliefs about the tax system, positive welfare effects at the bottom of the income distribution must be weighed against possibly negative welfare effects induced by behavioral responses to increased taxation at the upper end of the income distribution.

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<sup>21</sup> Assuming an 8-hour workday at the average gross hourly wage in 2005 of around 20 euros, and 26 million gainfully employed. Wage rate and number of employed obtained from the German Federal Statistical office.

In the end, this study can be considered as a pointer that quite likely there are hidden effects of taxation in areas that have not been considered thus far, and that these effects can be non-negligible in size.

Several questions are left for future research. It should be interesting to see whether our finding can be confirmed in other countries or whether this result is a German peculiarity. At least with respect to the willingness to comply with work norms, Germany does not seem to be a negative outlier in international comparisons (Hofstede, 1980), and so we don't expect our results to be upper bound estimates. Still, it would be interesting to see, whether in a country like the United States, where people believe in social mobility and in being in charge of their own destiny (Alesina and Angeletos, 2005), a link between perceived unfairness of taxation and work effort can be found, too. It should also be noted that we proposed just *one* type of fairness spillover that bears the potential of being relevant from an economic point of view. A general question is whether there are other such examples. Our robustness checks revealed that other beliefs about injustice in the world – such as the belief that income is determined by luck or that managers earn too much – may deter economic effort as well and hence should encourage research in that direction. Finally, it is reasonable to ask whether the recent financial crisis has aggravated the issue. Believing that the rich illegitimately generate high incomes and enjoy uncalled for tax privileges may have become even more prevalent during the financial crisis, and our suspicion is that the potential economic costs associated with fairness spillovers from taxation may then also have increased.

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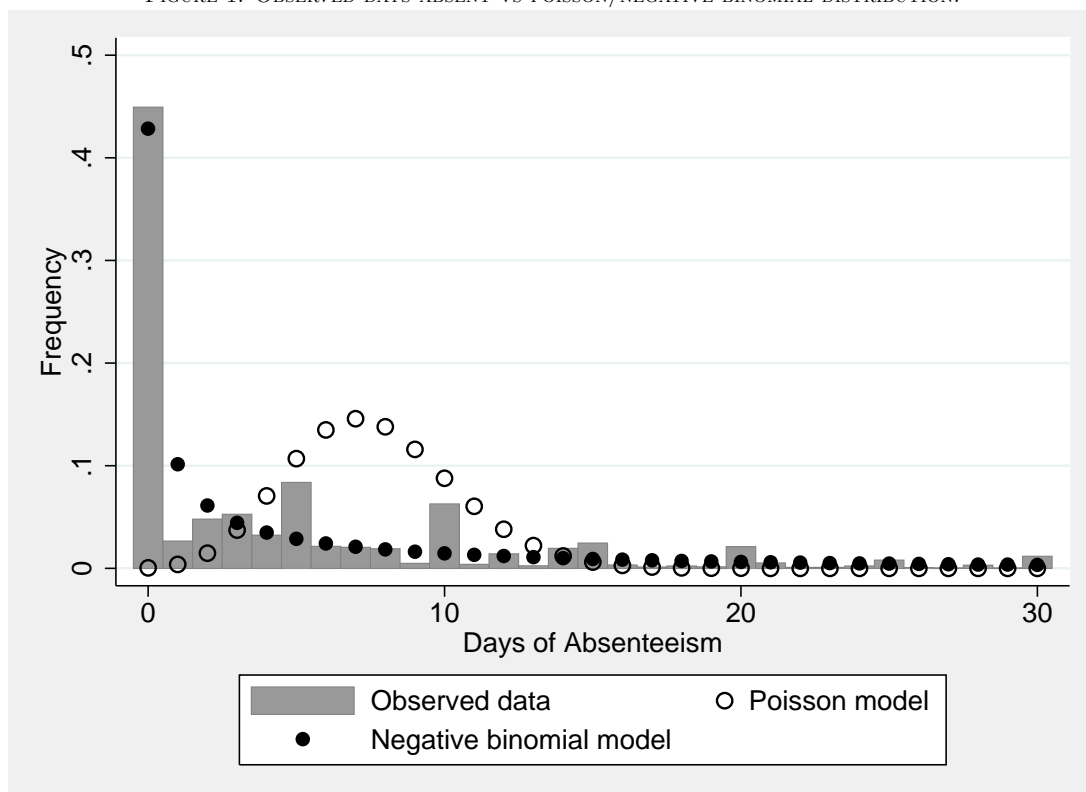
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## Appendix

FIGURE 1: OBSERVED DAYS ABSENT VS POISSON/NEGATIVE BINOMIAL DISTRIBUTION.



*Note:* The figure compares the observed distribution of the days of absenteeism with the distributions predicted from unconditional Poisson and Negative Binomial (Negbin II) count-data models. Due to overdispersion (mean 7.57, overdispersion parameter 4.09), the Negative Binomial model gives a better fit to the data than the Poisson model. To ensure an easier readability of the graph, it is truncated at 30 days of absenteeism (95th percentile). The 99th percentile of absenteeism is at 85 days of absenteeism, the maximum is 245 days. Number of observations  $N=5060$ .

TABLE 8: DESCRIPTION OF VARIABLES.

Variable	Description
<b>Main variables</b>	
absenteeism	number of days absent in the year of survey. Asked retrospectively in 2006.
managers taxed too little	indicator variable, takes on value 1 if respondent thinks managers are being taxed too little.
health score	'How would you describe your current health?'. Scale: 'Poor' (1) to 'Very good' (5).
health satisfaction	'How satisfied are you with your health?'. Scale: 'totally unhappy' (0) to 'totally happy' (10).
<b>Personal characteristics</b>	
gross income	gross monthly income in 1000 Euros.
age	age in years.
agesq	age in years squared.
male	indicator variable, 1 if male.
children	the number of children <16 years in the household.
foreign	indicator variable, 1 if non-German citizen.
schooling	years of schooling (includes tertiary education and vocational training).
<b>Job related variables</b>	
tenure	tenure with current employer.
tenure sq	tenure with current employer squared.
full time experience	years of full time experience.
full time experience sq	years of full time experience squared.
part time experience	years of part time experience.
part time experience sq	years of part time experience squared.
part time	indicator variable, 1 if currently part time employed.
marginally employed	indicator variable, 1 if currently marginally employed.
<b>Firm level variables</b>	
$20 \leq \text{employees} < 200$	indicator variable, 1 if number of employees at current employer $20 < \text{employees} < 200$ .
$200 \leq \text{employees} < 2000$	indicator variable, 1 if number of employees at current employer $200 \leq \text{employees} < 2000$ .
$\text{employees} \geq 2000$	indicator variable, 1 if number of employees at current employer $> 2000$ .
agriculture	indicator variable, 1 if employed in this sector.
mining/energy	indicator variable, 1 if employed in this sector.
processing	indicator variable, 1 if employed in this sector.
traffic/media	indicator variable, 1 if employed in this sector.
construction	indicator variable, 1 if employed in this sector.
wholesale	indicator variable, 1 if employed in this sector.
services	indicator variable, 1 if employed in this sector.
banking/insurance	indicator variable, 1 if employed in this sector.
public sector	indicator variable, 1 if employed in this sector.
<b>Personal attitudes</b>	
afraid to lose job	Indicator variable, 1 if individual is 'very concerned' or 'somewhat concerned' about job security.
satisfied w/ job	'How satisfied are you with your job?'. Scale: 'totally unhappy' (0) to 'totally happy' (10).
lazy	'I see myself as someone who tends to be lazy.' Scale: 'not at all' (1) to 'applies perfectly' (7).
risk taker	'Are you prepared to take risks?'. Scale: 'avoid risks' (0) to 'fully prepared' (10).
<b>Robustness checks</b>	
effective avg tax rate	$1 - (\text{net monthly income in Euros} / \text{gross monthly income in Euros})$ .
achievements determined by luck	indicator, 1 if respondent gave at least (5) on a (7)-point scale ('disagree' (0) – 'agree' (7)) to the question 'What a person achieves in life is above all a question of fate or luck'.
unfavorable job prospects	How likely is respondent to receive a promotion at current place of employment within next two years? Scale: 'certainly' (1) to 'certainly not' (4).
pessimist	indicator variable, 1 if individual states to be either 'pessimistic' or 'more pessimistic than optimistic' about the future.
life satisfaction	'How satisfied are you with your life' Scale: 'not at all' (0) to 'fully' (10).
leftist/right	'How would you rate your political views?' Scale: 'Far left' (0) to 'Far right' (10).
own income unfair	indicator variable, 1 if respondent thinks her/his own pay is unfair.
manager income unfair	indicator variable, 1 if respondent thinks manager pay is unfair.
<b>Other</b>	
region dummies	16 indicator variables for the German states.
occupation dummies	3 blue collar indicator variables: low, medium, high skilled, 3 white collar indicator variables: low, medium, high skilled, 3 public servant indicator variables: low, medium, high skilled.

TABLE 9: SUMMARY STATISTICS.

	<i>N</i>	Mean	Std. Dev.	Min	Max
<i>Main variables</i>					
absenteeism	5060	7.57	17.30	0	245
managers taxed too little	5060	0.72	0.45	0	1
health score	5060	3.55	0.82	1	5
health satisfaction	5060	7.01	1.90	0	10
<i>Personal characteristics</i>					
gross income	5060	2.78	1.83	0.25	35
age	5060	43.02	10.08	18	74
male	5060	0.56	0.50	0	1
children	5060	0.38	0.48	0	1
foreign	5060	0.05	0.23	0	1
schooling	5060	12.87	2.79	7	18
<i>Job related variables</i>					
tenure	5060	12.14	10.12	0	48.8
full time experience	5060	16.80	10.91	0	47
part time experience	5060	2.62	5.29	0	45
part time	5060	0.19	0.39	0	1
marginally employed	5060	0.03	0.17	0	1
<i>Firm level variables</i>					
employees<= 20	5060	0.21	0.40	0	1
20<employees< 200	5060	0.30	0.46	0	1
200<=employees<2000	5060	0.23	0.42	0	1
employees>2000	5060	0.26	0.44	0	1
agriculture	5060	0.01	0.10	0	1
mining/energy	5060	0.01	0.12	0	1
manufacturing	5060	0.21	0.41	0	1
processing	5060	0.05	0.22	0	1
traffic/media	5060	0.06	0.24	0	1
construction	5060	0.05	0.21	0	1
wholesale	5060	0.11	0.32	0	1
services	5060	0.13	0.34	0	1
banking/insurance	5060	0.05	0.23	0	1
public sector	5060	0.30	0.46	0	1
<i>Personal attitudes</i>					
afraid to lose job	5060	0.60	0.49	0	1
satisfied w/ job	5060	7.04	1.92	0	10
lazy	5060	2.20	1.45	1	7
risk taker	5060	4.85	2.14	0	10
<i>Robustness checks</i>					
effective avg tax rate	4983	0.33	0.12	-0.14	0.7
achievements determined by luck	5043	0.24	0.43	0	1
unfavorable job prospects	5049	3.41	0.67	1	4
pessimist	5048	0.26	0.44	0	1
life satisfaction	5056	7.19	1.61	0	10
leftist/right	4978	4.71	1.74	0	10
own income unfair	5045	0.33	0.47	0	1
manager income unfair	3391	0.75	0.43	0	1

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