Values, Incentives and Taxation

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Tobias König, December 2011

Abstract This thesis incorporates non-economic concepts like values and norms into public finance research. Perceived normative features of the tax system alone can affect economic behaviour. This, in turn, has repercussions for the design of optimal tax structures. Both theoretical and empirical aspects are analyzed.

Keywords: Taxation, incentive effects, social preferences.

Kurzzusammenfassung Diese Dissertation bezieht nicht-ökonomische Konzepte wie Werte und Normen in die finanzwissenschaftliche Forschung mit ein. Steuergerechtigkeitsvorstellungen können ökonomisches Verhalten beeinflussen. Dies wiederum hat Auswirkungen auf das Design von optimalen Steuerstrukturen. Es werden sowohl theoretische als auch empirische Aspekte analysiert.

Schlagwörter: Steuern, Anreizeffekte, soziale Präferenzen.

Contents

Chapter 1

Introduction

1.1   Motivation and summary of the results

Standard neoclassical theory assumes that individuals care about taxes only to the extent that their own material well-being is concerned. However, opinion data seem to tell a different story. For example, in a 2009 Economist poll on U.S. public opinion people were asked: "How angry do you get when thinking about tax breaks for the wealthy?". According to the neoclassical view, individuals should be unimpressed by the idea of what others pay in taxes, and consequently, should not show any emotion when thinking about tax code changes for other social groups. But this does not seem to be the case: in the poll, only one out of ten chose the neutral response option "Don't think about it", while the share of respondents answering with the extreme category "Very angry" was almost one-half (47.9%). In the same vein, psychologists report findings from free association studies that are puzzling from a neoclassical point of view: when asked about what comes spontaneously to their mind when hearing the word 'taxes', people raise concerns about the fairness of the distribution of tax burdens and other equity-related features of the tax system (see Kirchler, 2007; Taylor, 2003). E.g., in a 2002 Australian survey on tax attitudes, more than sixty percent of the probands use the word 'fair' or 'fairness' at least once when writing down their expectations of what the tax office should deliver to them (Rawlings, 2003).

This evidence suggests that people think about taxes in social categories, including notions of fairness, legitimacy and envy. But then, existing public finance frameworks of taxation need to be amended. This is what is done in this thesis. Two types of

non-standard preferences are taken into account: concerns for tax fairness and post-materialist value orientations. It is shown that incorporating these preferences into tax models considerably affects standard results and policy recommendations. Further, it is argued that studying values and norms is not just a theoretical exercise for behavioral public finance, but that psychological constructs economically matter: tax fairness perceptions are empirically related to work morale, and differences in cross-country culture go along with huge difference in international tax systems.

This thesis comprises six further chapters. The second chapter introduces tax equity concerns into a standard model for small open economies where capital is perfectly mobile, but labor supplied inelastically. Preferences for tax equity are modeled by assuming that differences in capital and labor tax rates negatively impact on well being via both a direct change in utility and by increasing disutility of labor, thus lowering work incentives. It is shown that even the slightest concern for tax equity invalidates the standard result that capital should remain tax-exempt. The reason is that government now trades off costly capital taxation against the positive welfare effect from satisfying the preference for equity. A comparative static analysis reveals the intuitive results that a stronger preference for tax equity raises the capital tax rate and reduces the distance between both tax rates. Surprisingly, however, a stronger equity concern may also result in a higher labor tax rate. The reason is that equity concerns may push the economy on the decreasing part of the partial Laffer curve for the capital tax rate – a situation that would never occur as optimal within a standard framework of taxation. Then, the revenue-dampening effect of a higher capital tax rate needs to be offset by higher labor taxation in order to satisfy the public expenditure requirement. Similar results hold for endogenous government spending. Moreover, in this case, it is shown that a stronger concern for tax equity, though it forces the government to make stronger use of an inefficient instrument to collect tax revenues, does not necessarily erode the size of the public sector.

The third chapter may be viewed as a test of the preferences assumed in Chapter 2: it analyzes empirically whether perceived inequity in taxation negatively impacts on work effort, using large-scale German survey data. Work effort is captured by the number of days an individual is absent from work due to illness, which is more or less a discretionary choice in the German health insurance system. This measure is

regressed on the belief that the rich pay less than their fair share of taxes. A surprising strong connection is revealed: 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, even after conditioning on a rich set of personal characteristics including health, income and other personal characteristics. This result is robust to different estimations methods. To address issues of unobserved heterogeneity, the research design implements Rosenbaum-type sensitivity tests. They reveal that any remaining omitted variable would need to have implausibly strong associations with absenteeism and perceived fairness in order to spuriously generate our results, suggesting that the presented association is not a statistical artifact.

Besides supporting chapter 2, chapter 3 also raises interesting aspects concerning the welfare costs of taxation. Standard economic theory explains that taxation imposes deadweight losses by distorting incentives. But if perceptions over tax rates can induce behavioral changes either, then the excess burden of taxation might be quite different from what is usually assumed. Second, and at a more general level, the regression results contribute to a growing literature on the role of fairness in economics. While experiments on conditional cooperation or reciprocity assume that individuals react only in the same area or against the same person, our results provide evidence that the behavioral adjustments to unfairness can be quite far-reaching, pointing to the possibility of 'fairness spillovers'.

Chapter 4 further elaborates on the real-world consequences of tax fairness perceptions. It tests whether the strong connection revealed in chapter 3 is also found for another concern often put forward in the public, namely that the 'working poor' are overtaxed. Interestingly, the belief that unskilled workers pay too much in taxes hardly triggers any changes in absenteeism rates, except with people in the lowest income quintile. In contrast, the view that there is tax unfairness at the top of the income scale is shown to be negatively associated with work morale throughout the social spectrum, and even among the rich themselves. This behavioral asymmetry is difficult to reconcile with existing fairness theories, but suggests that a distinction between upward and downward unfairness is informative when addressing the behavioral potential of tax equity concerns.

Chapter 5 extends chapter 3 in a different direction: it examines whether cognitive

dissonance may economically matter when individuals suspect pay differentials. It addresses one of the most hotly discussed and debated topics during financial crisis (and still today), namely that CEO compensation is going out of hand. It is shown that the belief that CEOs earn too much is associated with a similar increase in sickness leave as the belief that the rich are undertaxed, suggesting that verbal protests against bonus payments are only the tip of an iceberg and may come at a huge, though hidden economic cost.

Chapters 6 to 7 set aside people's fairness considerations, though the focus is still on how value orientations shape economic incentives, and how this is reflected in the tax setting behavior of governments. The chapters study postmaterialism. The reason why we propose this value concept (which is widely used in the political science literature to understand democratic processes) in an economic tax analysis is as follows. The degree of postmaterialism measures the importance which individuals give to immaterial goods over material possessions. Individuals who are less impressed by material goods (have a high tendency towards postmaterialist life goals) are arguably less sensitive to their income being taxed away. But then, optimal tax theory would suggest that these people should be taxed at higher levels (compared to materialists).

Chapter 6 formalizes this intuition within a standard model for open economies with mobile capital and elastically supplied labor. Postmateralism is introduced via a preference parameter controlling the priority individuals give to material over nonmaterial consumption (which we take to be complementary to leisure). It is shown that as the degree of postmaterialism increases, governments have incentives to shift tax burden from capital to labor as the wage elasticity decreases (firms and their decision where to allocate capital is assumed of not being affected by postmaterialist tendencies; they just maximize after tax profits).

In a second step, this theoretical result is tested empirically, using a panel data set comprising 17 OECD countries over the period from 1981 to 2001. The analysis employs a modified version of the so-called *Inglehart Four Items Index* but (to check robustness) also uses two other proxies for postmaterialist attitudes developed from the *World Values Surveys*. Controlling for country and time fixed effects, these proxies, a measure of capital mobility, and a set of control variables are used as regressors for explaining the ratio of the effective marginal tax rate on capital (EMTR) to the tax

wedge on labor. The estimates for the postmaterialism parameter exhibit the predicted (negative) signs and are highly significant in all regressions, indicating a substantial impact of non-material values on tax design.

As many works on culture and policy outcomes, the statistical setup in chapter 6 faces the problem that causality is likely to go both ways – from culture to politics and from politics to culture. This issue cannot be tackled by a fixed effects model. Therefore, chapter 7 proceeds with an instrumental variable approach to test whether postmaterialist attitudes are causally related to tax structures. To isolate postmaterialist culture from policy outcomes, we use information on the value inclinations of second-generation immigrants, as provided by the *American General Social Surveys*. The attitudes of American-born citizens whose ancestors emigrated to the US two generations ago are not shaped by the current economic and institutional environment of their ancestry country. Nevertheless, they systematically vary with cross-country differences in today's culture. This source of variation is used to instrument for today's postmaterialism in the home country. Doing so, we are able to identify that postmaterialist values shape tax structures: countries with a stronger emphasis on postmaterialist life goals tend to tax personal incomes relatively more heavily than corporate incomes. Interestingly, classical economic predictors, such as GDP or openness, are unrelated to these tax measures, further supporting the plea of this thesis that people's system of values and beliefs matter economically in the area of taxation.

1.2   Structure of the thesis

The thesis consists of seven chapters. It includes theoretical and empirical perspectives on the role of values and norms in public finance research. A motivation and summary of the results is given in Section 1.1.

Chapter 2 is co-authored with Andreas Wagener, Institute of Social Policy, University of Hannover. The chapter was published as: 'Tax Structure and Government Expenditures under Tax Equity Norms', CESifo Working Paper, No. 3205. It is currently under review at the *Journal of Economic Behavior and Organization* (present status: revise-and-resubmit). Earlier versions of the chapter were presented at the 24th Congress of the European Economic Association (Barcelona, Spain), the 66th

Congress of the International Institute of Public Finance (Uppsala, Sweden), the 2nd CESifo Venice Summer Institute on Ethics and Economics (Venice, Italy), the 14th Spring Meeting of Young Economists (Istanbul, Turkey), the 2009 Annual Meeting of the European Public Choice Society (Athens, Greece), the 2009 Annual Meeting of the American Public Choice Society (Las Vegas, USA), the 2009 Annual Congress of the Verein für Socialpolitik (Magdeburg, Germany), the 2008 Göttinger Workshop on Public Economics (Göttingen, Germany) and at the 2009 Mentoring Seminar of the Chair of Public Finance, University of Magdeburg (Potsdam, Germany).

Chapter 3 is joint work with Thomas Cornelissen, Centre for Research and Analysis of Migration (CReAM), University College London and Oliver Himmler, Max Planck Institute for Research on Collective Goods, Bonn. A reprint was published as: 'Fairness Spillovers: The Case of Taxation', CESifo Working Paper, No. 3217. Part of this chapter was also published at *Ökonomenstimme*, March 2011 (in German). The chapter received a revise-and-resubmit decision from the *Journal of Economic Behavior and Organization*. Earlier versions of the chapter were presented at the 10th World Congress of the Econometric Society (Shanghai, China), the 5th Nordic Behavioral and Experimental Economics Conference (Helsinki, Finland), the 2nd CESifo Venice Summer Institute on Ethics and Economics (Venice, Italy), the 2010 Annual Meeting of the Public Choice Society (Monterey, USA), the 2010 International Conference on Tax Policy Decision Making (Mannheim, ZEW, Germany), the 15th Spring Meeting of Young Economists (Luxembourg), the 2010 Economic Workshop, University of Tübingen (Tübingen, Germany), the 2010 Public Economics Seminar, LMU Munich (Munich, Germany) and at a 2009 seminar at CReAM, University College London (London, UK).

Chapter 4 is titled 'Testing for the Behavioral Asymmetry of Tax Fairness Perceptions: Evidence From Absenteeism' and was written in 2011. The subsequent chapter is a joint project with Thomas Cornelissen and Oliver Himmler. An earlier version of the chapter is available as Discussion Paper No. 435 of the discussion paper series of the Faculty of Economics and Business Administration at Leibniz University of Hannover. The chapter was published as: 'Perceived Unfairness in CEO Compensation and Work Morale', *Economics Letters*, 110, 2011, 45-48. Publication within this thesis is with kind permission of the editor, Eric Maskin.

Chapter 6 is joint work with Andreas Wagener. The chapter was published as:

'(Post-)Materialist Attitudes and the Mix of Capital and Labor Taxation', CESifo Working Paper, No. 2366. It was presented at the 64th Congress of the International Institute of Public Finance (Maastricht, Netherlands), the 13th Spring Meeting of Young Economists (Lille, France), the 2008 Annual Meeting of the European Public Choice Society (Jena, Germany) and at the 2008 Annual Meeting of the American Public Choice Society (San Antonio, USA). An earlier version of this chapter won the *Best Paper Award* at the 13th Spring Meeting of Young Economists.

The final chapter 'Cultures and Tax Structures' is co-authored with Andreas Wagener and was presented at the 2011 Annual Meeting of the Public Choice Society (San Antonio, USA).

Chapter 2

Tax Structure and Government Expenditures

under Tax Equity Norms[1]

2.1   Introduction

A fundamental theorem on taxation states that small open economies should not rely on capital taxation. This result, originally derived in Gordon (1986), emerges from the assumption of an infinitely elastic capital supply which small countries face. Under this assumption, the burden of a tax on capital will be entirely shifted onto workers or other immobile domestic factors. But if those factors bear the tax burden anyway, it is less costly to tax them directly and, by this, to avoid the excess burden associated with capital flight.

Zero capital taxation, thus, is optimal in this class of models – it maximizes the representative household's utility and is also the policy outcome that people actually want and would vote for. However, in reality the prospect of zero taxes on capital hardly looks popular. It flies in the face of all sorts of concerns with equity, fairness, and equal treatment in taxation – which remain unmodelled in the standard framework of optimal (international) taxation. Over the past decades a large body of evidence has been compiled suggesting that people not only care for, or are solely driven by, material self-interest but also by values, norms and equity concerns. Such ethical preferences

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[1]This chapter is co-authored with Andreas Wagener. The chapter was published as: 'Tax Structure and Government Expenditures under Tax Equity Norms', CESifo Working Paper, No. 3205. It is currently under review at the *Journal of Economic Behavior and Organization* (present status: revise-and-resubmit). The chapter was presented at conferences and seminars in Barcelona, Uppsala, Istanbul, Las Vegas, Venice, Magdeburg, Göttingen and Potsdam.

have been embedded into various economic contexts, but only little is known about the optimal tax structure when ethical norms are related to taxation.

In this paper, we analyze optimal taxation in the presence of tax equity norms, i.e., when citizens hold the view that tax rates on capital and labor incomes ought not to differ too widely. Such an approach can be motivated along several lines:

- First, tax systems that exclusively or disproportionately rely on taxes on labor incomes appear unacceptable on grounds of common norms for equity and justice.[2] The most general and fundamental of such norms is reflected in the principle of horizontal tax equity, to which most tax systems pay at least lip service. Stating that equal incomes should be taxed at equal rates (Musgrave, 1959; Kaplow, 1995), the principle forms part of the rationale underlying the comprehensive income tax (of the Schanz-Haig-Simons type), a normative ideal to which many countries (used to) adhere.[3] Discrimination between similarly situated tax payers – such as zero or low taxes on capital in the presence of positive and high tax rates on labor – clearly violates this principle. Such discrimination also violates its relative, the ability-to-pay principle, stating that all members of society have a duty to pay taxes in accordance with their economic capabilities; tax legislation warps this principle when tax privileges are not based on ability to pay.[4]

- Second, equity does not only matter from the abstract perspective of a philosopher. Rather, the experimental literature provides ample evidence that perceptions of "fairness" and its violation indeed and significantly impact on individuals' subjective well-being as well as on individuals' behaviour (for a survey see Fehr and Schmidt, 2006). From a citizen's perspective equity constitutes an important criterion for the legitimacy of a tax system; it shapes tax compliance (Bordignon,

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[2]For a survey on tax equity norms and their implications for actual tax policy see, e.g., Barker (2006).

[3]These aspects also matter in the debate on dual income taxes: by applying different tax treatments to incomes from different sources, dual income tax generate problems of horizontal inequity. See, e.g., Sørensen (1994).

[4]Moreover, burdening only one subgroup of the population (i.e., workers) could also be in conflict with the benefit principle of taxation, stating that the taxes an agent pays should somehow reflect the benefits that (s)he receives from the goods and services supplied by the state (for a discussion of the benefit and sacrifice principles of taxation see, e.g., Neill, 2000). Since everybody benefits from the provision of public goods, the benefit principle calls (as a minimum) for a positive share in taxes for everyone.

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1993), political support (Taylor, 2003, p. 84) and work incentives. Boadway et al. (2007) argue that individuals hold personal views on what constitutes an ethical tax rate; discrepancies between actual and ethically acceptable tax rates may induce individuals to (legally) avoid taxation by adjusting their labor supply. Hence, hurt ethical feelings may give rise to tax distortions.

- Third, zero or low tax rates on capital income in the presence of high tax rates on labor income cause discontent and envy. The rich, capital income earners or profitable businesses getting away without being taxed adequately makes wage earners with (perceived) high tax burdens angry (The Economist, 2009). The "common man", paying a substantial share of his moderate income in taxes, is up-set when – as it happens in many countries – capital incomes are subject to rather symbolic income or capital gains taxes, exempt from contributing to social insur-ance, and given various preferences and privileges. Likewise, the (perception of a) growing imbalance in the taxation of labor and capital incomes (allegedly induced by globalisation) nourishes political discomfort. Generally, policies that discrimi-nate across comparable circumstances or individuals appear to create resentment, possibly also endangering social stability. This view finds strong support in the socio-psychological literature which shows that *relative deprivation* – via unequal treatment, exclusion, or discrimination – negatively impacts both on individual well-being and on social cohesion and welfare (Runciman, 1966; Podder, 1996).[5] As argued by Elster (1991, p. 66) in general and by Boskin and Sheshinski (1978, p. 590) for taxation, a society that tries to assuage its envy may well adopt policies that damage its material interests.

- Fourth, large discrepancies between taxes on capital and labor may indicate a high degree of inequality which might be detrimental for utility (Alesina and Angeletos, 2005). Reducing inequality is a major rationale for taxation in modern societies, and the exemption from taxation or low tax rates for capital incomes and fortunes let the social compact for redistribution appear shaky – which many people find undesirable (Brooks and Manza 2006). Concerns over inequality have

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[5]While economists tend to reduce relative deprivation to shortfalls of income or consumption, Runci-man's original concept is far wider and applicable to abstract or intangible social objects, including policy measures such as tax rates.

mainly been studied in the context of the progressivity of income taxes (see, e.g., Snyder and Kramer, 1988). Recently, however, Kim (2007) embedded fairness considerations in form of inequality aversion into a Ramsey-Mirrlees framework of optimal taxation, making the case for a substantial taxation of capital.[6]

To summarize, people seem to care about the tax structure in itself (and beyond the extent by which it affects their own net incomes). They find it important that tax rates on different factors or types of income do not differ too much. Tax rate differentials affect individual well-being via concerns for equity, equality, and sentiments of relative deprivation or envy. In this paper we analyze the implications of such concerns for the tax structures in small open economies. To keep terminology simple, we shall henceforth and invariably refer to tax-related sentiments as "tax equity concerns". This term is an imperfect container for a wide range of different concepts that partially overlap and are difficult to disentangle (norms for horizontal tax equity, envy, fairness perceptions, feelings of relative deprivation or discrimination, status concerns etc.). Their common denominator is, however, that large discrepancies between tax rates on different types of income are undesirable. From a modelling perspective, holding a tax equity norms mean that tax rates (or the tax structure) directly into one's utility function, independently of whether material well-being is affected or not.

Concerns for tax equity may matter in at least two different ways: Perceiving a situation as more inequitable may cause discomfort and reduce the level of well-being (level effect), but it may also trigger adjustments in labor supply (incentive effects). The motivation for the inclusion of incentive effects comes from empirical and experimental evidence suggesting that unfairness felt in the context of taxation indeed affects work incentives. Dissatisfied individuals spend less effort on work, show higher rates of absenteeism etc. (see, e.g., Lévy-Garboua et al., 2009; Cornelissen et al., 2010, or in a theoretical framework, Boadway et al., 2007). In social psychology, adverse behavioural reactions of this type have since long been discussed under the label "equity

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[6]Another potential argument why unequal tax rates are disliked may indirectly enter via relative-income concerns (Luttmer, 2005; Layard 2006). If individual well-being depends, in addition to the absolute level of own income, also on one's income position relative to others and taxation changes these relative positions, then tax privileges (for earners of capital income, say) may be detrimental to utility (of wage earners, say). We do not follow this route here. With status concerns, the reference point for the assessment of taxes is not a general standard but an interpersonal comparison whose normative relevance is unclear.

theory" (Adams, 1963). In our model, level effects of tax equity concerns formally show up in preferences as (separable) reductions in total utility while incentive effects affect marginal rates of substitution between consumption and leisure.

We embed these tax equity concerns into a model of a small open economy whose remaining components are fairly standard: A single output is produced with labor and capital. Capital is perfectly mobile internationally. Workers are immobile but their supply of labor is endogenous (and may be affected by equity concerns). Higher levels of capital imply higher equilibrium wages. The government provides a consumption good and finances its expenditures with linear source taxes on capital and labor income. The level of government expenditure can be exogenously given or might be chosen optimally.

In the absence of concerns for tax equity, government finance should exclusively rely on labor income taxes. Capital taxation causes a higher excess burden, irrespectively of whether government expenditures are exogenous or endogenous. An optimum without concerns for tax equity, thus, involves a large differential tax treatment of capital and labor.

In the presence of equity concerns, however, the tax designer faces a trade-off. On the one hand, there is the standard excess burden: taxes on capital drive capital out of the country and, by this, also depress gross wages. On the other hand, at given (and relatively high) labor tax rates, they reduce the tax gap and thereby placate equity concerns. This trade-off has a number of implications for optimal tax policies, some expected, some perhaps less so.

First, exempting capital income from taxation is never optimal. Already with the slightest concern for tax equity a zero tax rate on capital income ceases to be optimal, irrespectively of whether equity concerns impact on work incentives or "only" on well-being. Second, and more surprising, stronger concerns for tax equity may indeed call for a higher level of *labor* taxation. One reason is that equity concerns may drive the economy onto the decreasing part of the partial Laffer curve for the capital tax – a situation that would never occur within a standard framework of taxation. Another reason is that government finance via capital taxes may eventually carry so large an excess burden that a further increase of capital taxes, induced by stronger equity concerns, needs to be accommodated by an (smaller) increase in labor taxes. Third, also the comparative statics for government expenditures reveal some interesting non-monotonicities. One

might expect that a stronger concern for tax equity calls for higher capital tax rates and, by this, for a smaller public sector (capital taxation being plagued by a larger excess burden). However, even when the former is true, the size of the public sector need not necessarily decline. Tax equity concerns erode the size of the public sector only when they are relatively weak. If strong equity concerns grow even more intense, higher government expenditure can be desirable.

Our paper contributes to the theory of taxation in two areas. First, it complements a small literature that incorporates values and equity norms into optimal tax frameworks.[7] Most of this literature is concerned with the impact of equity perceptions on tax compliance, but some recent theoretical and experimental research also deals with the interaction between inequity aversion (in the Fehr-Schmidt sense) and tax structures (see, e.g., Kim 2007, or Lévy-Garboua et al., 2009). Second, we add to recent research on the optimal mix of capital and labor taxation in open economies which is puzzled by the failure of empirical studies to confirm the theoretical prediction that increased capital mobility leads to a lower relative tax burden on capital (see Haufler, 1997, or Haufler et al., 2008). Our paper suggests that concerns with tax equity may have prevented such a race to the bottom for capital taxes; the social value of balanced taxation may outweigh the economic benefits from low capital taxes.

This paper proceeds as follows: Section 2.2 sets out a basic model with tax equity concerns. In Section 2.3, we analyze tax policies and their comparative statics for the case that government spending is exogenous. In Section 2.4, we extend the model to endogenous government spending. Section 2.5 concludes.

2.2   The model

We consider a small open one-good economy which is inhabited by a large number of identical individuals. For simplicity, we normalize the number of individuals to unity. Production in the economy takes place in one single-output firm that is owned by absent foreigners. It uses labor and capital as its inputs. Capital is an internationally mobile

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[7]The literature on social preferences often assumes that individuals compare their own income position to that of others. If such comparisons entail negative externalities (via envy, say), Pigouvian taxes may be helpful remedies (see, e.g., Alvarez-Cuadrado 2007; Alonso-Carrera et al. 2006). By contrast, in our framework unequal taxation is a *source* of disutility – and not a remedy against it.

factor of production that can be purchased on world capital markets at an exogenous rental rate of $r > 0$ per unit. Capital and labor can be taxed with constant average tax rates t_ℓ for labor and t_k for capital. Taxation is only source-based.

The individual has convex and increasing preferences over consumption c, leisure – which will be negatively represented by working hours ℓ –, and a publicly provided good g. We assume that these preferences can be represented by an additively separable utility function

$$u(c, \ell) = c - E(\ell, \psi) + h(g) - \Omega, \tag{2.1}$$

where $E(\cdot)$ with $E_\ell > 0$ and $E_{\ell\ell} > 0$ represents the disutility from labor ℓ and $h(g)$ with $h'(g) > 0 > h''(g)$ measures the utility from the publicly provided good.

The special features of preferences in our model are functions Ω and ψ, both of which are assumed to depend on the tax rates on labor and capital:

$$\Omega = \Omega(t_\ell, t_k) \quad \text{and} \quad \psi = \psi(t_\ell, t_k).$$

Preferences, thus, directly depend on the policy choices made in the society. Specifically, Ω captures that the level of individual well-being may be affected by the tax structure. We assume that

$$\Omega_\ell := \partial\Omega/\partial t_\ell \geq 0 \quad \text{and} \quad \Omega_k := \partial\Omega/\partial t_k \leq 0.$$

Hence, individuals welcome lower taxes on labor and higher taxes on capital. In spite of this asymmetric treatment of t_k and t_ℓ in Ω (and also below in ψ), we can interpret Ω (and ψ) as concerns for tax equity. In our framework, we will only encounter situations where capital is taxed less severely than labor. On this domain, preference functions such as Ω can reflect that any widening of the statutory tax gap $(t_\ell - t_k)$ is welfare reducing. Viz., as a special case (sometimes used below), Ω could be written as

$$\Omega = \tilde{\Omega}\left(\beta \cdot (t_\ell - t_k)\right)$$

with $\tilde{\Omega}' > 0$; the parameter $\beta > 0$ would then measure the intensity of the equity

concern.

The function ψ in (2.1) captures that tax equity concerns may generate incentive effects: the disutility from work not only varies with working hours ℓ but also with the individual's perception ψ of tax policies. We assume that both the absolute and the marginal disutility from labor increases whenever the tax policy is perceived to be less fair ($E_\psi > 0$, $E_{\ell\psi} > 0$). Moreover, we assume that $\psi = \psi(t_\ell, t_k)$ with

$$\psi_\ell := \partial\psi/\partial t_\ell \geq 0 \quad \text{and} \quad \psi_k := \partial\psi/\partial t_k \leq 0, \tag{2.2}$$

reflecting that higher taxes on labor (weakly) depress work morale while higher taxes on capital boost it. As with Ω, this asymmetric treatment does not preclude the interpretation of ψ as an ethical norm; we operate on a policy domain where $t_k < t_\ell$. Experimental evidence for the validity of (2.2) can be found in Lévy-Garboua et al. (2009) where it is shown that workers who consider equity norms to be violated by taxation refuse to work.

As discussed in the introduction, the labelling of both ψ and Ω as equity concerns covers a wide array of affects, ranging from abstract horizontal equity norms to envy to feelings of relative deprivation. The distinction between Ω and ψ reflects two channels of tax equity: a work morale effect (ψ alters the marginal rate of substitution between leisure and consumption) and a "feel-good" effect (Ω affects well-being but leaves incentives untouched).

In (2.1) we take the perspective of a worker without capital income. Moreover, (2.1) does not entail any status concerns, comparisons with reference groups or comparisons of actual tax payments; the direct preference over tax structures is purely an (individual) ethic norm.

The legal incidence of labor taxes is assumed to lie with workers. Thus, the disposable income of a worker just equals the hourly net wage $(w - t_\ell)$ times hours worked: $c = (w - t_\ell) \cdot \ell$. The (gross) wage rate w will be endogenously determined (see below).

Individuals take the wage and tax rate as parametrically given when deciding on their labor supply. Substituting for c in (2.1) and maximizing over ℓ requires that:

$$E_\ell(\ell, \psi(t_\ell, t_k)) = w - t_\ell. \tag{2.3}$$

Equation (2.3) implicitly defines a labor supply function $\ell^S(w, t_\ell, t_k)$ with properties

$$\frac{\partial \ell^S}{\partial w} = \frac{1}{E_{\ell\ell}} > 0, \tag{2.4}$$

$$\frac{\partial \ell^S}{\partial t_\ell} = -\frac{1}{E_{\ell\ell}} \cdot (1 + E_{\ell\psi} \cdot \psi_\ell) < 0, \tag{2.5}$$

$$\frac{\partial \ell^S}{\partial t_k} = -\frac{E_{\ell\psi}}{E_{\ell\ell}} \cdot \psi_k > 0. \tag{2.6}$$

Firms maximize their profits. Denoting by K and L, respectively, the amounts of capital and labor employed in the firm, output of the firm equals $F(K, L)$, where F is a strictly increasing, constant-returns-to-scale and strictly quasi-concave production function. Firms pay a tax t_k on each unit of capital they hire. Since the cost of hiring an additional hour of labor are w while an additional unit of capital costs $r + t_k$, the firm's net profits amount to

$$\pi = F(K, L) - w \cdot L - (r + t_k) \cdot K = L \cdot (f(k) - w - (r + t_k) \cdot k). \tag{2.7}$$

Here, $k := K/L$ denotes capital per labor unit and $f(k)$ is the per-unit-of-labor production function; f is strictly increasing and strictly concave. The firm takes input prices and taxes as given. Profit maximization requires

$$f'(k) = r + t_k, \tag{2.8}$$

which implicitly defines the capital intensity $k = k(r + t_k)$ as a function of the cost of capital, with

$$k'(r + t_k) = \frac{1}{f''(k)} < 0. \tag{2.9}$$

Since we assume constant returns to scale, the gross wage rate is determined via the factor price frontier and is given by

$$w(r + t_k) = f(k) - (r + t) \cdot k \tag{2.10}$$

with

$$w'(r + t_k) = -k. \tag{2.11}$$

In equilibrium, labor supply must equal labor demand. The equilibrium level L^* of employment is, thus, given by

$$L^*(t_\ell, t_k) = \ell^S(w(r + t_k), t_\ell, t_k); \tag{2.12}$$

it decreases in the tax rate on labor but has an ambiguous response to higher capital taxation:

$$\frac{\partial L^*}{\partial t_\ell} = \frac{\partial \ell^S}{\partial t_\ell} < 0,$$

$$\frac{\partial L^*}{\partial t_k} = w'(r + t_k) \cdot \frac{\partial \ell^S}{\partial w} + \frac{\partial \ell^S}{\partial t_k} = -k \cdot \frac{\partial \ell^S}{\partial w} + \frac{\partial \ell^S}{\partial t_k} \lesseqgtr 0.$$

Note that when equity concerns are sufficiently high, they may offset the usual disincentive from higher capital taxation on labor supply. In this case, equilibrium employment would increase in the tax rate on capital.

The government provides a (public) good g (measured in units of output) which has to be financed out of the revenues from labor and capital taxes. Hence, its budget constraint reads:

$$g = t_\ell \cdot L^* + t_k \cdot K = L^*(t_\ell, t_k) \cdot (t_\ell + t_k \cdot k(r + t_k)) =: G(t_\ell, t_k). \tag{2.13}$$

In what follows, we shall refer to $G(t_\ell, t_k)$ as the Laffer curve of the economy. For later use, we note that from (2.13) the partial derivatives of the Laffer curve with respect to the two tax rates are given by

$$\frac{\partial G}{\partial t_k} = \frac{\partial L^*}{\partial t_k} \cdot (t_\ell + t_k k) + L^* \cdot (k + t_k k') =: G_k, \tag{2.14}$$

$$\frac{\partial G}{\partial t_\ell} = \frac{\partial L^*}{\partial t_\ell} \cdot (t_\ell + t_k k) + L^* =: G_\ell. \tag{2.15}$$

2.3 Optimal tax policy with exogenous government spending

In this section, we assume that a given and fixed level of government revenues $\bar{g}$ has to be raised; the case of endogenous government expenditures will be dealt with in

Section 2.4.

2.3.1 Some taxation of capital is optimal

The government chooses t_ℓ and t_k such as to maximize individual welfare (recall that firm owners are absentee capitalists). Plugging the equilibrium level of employment L^* and (2.13) into (2.1) and taking into account that $w = w(r + t_k)$ via (2.10), we obtain indirect utility (= social welfare) in equilibrium as follows:

$$V(t_\ell, t_k) := (w(r + t_k) - t_\ell) \cdot L^*(t_\ell, t_k) - E(L^*(t_\ell, t_k), \psi(t_\ell, t_k)) - \Omega(t_\ell, t_k). \quad (2.16)$$

As government expenditures g are exogenously fixed, the utility $h(g)$ derived from them does not matter here; it is omitted from (2.16). The government chooses tax rates t_ℓ and t_k such as to maximize V subject to the revenue constraint. The Lagrangian W for this problem reads:

$$\max_{t_\ell, t_k} \quad W(t_\ell, t_k) = V(t_\ell, t_k) + \lambda \cdot [G(t_\ell, t_k) - \bar{g}], \quad (2.17)$$

where λ denotes the Lagrange multiplier and $\bar{g}$ the exogenous level of the public good to be financed. Differentiating (2.17), with respect to tax rates (t_k, t_ℓ) and using the Envelope Theorem gives:

$$
\begin{aligned}
\frac{\partial W}{\partial t_\ell} &= -L^* + \lambda \cdot G_\ell - E_\psi \cdot \psi_\ell - \Omega_\ell \\
&= L^* \cdot [\lambda - 1] + \lambda \cdot (t_\ell + t_k k) \cdot \frac{\partial L^*}{\partial t_\ell} - E_\psi \cdot \psi_\ell - \Omega_\ell \quad (2.18) \\
\frac{\partial W}{\partial t_k} &= w'(r + t_k)L^* + \lambda \cdot G_k - E_\psi \cdot \psi_k - \Omega_k \\
&= kL^* \cdot [\lambda - 1] + \lambda \cdot \left((t_\ell + t_k k) \cdot \frac{\partial L^*}{\partial t_k} + t_k k' L^* \right) - E_\psi \cdot \psi_k - \Omega_k. \quad (2.19)
\end{aligned}
$$

No concerns for tax equity. As a benchmark, we consider the case without tax equity concerns (i.e., $\psi_k = \psi_\ell = \Omega_k = \Omega_\ell \equiv 0$). Here,

$$\frac{\partial L^*}{\partial t_\ell} = -\frac{\partial \ell^S}{\partial w} \quad \text{and} \quad \frac{\partial L^*}{\partial t_k} = -k \cdot \frac{\partial \ell^S}{\partial w}. \quad (2.20)$$

From (2.18) and (2.19) we, thus, get

$$\frac{\partial W}{\partial t_\ell} = \frac{1}{k} \cdot \frac{\partial W}{\partial t_k} - \lambda L^* \frac{t_k k'}{k} > \frac{1}{k} \cdot \frac{\partial W}{\partial t_k} \tag{2.21}$$

for all (t_ℓ, t_k) with $t_k > 0$. Hence, without equity concerns it can never be optimal to tax capital at source: $t_k = 0$.[8] The intuition for this standard result is that a small country faces a fixed rate of return on capital and, thereby, an infinitely elastic capital supply. Capital taxes would then be entirely shifted over to the immobile factor, which makes it less costly to tax this factor directly (Razin and Sadka, 1991; Bucovetsky and Wilson, 1991).

Disutility from unequal tax rates. First, consider the case where concerns for tax equity only affect utility levels ($\Omega_k \leq 0, \Omega_\ell \geq 0$ with at least one strict inequality) but do not have any incentives effects (i.e., $\psi_k = \psi_\ell \equiv 0$). Then (2.20) continues to hold and we get from (2.18) and (2.19) that

$$\frac{\partial W}{\partial t_\ell} = \frac{1}{k} \cdot \frac{\partial W}{\partial t_k} - \lambda \frac{t_k k' L^*}{k} - \Omega_\ell + \frac{1}{k} \Omega_k. \tag{2.22}$$

This equation differs from (2.21) only by the term $-\Omega_\ell + \Omega_k/k < 0$, implying that zero taxation of capital is no longer desirable: at $t_k = 0$ and $\frac{\partial W}{\partial t_\ell} = 0$, we get $\frac{\partial W}{\partial t_k} > 0$ instead of $\frac{\partial W}{\partial t_k} = 0$ such that a positive t_k is warranted. Intuitively, with preferences for equal taxation, capital taxation not only has economics costs (distortion of the capital intensity), but also reduces the psychological costs from tax differences. For later use, note that

$$L^* t_k k'/k = \frac{1}{\lambda}(\frac{1}{k}\Omega_k - \Omega_\ell) \tag{2.23}$$

must hold in a welfare maximum.

Incentive effects. Suppose now that deviations from the tax equity norm do not cause a deterioration in utility *per se*, but distort the incentives to provide labor. I.e., we shall assume that $\psi_k(t_\ell, t_k) \leq 0 \leq \psi_\ell(t_\ell, t_k)$ with at least one strict inequality, while we reset $\Omega_k = \Omega_\ell \equiv 0$. Then the partial derivatives of equilibrium employment with

---

[8]Formally, if $\frac{\partial W}{\partial t_\ell} = 0$, one gets $\frac{\partial W}{\partial t_k} < 0$ for all $t_k > 0$ such that a reduction of t_k is worthwhile.

respect to the tax rates are given by

$$\frac{\partial L^*}{\partial t_\ell} = -\frac{1}{E_{\ell\ell}} \cdot (1 + E_{\ell\psi} \cdot \psi_\ell) \quad \text{and} \quad \frac{\partial L^*}{\partial t_k} = -\frac{1}{E_{\ell\ell}} \cdot (k + E_{\ell\psi} \cdot \psi_k). \tag{2.24}$$

Using (2.24), it follows from (2.18) and (2.19) that

$$\frac{\partial W}{\partial t_\ell} = \frac{1}{k} \cdot \frac{\partial W}{\partial t_k} - \lambda L^* \frac{t_k k'}{k} + \underbrace{(\frac{1}{k}\psi_k - \psi_\ell)[E_\psi + \lambda(t_\ell + t_k k)\frac{E_{\ell\psi}}{E_{\ell\ell}}]}_{< 0}. \tag{2.25}$$

This again implies that no taxation of capital can never be optimal: For any $(t_\ell, t_k) = (t_\ell, 0)$, we get $\frac{\partial W}{\partial t_k} > k \cdot \frac{\partial W}{\partial t_\ell}$ such that an increase in t_k is warranted. In an interior solution $\frac{\partial W}{\partial t_k} = \frac{\partial W}{\partial t_\ell} = 0$ and, from (2.25),

$$L^* \frac{t_k k'}{k} = \frac{1}{\lambda}(\frac{1}{k}\psi_k - \psi_\ell)[E_\psi + \lambda(t_\ell + t_k k)\frac{E_{\ell\psi}}{E_{\ell\ell}}]. \tag{2.26}$$

To sum up:

Result 1 *In the absence of tax equity concerns, capital should remain untaxed. In the presence of equity concerns, whether they shape incentives or just affect utility levels, a zero tax rate on capital is never optimal.*

Result 1 shows that the standard recommendation that small open economies should leave capital untaxed balances on a knife's edge. Any effect providing capital taxation with some extra marginal benefit induces the government to rely on at least some capital taxation. Here, concerns for tax equity do the job.

2.3.2   Comparative statics with level effects

The inclusion of tax equity considerations provides governments with incentives to levy positive capital tax rates. But precisely how does the strength of equity concerns affect optimal tax policy? To answer this, we first consider the case where tax equity concerns do not impact on work incentives (i.e., ψ is a constant). To be able to measure the intensity of equity concerns, we suppose that equity concerns are assuaged as soon as the difference between capital and labor tax rates narrows. Then Ω only depends on

the gap between labor and capital tax rates:

$$\Omega = \tilde{\Omega}(\beta \cdot (t_\ell - t_k)) \tag{2.27}$$

with $\tilde{\Omega}' > 0$ and $\tilde{\Omega}'' \geq 0$. Parameter $\beta > 0$ then serves as a parametric measure for the strength of equity concerns. The comparative statics of (t_ℓ, t_k) with respect to β are given through:

$$\begin{pmatrix} W_{\ell\ell} & W_{\ell k} & G_\ell \\ W_{\ell k} & W_{kk} & G_k \\ G_\ell & G_k & 0 \end{pmatrix} \cdot \begin{pmatrix} \mathrm{d}t_\ell \\ \mathrm{d}t_k \\ \mathrm{d}\lambda \end{pmatrix} = \begin{pmatrix} -W_{\ell\beta} \\ -W_{k\beta} \\ 0 \end{pmatrix} \mathrm{d}\beta,$$

with $W_{xy} = \partial^2 W / (\partial t_x \partial t_y)$ and $W_{x\beta} = \partial^2 W / (\partial t_x \partial \beta)$. From (2.18), (2.19), and (2.27) we get that

$$W_{k\beta} = -W_{\ell\beta} = \Omega_{\ell\beta} := \tilde{\Omega}' + \beta(t_\ell - t_k) \cdot \tilde{\Omega}'' > 0 \tag{2.28}$$

for all $t_\ell > t_k$. Hence, applying Cramer's Rule to (2.28) we obtain:

$$\frac{\mathrm{d}t_\ell}{\mathrm{d}\beta} = -\frac{1}{D} \cdot \Omega_{\ell\beta} \cdot (G_k^2 + G_\ell G_k) \tag{2.29}$$

$$\frac{\mathrm{d}t_k}{\mathrm{d}\beta} = \frac{1}{D} \cdot \Omega_{\ell\beta} \cdot (G_\ell^2 + G_\ell G_k) \tag{2.30}$$

$$\frac{\mathrm{d}(t_\ell - t_k)}{\mathrm{d}\beta} = -\frac{1}{D} \cdot \Omega_{\ell\beta} \cdot (G_k + G_\ell)^2. \tag{2.31}$$

Here,

$$D = 2G_k G_\ell W_{\ell k} - (G_k^2 W_{\ell\ell} + G_\ell^2 W_{kk})$$

is the determinant of the bordered Hessian on the LHS of (2.28). In a welfare maximum, $D > 0$ as well as $W_{kk}, W_{\ell\ell} < 0$.

Observe from (2.28) that the weak assumption $\tilde{\Omega}' > 0$ (the individual feels worse the larger the tax rate differential) suffices to have equity concerns affect tax policies – we do not strictly need to assume that $\tilde{\Omega}'' \geq 0$ (the psychological costs of tax inequity increase more than proportionately with the tax gap).

As can be seen immediately from (2.31), a stronger concern for tax equity has an

unambiguous effect on the tax rate differential: $(t_\ell - t_k)$ is strictly decreasing in β, irrespective of the signs of the partial derivatives of the Laffer curve (G_ℓ, G_k). Starting from $t_\ell > t_k = 0$ at $\beta = 0$, the stronger the tax equity norm, the closer the tax structure moves towards equal tax rates:

$$\frac{\mathrm{d}(t_\ell - t_k)}{\mathrm{d}\beta} < 0.$$

To determine the signs of (2.29) and (2.30), we manipulate these expressions in the following way. From (2.20), (2.14), (2.15), (2.23) and $\Omega_\ell = -\Omega_k$, it follows that we have

$$G_\ell = \frac{1}{k}G_k - \frac{1}{\lambda}\Omega_k(1 + \frac{1}{k}) \tag{2.32}$$

in an interior equilibrium. Observe from (2.18) that $G_\ell > 0$ in an optimum. Substituting for G_ℓ from (2.32) into (2.29), we obtain

$$\frac{\mathrm{d}t_\ell}{\mathrm{d}\beta} = \underbrace{-\frac{1}{D} \cdot \Omega_{\ell\beta}}_{< 0} \cdot G_k(1 + \frac{1}{k})\left[G_k - \frac{\Omega_k}{\lambda}\right] \gtreqless 0, \tag{2.33}$$

where $\Omega_k/\lambda < 0$. Thus, the effects from stronger tax equity concerns on the labor tax rate are unclear in sign. If $G_k > 0$, the labor tax decreases with the strength of the equity concern. This accords with intuition: the more upset workers are with privileged capital taxation, the lower the tax burden they are willing to accept on their own incomes. However, the counter-intuitive case, that a stronger desire to correct for tax inequity is associated with higher labor taxation may also occur. This can happen if $G_k < 0$, i.e. if the economy is on the downward-sloped part of the Laffer curve of the capital tax rate (given that G_ℓ and, from (2.32), $G_k - \frac{\Omega_k}{\lambda}$ are positive). In Example 1 below we will show that under certain conditions government in fact has an incentive to push the economy beyond the maximum of the (partial) Laffer-curve for the capital tax.

Similar as for (2.33) one can show that

$$\frac{\mathrm{d}t_k}{\mathrm{d}\beta} = -\frac{1}{k}\frac{\mathrm{d}t_\ell}{\mathrm{d}\beta}\frac{1}{G_k}\left[(G_k - \frac{\Omega_k}{\lambda}) - \frac{k\Omega_k}{\lambda}\right]. \tag{2.34}$$

This expression is positive, irrespective of the sign of G_k. Thus, we get a monotonic increase of the capital tax rate with the strength of equity concerns:

$$\frac{\mathrm{d}t_k}{\mathrm{d}\beta} > 0.$$

The observation that the tax on labor may increase when tax equity concerns grow stronger deserves an explanation. An increase in β calls for a higher t_k. If t_k is high enough, this will ceteris paribus cause tax revenues to drop ($G_k < 0$), due to a reduction both in the capital stock and wages. As revenue shortfalls are not allowed with an exogenous budget requirement, the tax on labor consequently has to rise (but at a lower pace than the capital tax rate as $(t_\ell - t_k)$ is bound to decrease).

To see that $\frac{\mathrm{d}t_\ell}{\mathrm{d}\beta} > 0$ might indeed be an optimal policy response, have a look at

Example 1. In this and the following examples, we consider a Cobb-Douglas technology where per-capita output is produced according to $y = k^\alpha$. We parameterize the disutility from labor by $E = 0.5 \cdot \psi \cdot \ell^2$. The disutility from tax rate differentials is assumed to follow $\Omega = 0.5 \cdot \beta \cdot (t_\ell - t_k)^2$. The parameter α, capital's share of output, is set equal to 0.25. The "dislove for work" parameter, ψ, is set to 0.1, and the world market's rental rate, r, to 0.25. Figure 2.1 depicts optima for different values of β.

Each graph plots tax indifference curves for $V(t_\ell, t_k)$ (dashed curves) and a government iso-budget contour (solid lines) in (t_ℓ, t_k)-space. The aspired revenue level and (since there are no incentive effects) the iso-budget contours for the government are the same in all panels. The (lower leg of the) iso-budget contour is negatively sloped for moderate capital tax rates: a higher capital tax entails higher tax revenues and, thus, allows for a lower tax rate on labor to meet the budget requirement. However, eventually the negative effect of a higher capital tax rate on tax revenues (a lower tax base induced by capital flight) dominates, such that the same level of g can only be met at higher taxes on labor. The shape of the V-indifference curves varies across the four panels of Figure 2.1 with the strength β of the tax equity concern. For zero or low values of β indifference curves are negatively sloped since individuals place high emphasis on the adverse effects of capital taxation on consumption ($w' < 0$). For $\beta = 0$ both the labor and the capital tax rate are considered as "bads" – while t_ℓ adversely

affects consumption via lower net wages, a higher t_k depresses gross wages. Indifference curves closer to the origin represent higher utility levels. With increasing concerns for tax equity, indifference curves bend upwards. Closing the tax gap is increasingly considered as good, and losses in material consumption can be less easily compensated for by a lower tax burden on labor income.[9]

Fig. 2.1: TAX EQUITY WITHOUT INCENTIVE EFFECTS. GOVERNMENT ISO-BUDGET CONTOUR (SOLID) AND INDIFFERENCE CURVES (DASHED) FOR VARYING VALUES OF β.
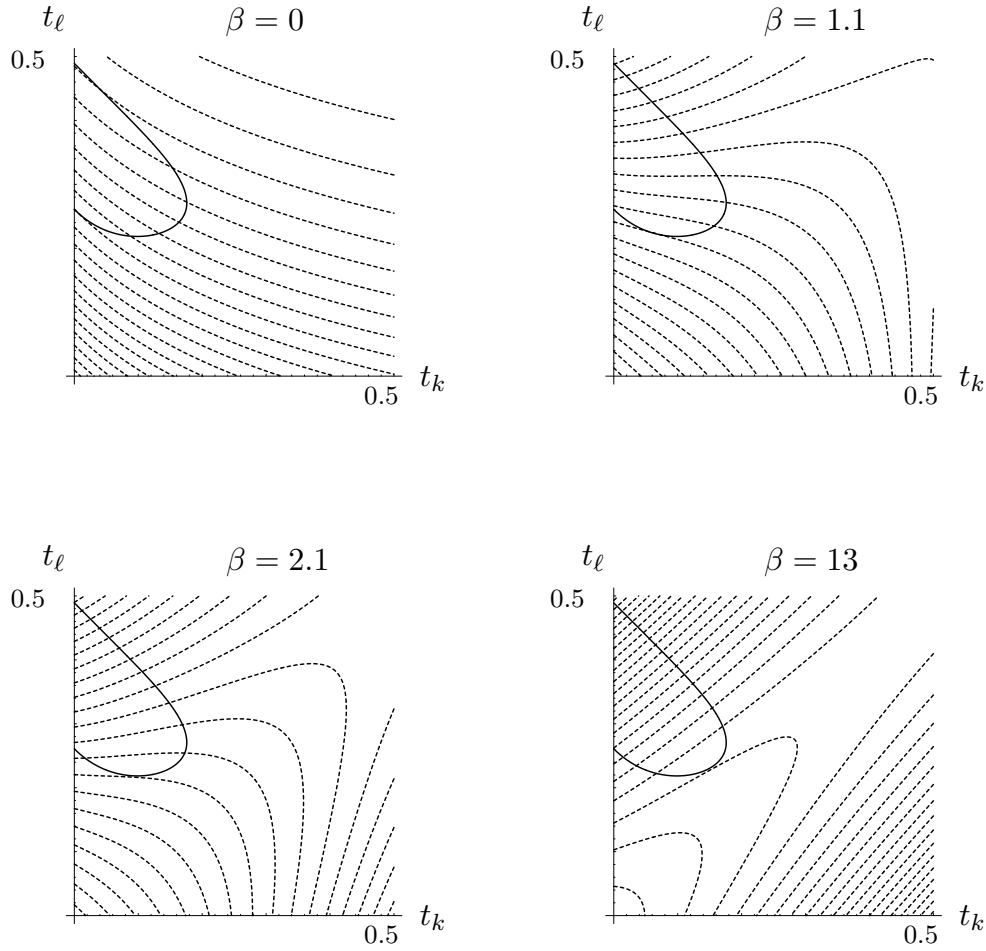
Geometrically the indifference curve at an optimal tax mix must be tangent to the (lower leg of the) iso-budget contour representing the exogenous revenue requirement $\bar{g}$. In the benchmark case ($\beta = 0$), this point of tangency is on the vertical axis where

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[9]In the extreme, when tax equity concern becomes overwhelmingly strong, indifference curves would be linear with slope $+1$ and the highest utility level is represented by the 45°-line. All tax combinations along the 45°-line are then considered as equally good.

capital is tax exempt. Starting from such a position, the point of tangency moves along the budget contour towards the 45°-line. This initially entails a reduction of t_ℓ and an increase in t_k. However, with equity concerns strong enough, eventually the upward-sloped part of the iso-budget contour might be entered. The optimal tax mix then leads the economy on the downward-sloped part of the (partial) Laffer for the capital tax rate (where $G_k < 0$). Thus, it is shown that $(\frac{\mathrm{d}t_\ell}{\mathrm{d}\beta} > 0)$ is possible.[10]

Equity concerns call for narrowing the spread between labor and capital taxation. Indeed, if it is possible to finance the exogenous revenue requirement at equal tax rates (the iso-budget contour intersects with the diagonal), $t_\ell = t_k$ will eventually be implemented when equity concerns β grow strong enough. Such tax rate equalization need not be feasible, in particular not when budget requirements are sufficiently high. An economy with strong tax equity motives will then (geometrically) remain at that situation on the iso-budget contour that lies at minimal distance to the diagonal. From here onwards, $\frac{\mathrm{d}t_\ell}{\mathrm{d}\beta} = \frac{\mathrm{d}t_\ell}{\mathrm{d}\beta} = 0$.

We sum up the general findings of this section in

Result 2 *Suppose that individual well-being decreases when the gap between the tax rates on capital and labor widens.*

1. *A more intense concern for tax equity calls for a higher tax on capital and for a more narrow gap between capital and labor tax rate.*

2. *Starting from weak levels, a strengthening of tax equity concerns calls for a lower tax on labor. However, if equity concerns become sufficiently strong, the optimal tax rate on labor may eventually increase. This occurs if and only if, at the optimal tax mix, the economy operates on the decreasing part of the Laffer curve for the capital tax.*[11]

The significant (economic) inefficiency identified in the last effect in item b) is interesting in itself. Already Boskin and Sheshinski (1978) conjectured that the inclusion of social preferences (in their case: concerns about relative consumption) potentially

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[10]Formally, the tax mix (t_k, t_ℓ) that is at minimum distance to the 45°-line satisfies, on the iso-budget contour for g, the condition $-G_k/G_\ell = 1$. From (2.29) to (2.31), this implies that tax rates do no further vary with β.

[11]The economy will never operate on the downward-sloped part of its total Laffer curve (G_ℓ, G_k both negative); G_ℓ must be positive from the FOC (2.18).

removes the economic barriers for increasing tax rates to the point where disincentive effects actually reduce tax revenues. Tax equity concerns provide a case in point here. In an alternative interpretation the equity norm may represent tax envy. Then the choice of economically questionable tax policies (i.e., operating in the decreasing part of the Laffer curve) is reminiscent of Elster's (1991, p. 66) warning that assuaging its envy may come at the expense of a society's substantial economic interests.[12]

It is informative to study how the level of equilibrium labor supply $L^*(t_\ell, t_k)$ varies with the strength of tax equity concerns. From (2.12) in conjunction with (2.4) to (2.6), (2.34), and (2.33) we obtain:[13]

$$
\begin{aligned}
\frac{\mathrm{d}L^*}{\mathrm{d}\beta} &= \frac{\partial L^*}{\partial t_\ell}\frac{\mathrm{d}t_\ell}{\mathrm{d}\beta} + \frac{\partial L^*}{\partial t_k}\frac{\mathrm{d}t_k}{\mathrm{d}\beta} = -\frac{\partial \ell^S}{\partial w}\cdot\left(\frac{\mathrm{d}t_\ell}{\mathrm{d}\beta} + k\frac{\mathrm{d}t_k}{\mathrm{d}\beta}\right) \\
&= -\frac{\partial \ell^S}{\partial w}\cdot\frac{\mathrm{d}t_\ell}{\mathrm{d}\beta}\cdot\frac{(1+k)\Omega_k}{\lambda G_k} \\
&= \underbrace{\frac{\partial \ell^S}{\partial w}}_{>0}\cdot\underbrace{\frac{1}{D}\cdot\Omega_{\ell\beta}\cdot\frac{(1+k)^2}{k}}_{>0}\cdot\underbrace{\left(G_k - \frac{\Omega_k}{\lambda}\right)}_{>0}\cdot\underbrace{\frac{\Omega_k}{\lambda}}_{<0} < 0
\end{aligned}
$$

Hence,

Corollary 1 *People in an economy with more intense concerns for tax equity work less.*

This observation should be interpreted against the backdrop that the equity norm itself does not exert any incentive effects (in the present scenario). The impact of tax equity concerns on labor supply is entirely indirect, via the attending optimal tax structure.

2.3.3 Comparative statics with incentive effects

Now we turn to the effects of stronger fairness concerns when tax equity concerns impact on work incentives (i.e., $\psi_\ell > 0 > \psi_k$ but $\Omega_\ell = \Omega_k \equiv 0$). This change affects indifference maps for $V(t_\ell, t_k)$ as well as the iso-budget contour $G(t_\ell, t_k) = \bar{g}$ – which now changes its shape when equity concerns vary.

---

[12]Lévy-Garboua et al. (2009) experimentally show that workers who respond sensitively to violations of a tax equity norm refuse to work. This implies that higher tax rates (viz., more severe violations of the equity norm) lead to decreasing tax revenues. This undesirable Laffer curve effect has to be clearly distinguished from our observation where it may be optimal to bring the economy on the downward-sloped side of the (partial) Laffer curve.

[13]The positive sign of the bracketed expression is implied by $G_\ell > 0$ in (2.32).

For low levels of equity concerns, the effects are similar as in the "level effect"-scenario of the previous section: starting from $t_k = 0$, stronger equity concerns call for raising t_k and lowering t_ℓ. Eventually, higher equity concerns may call for an increase in the labor tax rate t_ℓ. However, unlike in the previous scenario, this does neither imply nor necessitate that the economy is on the decreasing leg of its Laffer curve. We demonstrate this in

Example 2. As above, preferences are parameterized by $u = c - 0.5 \cdot \psi \cdot \ell^2$. But now ψ is not a constant but a function given by

$$\psi = \psi_0 + 0.5 \cdot \beta \cdot (t_\ell - t_k)^2. \tag{2.35}$$

The level of spending is again exogenously fixed. Throughout the numerical examples, we set ψ_0 equal to 0.1 and $\bar{g} = 0.12$; all other parameters take on the same values as in Example 1.[14]

The four panels in Figure 2.2 depict the government iso-budget contour (solid line) and indifference curves (dashed lines) for different values of β. Unlike in Figure 2.1, the iso-budget contours vary with the strength of the equity norm. They move into the direction of the 45°-line in (t_ℓ, t_k)-space and tend to bend upwards when β increases. The reason is that (starting from a situation with $t_\ell > t_k$) a higher capital tax motivates people to work more. The same level of tax revenues can be generated at a lower labor tax than in the absence of incentive effects. Moreover, when work disincentives from tax differentials are very large, tax revenues can only be earned when the tax rates are sufficiently close to each other.[15] The effect of β on the shape of indifference curves looks qualitatively similar as in Figure 2.1.

Figure 2.2 shows that the optimal capital tax rate decreases monotonically with β. Initially, the tax rate on labor falls. However, as the transition from the third to the fourth panel shows, the labor tax rate eventually may increase again. Observe that all optimal tax mixes lie on the lower and decreasing arc of the iso-budget contours. I.e., tax revenues are increasing in either tax rate.

---

[14]For $\beta = 0$, scenarios here and in Example 1 coincide. Cf. also the upper left panels in Figures 1 and 2.

[15]In the extreme case when people only care for tax equity, $t_\ell = t_k$ must hold (for any given t_k); otherwise people would not supply any labor at all.

Fig. 2.2: TAX EQUITY WITH INCENTIVE EFFECTS. GOVERNMENT ISO-BUDGET CONTOURS (SOLID) AND INDIFFERENCE CURVES (DASHED) FOR VARYING VALUES OF β.
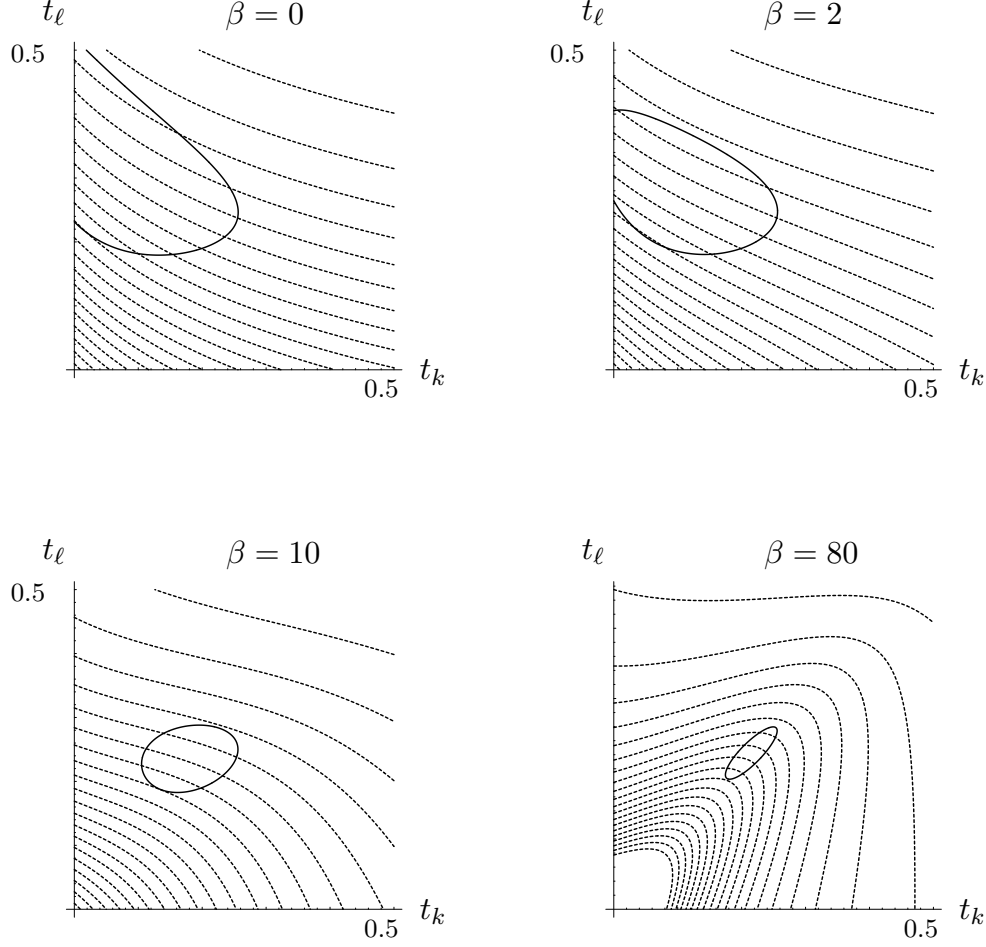
Result 3 *Suppose that a widening of the gap between labor and capital tax rates depress work incentives. Starting from weak levels, a stronger tax equity concern calls for a higher tax on capital and a lower tax on labor. However, if equity concerns become sufficiently intense, increasing the labor tax rate may eventually become optimal.*

2.4 Endogenous government expenditure

We now analyze the effects of tax equity concerns when government spending is endogenous. Such an analysis appears worthwhile since tax equity norms make government activities less desirable *per se*: they call for tax mixes that are excessively costly from a pure efficiency perspective; obedience to tax equity norms increases the marginal costs

of public funds. This might impact on the optimal level of government expenditures –
and a first intuition would suggest that greater concerns for tax equity call for smaller
governments. But we better have a closer look.

2.4.1 Capital taxation and the size of government

We recycle the set-up of Section 2.2. Again, the government chooses t_ℓ and t_k in order
to maximize social welfare (= indirect utility). Allowing g to vary rather than being
preset, the government objective function reads as

$$V(t_\ell, t_k) : = (w(r + t_k) - t_\ell) \cdot L^*(t_\ell, t_k) - E(L^*(t_\ell, t_k), \psi(t_\ell, t_k)) \qquad (2.36)$$
$$+ h(G(t_\ell, t_k)) - \Omega(t_\ell, t_k)$$

where $L^*(\cdot)$ and $G(\cdot)$ are defined as in (2.12) and (2.13). Differentiating V, as defined
in (2.36), with respect to tax rates (t_k, t_ℓ) and using the Envelope Theorem gives:

$$\frac{\partial V}{\partial t_\ell} = L^* \cdot [h'(G) - 1] + h'(G) \cdot (t_\ell + t_k k) \cdot \frac{\partial L^*}{\partial t_\ell} - E_\psi \cdot \psi_\ell - \Omega_\ell \qquad (2.37)$$

$$\frac{\partial V}{\partial t_k} = kL^* \cdot [h'(G) - 1] + h'(G) \cdot \left((t_\ell + t_k k) \cdot \frac{\partial L^*}{\partial t_k} + t_k k' L^* \right) - E_\psi \cdot \psi_k - \Omega_k$$

$$= k \cdot \frac{\partial V}{\partial t_\ell} + h'(G) t_k k' L^* + k\Omega_\ell - \Omega_k. \qquad (2.38)$$

These conditions give rise to

Result 4 *1. In the absence of tax equity concerns, capital should optimally never be
taxed.*

*2. In the presence of tax equity concerns, whether they shape incentives or just affect
utility levels, a zero tax rate on capital is never optimal.*

3. The level of the government-provided good is always[16] inefficiently low.

The analytical results on the tax structure and their interpretation coincide with
those in Section 2.3.1. Also the proof of items 1 and 2 is similar as for Result 1.

---

[16]There is one (immaterial) exception: With exogenous labor supply and in the absence of tax equity
concerns, government expenditures are optimally at their efficient level. This can be seen in (2.37)
when $\partial L^*/\partial t_\ell = \psi_\ell = \Omega_\ell \equiv 0$.

Consequently, we omit it (the optimality of a zero tax rate on capital was also proven by Fuest and Huber, 2001).

The under-provision of the government good in the absence of tax equity concerns (i.e., when $\psi_\ell = \Omega_\ell = 0$) can be seen from equating (2.37) to zero with $t_k = 0$; we then get the Atkinson-Stern Rule:

$$h'(G) = \frac{1}{1 + \frac{\partial \ell^S}{\partial w} \cdot \frac{t_\ell}{\ell^S}} > 1. \tag{2.39}$$

Hence, the marginal willingness-to-pay for the government good exceeds the marginal rate of transformation (which is equal to one). The reason for the under-provision is the financing through a distortionary (labor) tax. When tax equity concerns only affect the level of well-being (i.e., $\Omega_\ell > 0 = \psi_\ell$), the costs of public funds further increase since government expenditures will now partly be financed through the even less efficient capital tax.

2.4.2 Comparative statics with level effects

As in the previous section, let us consider the case that the feeling of inequitable taxation has no incentives effects, i.e., $\psi_k = \psi_\ell \equiv 0$. Only the level effect of tax equity concerns is operative. For simplicity (and as in Section 2.3) let us assume that Ω is given by (2.27): $\Omega = \tilde{\Omega}(\beta \cdot (t_\ell - t_k))$. Though comparative statics get quite messy, some reasonably general results are available. Our first finding is in the spirit of Result 2; it holds irrespective of whether labor supply is endogenous or exogenous:

Result 5 *Suppose that tax equity concerns are not too strong initially (i.e., β is positive, but small).*

1. *A more intense concern for tax equity, represented by an increase β, calls for a decrease in the tax rate on labor, an increase in the tax rate on capital and, consequently, a decrease in the tax rate differential.*

2. *The optimal level of government expenditures decreases when concerns for tax equity get stronger.*

The **proof** of this result is in Appendix 1. From the second item in Result 5, stronger concerns for tax equity call for cutting back the size of the public sector. The

intuition appears straightforward: Capital taxation is economically more costly than labor taxation. When equity concerns induce the economy to rely more heavily on the less efficient tax instrument, the (economic) opportunity costs of the government good rise. Consequently, its optimal provision level decreases.

While Result 5 sounds plausible, a strong caveat has to be added: the qualification of only weak equity concerns made in the proposition is indeed essential. If concerns with tax equity are strong already, a further intensification may call for an increase in labor taxes and/or a rise in government expenditures. This is illustrated by means of

Example 3:   As in Example 1, we choose $y = f(k) = k^\alpha$. To arrive at explicit solutions, we further suppose that labor supply is inelastic at some level $\bar{L} > 0$. Utility is then measured by $u = c - \Omega$, where $\Omega = 0.5\beta(t_\ell - t_k)^2$.

Fig. 2.3: Optimal policies when government spending is endogenous.
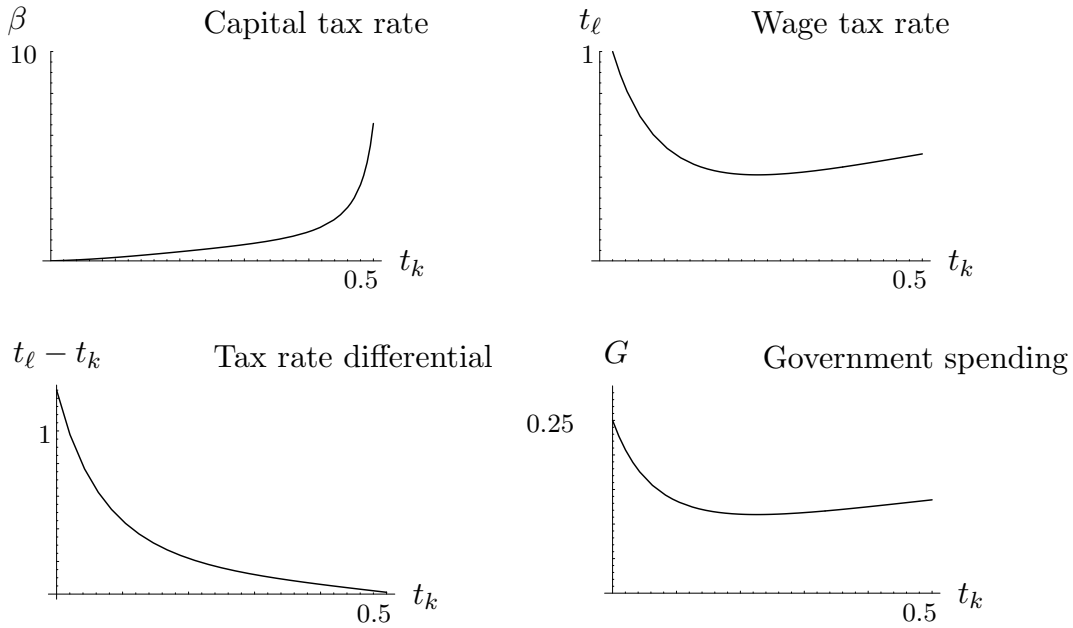
Figure 2.3 illustrates optimal policies when parameter values are set to $\bar{L} = 0.2$, $\alpha = 1/3$, and $r = 0.2$. The first graph shows that β and t_k are strictly positively related, as expected. The other three graphs plot, respectively, $(t_\ell - t_k)$, t_ℓ, and optimal government expenditure $G(t_\ell(\beta), t_k(\beta))$ against t_k – which translates, by the positive association between β and t_k from the first graph, into similarly shaped plots against

β. As can be seen, t_k and the tax rate differential $(t_\ell - t_k)$ move monotonically with β, but the labor tax rate initially falls and later rises when tax equity concerns intensify beyond some level. This eventual non-monotonicity of the labor tax rate in the strength of equity considerations may be explained as follows: With strong equity concerns, the tax rate on capital is quite high and government finance is economically quite costly.[17] To reduce the economic costs of a further narrowing (demanded by even stronger equity concerns) in the tax gap may then call for a stronger reliance on the labor tax, which is lump-sum here. Naturally, the increase in the labor tax must not offset the rise of the capital tax rate; the tax differential is bound to decrease.

The fourth graph in Figure 2.3 shows that also government expenditures are non-monotonic in β, first falling, then rising. The simultaneous increase in both tax rates just explained yields higher revenues for the government. Thus, the first-order intuition that an increase in the marginal costs of public funds (due to greater reliance on capital taxes, induced by larger equity concerns) always calls for smaller government is not correct. An equity-induced reduction in the tax spread may well go along with a larger government budget.

Result 6 *In spite of a greater reliance of government finance on capital taxes, stronger tax equity concerns may call for an expansion of government expenditures.*

Of course, Result 5 remains valid in that government expenditure is always inefficiently low in the presence of equity concerns, even though it may increase once equity concerns get stronger.[18]

The upper left panel in Figure 2.3 depicts a positive relationship between the strength of equity concerns and the optimal capital tax rate. Other than the effects shown in the remaining three panels, this relationship is indeed general in the case of exogenous labor supply, but not in the case of endogenous labor supply:

Result 7 *1. For endogenous government spending and exogenous labor supply, a stronger concern with tax equity always calls for an increase in the capital tax rate.*

---

[17]This effect is more severe the more elastically capital responds to higher taxation.

[18]In the example, an inelastic labor supply is assumed. Hence, the third item in Result 3 does not strictly apply (see previous footnote). Rather, in the example G is at its efficient level for $\beta = 0$: we have $G = 0.25$, which solves $1 = h'(G) = 0.5G^{-0.5}$.

2. *For endogenous government spending but endogenous labor supply, a stronger concern with tax equity may call for a lower tax rate on capital. A necessary (but insufficient) condition for this to occur is that the labor supply function is strictly convex in the net wage (i.e., $\partial^2 \ell^S / \partial w^2 > 0$).*[19]

The **proof** is in Appendix 2. Result 7 shows that the a priori intuition that a higher degree of tax equity calls for higher taxes on capital is only true for exogenous labor supply. For variable labor supply, a stronger concern for tax equity may also be associated with lower taxes on capital income, given that the labor supply function is sufficiently convex in the net wage. The reason is the following: With relatively strong concerns for tax equity the capital tax rate will optimally be positive (see Result 4). Even stronger equity concerns call for further narrowing the spread between labor and capital taxes. One way to achieve this is to cut back both tax rates, but with a larger reduction in the labor tax rate. Such tax cuts will increase the gross wage (lowering t_k boosts k), the net wage ($w - t_\ell$ rises), indirect utility V, and finally labor supply (both via the standard wage effect and the reduced disincentive by the smaller tax gap). If these effects are strong enough (here the convexity requirement jumps in), such a move need not reduce, and may even increase, government expenditure, rendering the joint tax cut indeed feasible and optimal. Recall, however, the necessary requirements: strong equity concerns and a highly elastic labor supply.

With invariant labor supply, only the comparative statics for the capital tax rates are unambiguously characterized in Result 7. All other comparative statics depend on the sign and magnitude of k'', i.e., on the curvature of the capital demand function or, which is the same, on the third derivative of the production function $f(k)$. In addition, the case of an endogenous labor supply entails a complex interaction between equity and efficiency effects: Closing the spread between labor and capital tax rates increases labor supply via reduced disincentives for work. On the other hand, it also raises the excess burden of taxation, due to the mobility of capital. These opposing effects make it virtually impossible to arrive at any predictions of at least moderate generality when fairness concerns are strong and labor supply is exogenous. However, Example 3 shows that counter-intuitive effects may arise already when labor supply is

---

[19]In our model, this convexity condition is equivalent to the marginal disutility from labor being concave: further implicit differentiation of (2.3) gives $\partial^2 \ell / \partial w^2 = E_{\ell\ell\ell} / (-E_{\ell\ell})^3$.

fixed; by a continuity argument they cannot be excluded in case of an endogenous labor supply either.

2.5 Conclusion

In this paper, we augmented a standard model for factor taxation in small open economies by concerns about tax equity. Violating standard neoclassical assumptions, we endowed individuals with direct preferences over tax rates, allowing for a distinction between equity considerations that shape work incentives and such that just scale up or down utility levels. Optimal tax policies have to balance three policy goals: (i) maintaining a solid capital base in spite of international mobility, (ii) generating sufficiently high tax revenue, and (iii) avoiding large imbalances between capital and labor taxation.

The third requirement upsets the standard recommendation of exempting capital from taxation. Moreover, our comparative statics reveal some unexpected non-monotonicities: With weak concerns about tax equity the tax on capital should be higher and the tax on labor and (endogenous) government expenditures should be lower, relative to an economy that is unconcerned with tax equity. However, with intense concerns for tax equity these intuitive patterns turn out to be unstable: capital taxes might decrease, labor taxes increase, and government expenditure go up.

The potential implications of concerns for tax equity on the optimal structure of factor income taxation can be substantial. Moreover, they vary considerably with the strength of equity motives. Yet, while from the arguments provided in the introduction (justice principles, fairness considerations, relative deprivation, envy, etc.) the prevalence of such equity concerns appears highly plausible, we can at present not provide any measurable evidence for their intensity. We hope that by demonstrating the potential policy relevance of equity concerns, we shall encourage empirical work on the subject.

2.6   Appendix 1: proof of result 5

Tax rates (item 1)

From (2.27), $\Omega_{\ell\beta} = -\Omega_{k\beta} = \tilde{\Omega}' + \beta(t_\ell - t_k)\tilde{\Omega}'' > 0$. Using (2.37) and (2.38), the comparative statics of (t_ℓ, t_k) with respect to β are given by:

$$\begin{pmatrix} V_{\ell\ell} & V_{\ell k} \\ V_{\ell k} & V_{kk} \end{pmatrix} \cdot \begin{pmatrix} \mathrm{d}t_\ell \\ \mathrm{d}t_k \end{pmatrix} = - \begin{pmatrix} V_{\ell\beta} \\ V_{k\beta} \end{pmatrix} \mathrm{d}\beta$$

$$= \left[\tilde{\Omega}' + \beta \cdot (t_\ell - t_k) \cdot \tilde{\Omega}'' \right] \cdot \begin{pmatrix} +1 \\ -1 \end{pmatrix} \mathrm{d}\beta$$

(with $V_{xy} = \partial^2 V/(\partial t_x \partial t_y)$ and $V_{x\beta} = \partial^2 V/(\partial t_x \partial\beta)$). Consequently, by Cramer's Rule:

$$\frac{\mathrm{d}t_\ell}{\mathrm{d}\beta} = \frac{1}{D} \cdot \left[\tilde{\Omega}' + \beta \cdot (t_\ell - t_k) \cdot \tilde{\Omega}'' \right] \cdot (V_{kk} + V_{\ell k}) \tag{2.40}$$

$$\frac{\mathrm{d}t_k}{\mathrm{d}\beta} = -\frac{1}{D} \cdot \left[\tilde{\Omega}' + \beta \cdot (t_\ell - t_k) \cdot \tilde{\Omega}'' \right] \cdot (V_{\ell\ell} + V_{\ell k}) \tag{2.41}$$

$$\frac{\mathrm{d}(t_\ell - t_k)}{\mathrm{d}\beta} = \frac{1}{D} \cdot \left[\tilde{\Omega}' + \beta \cdot (t_\ell - t_k) \cdot \tilde{\Omega}'' \right] \cdot (V_{\ell\ell} + V_{kk} + 2V_{\ell k}) . \tag{2.42}$$

Here,

$$D := V_{\ell\ell} V_{kk} - V_{\ell k}^2 \tag{2.43}$$

is the determinant of the matrix on the LHS of (2.28). In a welfare maximum, $D > 0$ as well as $V_{kk}, V_{\ell\ell} < 0$. From (2.27), $\Omega_{\ell\ell} = \Omega_{kk} = -\Omega_{\ell k} = \beta^2 \tilde{\Omega}'' > 0$. The claims in item 1 of Result 5 are, thus, proven if (but not only if) $V_{\ell k} < 0$.[20]

As an intermediate result (which will also be helpful in the proof of item 2) we report:

$$V_{\ell k} = k V_{\ell\ell} + A_1 \tag{2.44}$$

$$V_{kk} = k V_{\ell k} + A_2 \tag{2.45}$$

---

[20]In fact, this condition is overly strict. It would suffice that $V_{\ell k} < \max\{-V_{\ell\ell}, -V_{kk}\}$.

where we set

$$
A_1 \; := \; h''(G)\frac{\partial G}{\partial t_\ell}Lt_kk' - h'(G)t_kk'\frac{\partial \ell}{\partial w} + (k+1)\beta^2\tilde{\Omega}'' \geq 0; \tag{2.46}
$$

$$
A_2 \; := \; h''(G)Lt_kk'\frac{\partial G}{\partial t_k} - h'(G)kt_kk'\frac{\partial \ell}{\partial w} + h'(G)L(2k' + t_kk'')
$$

$$
- (k+1)\beta^2\tilde{\Omega}'' - h'k'\frac{\partial \ell}{\partial w}(t_\ell + t_kk) - k'L. \tag{2.47}
$$

Equations (2.44) and (2.45) are proven below.

From Result 3 we get that $t_k = 0$ for $\beta = 0$. Hence, $A_1 = 0$ in this case. However, then $V_{\ell k} < 0$ follows from (2.44). Hence, at $\beta = 0$, we get from (2.40 to 2.42) that $\frac{\mathrm{d}t_\ell}{\mathrm{d}\beta} < 0$, $\frac{\mathrm{d}t_k}{\mathrm{d}\beta} > 0$, and $\frac{\mathrm{d}(t_\ell - t_k)}{\mathrm{d}\beta} < 0$. By continuity, the same holds for small positive values of β (and, thus, t_k). ∎

Government expenditures (item 2)

Observe that

$$
\frac{\mathrm{d}G}{\mathrm{d}\beta} \; = \; G_k \cdot \frac{\mathrm{d}t_k}{\mathrm{d}\beta} + G_\ell \cdot \frac{\mathrm{d}t_\ell}{\mathrm{d}\beta}.
$$

Suppose now that $\beta = 0$ and, thus, $t_k = 0$ (from Result 3). Then, using (2.15) and (2.14), we obtain

$$
\begin{aligned}
\frac{\mathrm{d}G}{\mathrm{d}\beta} &= \left(\frac{\partial L}{\partial t_k}t_\ell + L^*k\right) \cdot \frac{\mathrm{d}t_k}{\mathrm{d}\beta} + \left(\frac{\partial L}{\partial t_\ell}t_\ell + L^*\right) \cdot \frac{\mathrm{d}t_\ell}{\mathrm{d}\beta} \\
&= \left[\frac{\partial L}{\partial t_\ell}t_\ell + L^*\right] \cdot \left(k\frac{\mathrm{d}t_k}{\mathrm{d}\beta} + \frac{\mathrm{d}t_\ell}{\mathrm{d}\beta}\right) \\
&= G_\ell \cdot \left(k\frac{\mathrm{d}t_k}{\mathrm{d}\beta} + \frac{\mathrm{d}t_\ell}{\mathrm{d}\beta}\right).
\end{aligned}
$$

Recall that $G_\ell > 0$ in an optimum.[21] Hence, $\frac{\mathrm{d}G}{\mathrm{d}\beta} < 0$ if and only if $k\frac{\mathrm{d}t_k}{\mathrm{d}\beta} + \frac{\mathrm{d}t_\ell}{\mathrm{d}\beta} < 0$. Verify that, using (2.44) and (2.45) and the fact that $A_1 = 0$ for $\beta = 0$,

$$
\begin{aligned}
k\frac{\mathrm{d}t_k}{\mathrm{d}\beta} + \frac{\mathrm{d}t_\ell}{\mathrm{d}\beta} &= \frac{1}{D} \cdot \left[\tilde{\Omega}' + \beta \cdot (t_\ell - t_k) \cdot \tilde{\Omega}''\right] \cdot (-kV_{\ell\ell} - kV_{\ell k} + V_{kk} + V_{\ell k}) \\
&= \frac{1}{D} \cdot \left[\tilde{\Omega}' + \beta \cdot (t_\ell - t_k) \cdot \tilde{\Omega}''\right] \cdot \left(-k^2V_{\ell\ell} + k(kV_{\ell\ell} + A_1) + A_2\right) \\
&= \frac{A_2}{D} \cdot \left[\tilde{\Omega}' + \beta \cdot (t_\ell - t_k) \cdot \tilde{\Omega}''\right]. \tag{2.48}
\end{aligned}
$$

---

[21] See (2.37) and (2.38): Conditions $V_\ell = V_k = 0$ require that $G_\ell > 0$ and $G_k - \frac{1}{h'}\Omega_k > 0$, respectively.

In (2.48) both the square-bracketed expression and D are positive. Moreover, using the definition of D in (2.43) and, again, (2.44) and (2.45) and the fact that $A_1 = 0$ at $\beta = 0$,

$$D = V_{\ell\ell}(A_2 - kA_1) - A_1^2 = V_{\ell\ell}A_2.$$

As $V_{\ell\ell} < 0$ in an optimum, D being positive necessitates $A_2 < 0$. In turn, we get that (2.48) is negative and, thus, $\frac{\mathrm{d}G}{\mathrm{d}\beta} < 0$ at $\beta = 0$. Again, by continuity, this also holds for $\beta > 0$, but small. ∎

Proof of (2.44) and (2.45)

Calculate:

$$
\begin{aligned}
V_{\ell\ell} &= -\frac{\partial L}{\partial t_\ell} + h''(G)\left(\frac{\partial G}{\partial t_\ell}\right)^2 + h'(G)\frac{\partial^2 G}{\partial t_\ell^2} - \Omega_{\ell\ell} \\
&= \frac{\partial \ell}{\partial w} + h''(G)\left(L - (t_\ell + t_k k)\frac{\partial \ell}{\partial w}\right)^2 + h'(G)\left(2\frac{\partial L}{\partial t_\ell} + (t_\ell + t_k k)\frac{\partial^2 L}{\partial t_\ell^2}\right) - \Omega_{\ell\ell} \\
&= \frac{\partial \ell}{\partial w} + h''(G)\left(L - (t_\ell + t_k k)\frac{\partial \ell}{\partial w}\right)^2 + h'(G)\left(-2\frac{\partial \ell}{\partial w} + (t_\ell + t_k k)\frac{\partial^2 \ell}{\partial w^2}\right) - \\
&\quad \beta^2 \tilde{\Omega}''.
\end{aligned}
\tag{2.49}
$$

Moreover,

$$
\begin{aligned}
V_{\ell k} &= -\frac{\partial L}{\partial t_k} + h''(G)\frac{\partial G}{\partial t_\ell}\frac{\partial G}{\partial t_k} + h'(G)\frac{\partial^2 G}{\partial t_\ell \partial t_k} - \Omega_{\ell k} \\
&= k\frac{\partial \ell}{\partial w} + h''(G)\left(L - (t_\ell + t_k k)\frac{\partial \ell}{\partial w}\right)\left(L(k + t_k k') + (t_\ell + t_k k)\frac{\partial L}{\partial t_k}\right) \\
&\quad + h'(G)\left(\frac{\partial L}{\partial t_k} + (k + t_k k')\frac{\partial L}{\partial t_\ell} + (t_\ell + t_k k)\frac{\partial^2 L}{\partial t_\ell \partial t_k}\right) - \Omega_{\ell k} \\
&= k\frac{\partial \ell}{\partial w} + h''(G)\left(L - (t_\ell + t_k k)\frac{\partial \ell}{\partial w}\right)\left(k\left[L - (t_\ell + t_k k)\frac{\partial \ell}{\partial w}\right] + Lt_k k'\right) \\
&\quad + h'(G)\left(-2k\frac{\partial \ell}{\partial w} - t_k k'\frac{\partial \ell}{\partial w} + k(t_\ell + t_k k)\frac{\partial^2 \ell}{\partial w^2}\right) - \Omega_{\ell k} \\
&= kV_{\ell\ell} + A_1.
\end{aligned}
$$

With A_1 as defined in (2.46), this is (2.44). Finally,

$$
\begin{aligned}
V_{kk} &= w'\frac{\partial L}{\partial t_k} + Lw'' + h''(G)\left(\frac{\partial G}{\partial t_k}\right)^2 + h'(G)\frac{\partial^2 G}{\partial t_k^2} - \Omega_{kk} \\
&= k^2\frac{\partial \ell}{\partial w} - Lk' + h''(G)\left(k\left[L - (t_\ell + t_k k)\frac{\partial \ell}{\partial w}\right] + Lt_k k'\right)^2 \\
&\quad + h'(G)\left(2(k + t_k k')\frac{\partial L}{\partial t_k} + (t_\ell + t_k k)\frac{\partial^2 L}{\partial t_k^2} + (2k' + t_k k'')L\right) - \Omega_{kk} \\
&= k^2\frac{\partial \ell}{\partial w} - Lk' + h''(G)\left(k\left[L - (t_\ell + t_k k)\frac{\partial \ell}{\partial w}\right] + Lt_k k'\right)^2 \\
&\quad + h'(G)\left(-2k^2\frac{\partial \ell}{\partial w} - kt_k k'\frac{\partial \ell}{\partial w} + k^2(t_\ell + t_k k)\frac{\partial^2 \ell}{\partial w^2} + (2k' + t_k k'')L - kt_k k'\frac{\partial \ell}{\partial w}\right) \\
&\quad - h'(G)\left(k'\frac{\partial \ell}{\partial w}(t_\ell + t_k k)\right) - \Omega_{kk} \\
&= k^2\frac{\partial \ell}{\partial w} - Lk' + h''(G)\left\{k\left(L - (t_\ell + t_k k)\frac{\partial \ell}{\partial w}\right)\left(k\left[L - (t_\ell + t_k k)\frac{\partial \ell}{\partial w}\right] + Lt_k k'\right)\right. \\
&\quad \left. + Lt_k k'\left(Lt_k k' + k\left(L - (t_\ell + t_k k)\frac{\partial \ell}{\partial w}\right)\right)\right\} \\
&\quad + h'(G)\left(-2k^2\frac{\partial \ell}{\partial w} - kt_k k'\frac{\partial \ell}{\partial w} + k^2(t_\ell + t_k k)\frac{\partial^2 \ell}{\partial w^2} + (2k' + t_k k'')L\right) \\
&\quad - h'(G)\left(kt_k k'\frac{\partial \ell}{\partial w} - k'\frac{\partial \ell}{\partial w}(t_\ell + t_k k)\right) - \Omega_{kk} \\
&= kV_{\ell k} + A_2.
\end{aligned}
$$

With A_2 as defined in (2.47), this coincides with (2.45). ∎

2.7 Appendix 2: proof of result 7

Exogenous labor supply (item 1)

From (2.41), $\mathrm{d}t_k/\mathrm{d}\beta$ is opposite in sign to $V_{\ell\ell} + V_{\ell k}$. Using (2.44), we get that $V_{\ell\ell} + V_{\ell k} = (1+k)V_{\ell\ell} + A_1$. With exogenous labor supply, (2.46) gives $A_1 = h''(G)L^2 t_k k' + (k+1)\beta^2\tilde{\Omega}''$. Moreover, from (2.49), $V_{\ell\ell} = h''(G)L^2 - \beta^2\tilde{\Omega}''$ when labor supply is exogenous. Hence,

$$
V_{\ell\ell} + V_{\ell k} = h''(G)L^2(1 + k + t_k k') = h''(G)L(G_\ell + G_k) < 0,
$$

where we used (2.15) and (2.14) and exploited that from (2.32), it follows that

$$G_\ell + G_k = (1 + \frac{1}{k})(G_k - \frac{1}{h'}\Omega_k) \tag{2.50}$$

must be positive in an inner solution.[22] Thus, $\mathrm{d}t_k/\mathrm{d}\beta > 0$. ∎

Endogenous labor supply (item 2)

From (2.41) and 2.44, $\text{sign}[\mathrm{d}t_k/\mathrm{d}\beta] = -\text{sign}[(1+k)V_{\ell\ell} + A_1]$. With endogenous labor supply, (2.49) and (2.46) give

$$(1+k)V_{\ell\ell} + A_1 \tag{2.51}$$
$$= \underbrace{\frac{\partial \ell}{\partial w}(1+k)(1h')}_{<0} + \underbrace{h''G_\ell(G_\ell + G_k)}_{<0} + \underbrace{h'(-\frac{\partial \ell}{\partial w})(1 + k + t_k k')}_{<0} + h'(t_\ell + t_k k)\frac{\partial^2 \ell}{\partial w^2}(1+k).$$

Here we used that $\Omega_{kk} = -\Omega_{\ell\ell}$. The first and second term on the RHS of (2.51) are negative since $h' > 1$, $G_\ell > 0$ and $G_\ell + G_k > 0$ must hold in an inner optimum. The sign of the third term in (2.51) can be determined from (2.15), (2.14) and (2.50) which yield that $L(1 + k + t_k k') = G_\ell + G_k + \frac{\partial \ell}{\partial w}(t_\ell + t_k k)(1 + k) > 0$. Thus, $\partial^2 \ell/\partial w^2 < 0$ is sufficient for (2.51) to be negative and, thus, for $\mathrm{d}t_k/\mathrm{d}\beta > 0$. ∎

---

[22]See also footnote 21. Note that in (2.32) we have to substitute for λ with h' to obtain the analogue for endogenous government spending.

Chapter 3

Fairness Spillovers: The Case of Taxation[1]

3.1 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, 2006), the belief that others do not 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 mail-

---

box 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.[2] 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 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

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[2]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).

"Very Angry", about one fifth get "Somewhat Angry" while only one out of ten said they "Don't think about it".[3] 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. 2011). While Kleven et al. (2011) 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 at 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 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

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[3]Economist/YouGov Poll, conducted March 22-24, 2009.

of not fulfilling the norm of paying ample taxes.[4] The German Socio-Economic Panel (GSOEP) provides data on absenteeism and also inquires about the belief that the rich do not 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 result 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, 2011); 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

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[4]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).

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 3.2 explains the choice of variables, describes the data and gives some descriptive statistics. Section 3.3 presents the empirical results. Section 3.4 discusses alternative explanations for the findings, and section 3.5 concludes.

3.2 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 [...]'.[5] Such drastic violent acts are rare, but each year the US tax authorities are faced with a substantial number of threats against employees.[6] 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.[7] 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

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[5]See http://www.nytimes.com/2010/02/19/us/19crash.html.

[6]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.

[7]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.

for those earning more than $250,000.[8] 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.[9] Given the large share of individuals that is discontent with the current state of taxation, we suspect that these people do not 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 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.[10] 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

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[8]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`, and a Fox News poll at `http://www.foxnews.com/projects/pdf/030509_Poll.pdf`.

[9]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.

[10]See Wagner et al. (2007) for a description of the panel survey.

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 3.1 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.[11] 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 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.[12] Quite the contrary, this view is held by a wide range of individuals from different social backgrounds.

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

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[11]Perhaps not surprisingly, the view that managers pay too much in taxes is only held by 6% of the respondents.

[12]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`. 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.

Tab. 3.1: ARE MANAGERS BEING TAXED TOO LITTLE?

	full	income quartiles				hierarchy in occupation			worker class	
	sample	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
N	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
N	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 3.3. 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.

Tab. 3.2: DAYS ABSENT BY ANSWER TO 'ARE MANAGERS TAXED TOO LITTLE?'.

	managers taxed too little		difference in
	yes	no	days absent
managers taxed too little (%)	72.1	27.9	
Days absent by answer category	8.34	5.58	2.76***
	(.31)	(.32)	(.54)
N	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). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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 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 3.2 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.

3.3 Estimation results

The descriptive statistics presented in Section 3.2 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 3.8 in the Appendix gives descriptions of all variables used in the analysis, with the corresponding summary statistics displayed in Table 3.9 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.

3.3.1 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.[13]

Table 3.3 provides the results from linear OLS estimations. Column (1) reproduces the raw differential presented in Table 3.2 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.[14] A first natural candidate to control for is a person's individual health.[15] 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.[16] 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

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[13]We exclude individuals who report more than 250 sick days, the maximum number of workdays per year.

[14]The only reason that these numbers diverge slightly is that the descriptives in Table 3.2 are based on the smaller sample which is used in the full specification (6).

[15]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.

[16]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.

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 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 3.2, does not seem

Tab. 3.3: 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)
Personal characteristics												
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)
Job related variables												
tenure							.2354***	(0.082)	.2179***	(0.084)	.1966***	(0.084)
tenure sq							-.0067***	(0.002)	-.0068***	(0.002)	-.0062***	(0.002)
full time experience							-.1406	(0.137)	-.1693	(0.142)	-.1914	(0.135)
full time experience sq							.0029	(0.003)	.0032	(0.003)	.0049	(0.003)
part time experience							.0848	(0.161)	.054	(0.165)	.0822	(0.139)
part time experience sq							-.0054	(0.004)	-.0049	(0.004)	-.004	(0.004)
part time[a]							-1.694*	(0.965)	-1.449	(1.032)	-1.407	(1.015)
marginally employed							-6.492***	(1.167)	-6.459***	(1.201)	-6.31***	(1.223)
Firm level variables												
20<=employees<200[b]									1.546***	(0.699)	1.579**	(0.714)
200<=employees<2000									3.696***	(0.808)	3.224***	(0.796)
employees>=2000									3.079***	(0.708)	2.849***	(0.712)
agriculture[c]									-3.385***	(1.530)	-3.224**	(1.521)
mining/energy									4.606	(2.865)	5.25*	(2.967)
processing									-.4616	(0.924)	-.0545	(0.900)
traffic/media									.8531	(1.079)	.7244	(1.033)
construction									1.819	(1.565)	2.045	(1.610)
wholesale									1.368	(1.075)	1.641	(1.087)
services									-.473	(0.762)	-.3028	(0.743)
banking/insurance									-.1163	(0.945)	.3499	(0.946)
public sector									.2814	(0.803)	.6824	(0.752)
Personal attitudes												
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	-3.2e+04		-3.2e+04		-2.4e+04		-2.4e+04		-2.2e+04		-2.1e+04	
R^2	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'. $*\ p < 0.10$, $**\ p < 0.05$, $***\ p < 0.01$.

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 3.4 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.[17] 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 η^2 in the two other models – the standard errors produced by the Poisson model systematically underestimate the true standard errors. Inference should therefore be based on the Negative Binomial and QMLE models.[18] 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.

3.4 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 mecha-

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[17]See Wooldridge (2002) for details.

[18]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.

Tab. 3.4: 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)
Personal characteristics						
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)
Job related variables						
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[a]	−.1634***	(0.020)	−.178*	(0.103)	−.1785*	(0.099)
marginally employed	−1.195***	(0.050)	−.9221***	(0.182)	−.9255***	(0.231)
Firm level variables						
20<employees<200[b]	.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[c]	−.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)
Personal attitudes						
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	
η^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. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

nisms 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.

3.4.1 '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 3.5 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 3.4 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 beliefs 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.[19] 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 3.3.1: 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 do not 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.

3.4.2 'Complainers' and general pessimism

Another objection is the idea that believing in an unjust world – and the belief the rich do not 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 3.5 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

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[19]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.

precise.

3.4.3 Direct reciprocity

There is also some concern that the statement 'managers of large companies do not 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 3.6).

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 3.5. 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.

Tab. 3.5: ROBUSTNESS CHECKS.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
managers taxed too little	.2558***	.241***	.2628***	.2532***	.2572***	.2532***	.2534***	.2566***	.1783**	.2463***	.1705**	.2259***
	(0.061)	(0.061)	(0.060)	(0.061)	(0.061)	(0.061)	(0.061)	(0.061)	(0.073)	(0.062)	(0.075)	(0.072)
effective average tax rate		−.1152								−.1298	−.3533	
		(0.292)								(0.297)	(0.365)	
unfavorable job prospects			.0841**							.0857**	.1499***	
			(0.041)							(0.042)	(0.049)	
achievements determined by luck				.1442**						.1687***	.0565	
				(0.063)						(0.063)	(0.079)	
leftist/right					−.0067					−.0033	−.0264	
					(0.016)					(0.016)	(0.018)	
pessimist						−.0014				−.0233	−.0955	
						(0.062)				(0.063)	(0.076)	
life satisfaction							−.0087			−.0007	.0181	
							(0.021)			(0.022)	(0.025)	
own income unfair								−.0042		−.0123	.0097	
								(0.059)		(0.059)	(0.070)	
manager income unfair									.1936**		.1798**	
									(0.077)		(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 3.4. 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 a variable that measures the respondent is with life overall (higher values indicate higher 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). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Tab. 3.6: DIRECT RECIPROCITY. SAMPLE SPLIT BY FIRM SIZE.

	(< 20)	$(20 - 199)$	$(200 - 1999)$	(≥ 2000)
managers taxed too little	.3211**	.3116***	.3019***	.0663
	(0.139)	(0.109)	(0.109)	(0.095)
N	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 3.3. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

3.4.4 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.[20] 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 are associated with higher levels of worker absenteeism.

3.4.5 Sensitivity test: simulated confounder

Columns (10) and (11) of Table 3.5 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

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[20]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.)

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 $s = p_{1.} - p_{0.}$, with $p_{1.} = P(U = 1|T = 1)$ and $p_{0.} = P(U = 1|T = 0)$. 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 3.3.[21]

Table 3.7 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 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 3.1: 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

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[21]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).

Tab. 3.7: SENSITIVITY CHECKS.

		d = 0.1	d = 0.2	d = 0.3	d = 0.4	d = 0.5	d = 0.6
s = 0.1	β	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
	δ_A	0.07	0.13	0.19	0.25	0.31	0.36
	δ_M	0.08	0.08	0.08	0.07	0.07	0.07
s = 0.2	β	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
	δ_A	0.06	0.13	0.19	0.26	0.32	0.38
	δ_M	0.16	0.16	0.16	0.16	0.16	0.16
s = 0.3	β	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
	δ_A	0.07	0.13	0.20	0.27	0.34	0.41
	δ_M	0.25	0.24	0.24	0.24	0.24	0.24
s = 0.4	β	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
	δ_A	0.07	0.15	0.22	0.30	0.38	0.45
	δ_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 3.3. The strength of the confounder rises with the parameters d and s (see text for details). In the table, the rows labeled β 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. δ_A denotes the partial effect of the confounder on the probability of having above-average absenteeism, δ_M denotes its partial effect on fairness beliefs about manager taxes. With rising δ_A and δ_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). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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.

3.5 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 do not 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.[22]

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. In the end, this study can be considered as a

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[22]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.

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 do not 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.

3.6 Appendix

Fig. 3.1: OBSERVED DAYS ABSENT VS POISSON/NEGATIVE BINOMIAL DISTRIBUTION.
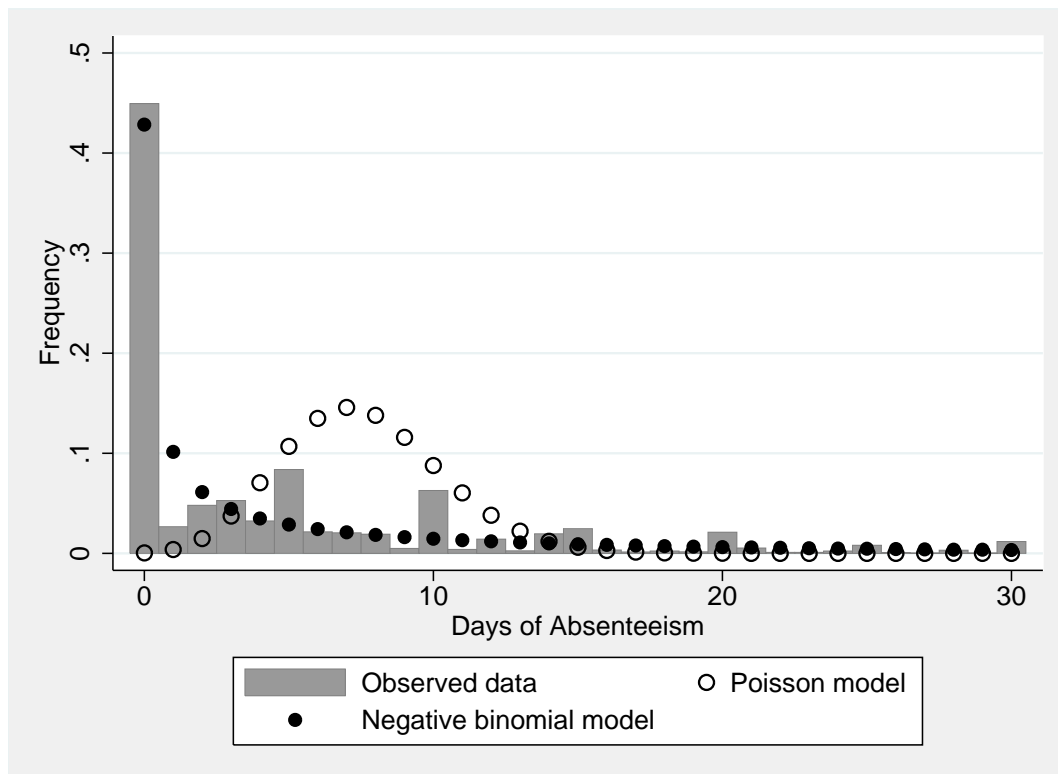
Note: The figure compares the observed distribution of the days of absenteeism with the distributions predicted from unconditional Poisson and Negative Binomial (Negbin II) count-data models. Due to overdispersion (mean 7.57, overdispersion parameter 4.09), the Negative Binomial model gives a better 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.

Tab. 3.8: DESCRIPTION OF VARIABLES.

Variable	Description
Main variables	
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).
Personal characteristics	
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).
Job related variables	
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.
Firm level variables	
20≤employees< 200	indicator variable, 1 if number of employees at current employer 20<employees<200.
200≤employees<2000	indicator variable, 1 if number of employees at current employer 200<=employees<2000.
employees≥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.
Personal attitudes	
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).
Robustness checks	
effective avg tax rate	1-(net monthly income in Euros/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.
Other	
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.

Tab. 3.9: SUMMARY STATISTICS.

	N	Mean	Std. Dev.	Min	Max
Main variables					
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
Personal characteristics					
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
Job related variables					
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
Firm level variables					
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
Personal attitudes					
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
Robustness checks					
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

Chapter 4

Testing for the Behavioral Asymmetry of Tax Fairness

Perceptions: Evidence From Absenteeism

4.1 Introduction

People often complain about unfairness in taxation. Typically, these complaints do not only refer to the own personal situation, but involve a number a quite abstract dimensions which refer to the tax structure or the tax system as a whole (Wenzel, 2003). Tax unfairness can be felt between occupations or industries, between different kinds of properties, between the married and the unmarried, or between men and women. However, one of most prominent dimensions of tax fairness is along income lines and involves a vertical perspective, i.e., whether or not the burden of taxes is distributed evenly across different levels of income (Kinsey and Grasmick, 1993). And there, a remarkable agreement in beliefs across space and time occurs: usually, a large majority feels that higher-income earners are not paying their fair share while the working poor are thought to be overtaxed (Song and Yarbrough, 1978; Wallschutzky, 1984; Kirchler, 2007). According to the International Social Survey Program from 1992, the percentage of respondents saying that top earners pay too little in taxes ranged from 41.4% in Australia to roughly 65% in Germany and the U.S., with Italy ranking the highest at 70.9%.[1] The share of respondents considering the tax system as unfair to the poor was even larger. Across industrialized countries, far beyond 50% said that taxes for low-incomes are 'too high' or 'much too high', ranging from 68.8% in Australia to 98.1% in

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[1] For the exact question wording and an illustration of the ISSP data, see the Appendix, Figure 4.2.

Italy.[2]

At first, complaints about the fairness of tax systems are expressions of opinions. Psychological research (as well as everyday experience) suggests that concerns over tax inequity can be associated with moral indignation and sometimes rather strong emotional repercussions (Rawlings, 2003; Braithwaite, 2003). More interesting from an economic perspective is whether these opinions translate into behavior, and thus, are materially relevant.

Tax complaints can be more than just 'cheap talk', as suggested in the literature on tax evasion. Individuals perceiving stronger inequities in the tax system are more likely to engage in tax evasion behavior or tax avoidance schemes (for a survey, see, e.g., Feld and Frey, 2002). Little is known whether it makes a difference 'where' the unfairness is perceived, i.e. whether the complaints refer to the top or the bottom of the income distribution. E.g., Porcano (1988) uses a single measure for a respondent's view on tax justice which aggregates information from whether he/she thinks that the tax system treats everyone fairly or whether certain types of taxpayers (based on income) received favorable treatment. Similarly, in Kinsey and Grasmick (1993) respondents choose on a 6-point scale whether they agreed or disagreed that 'the present tax system benefits the rich and is unfair to ordinary working people' – again a measure that does not treat perceptions about upper and lower brackets separately.

In this paper, we disaggregate concerns over vertical tax equity into the two beliefs that, first, the rich pay too little (upward unfairness) and, second, that the poor pay too much in taxes (downward unfairness). We study whether there are behavioral differences between perceived 'upward' and 'downward' perceptions of tax fairness. To do so, we use a slightly different setup than in the tax evasion literature.[3] Instead of relating tax fairness beliefs to tax morale, we associate them with *work* morale, which we measure by worker absenteeism due to illness. The reasons for using a different dependent variable are as follows. First, by taking a classical labor market variable, we can employ a survey data set with a huge range of background information including an individual's fundamental value orientation and attitudes. This strategy helps to empirically disentangle tax fairness perceptions from socio-economic characteristics

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[2]See the Appendix, Figure 4.3.
[3]This general framework has been suggested by Cornelissen et al. (2010).

(education, social status etc.) and 'other' fairness-related beliefs and attitudes (e.g., perceived income fairness, general pessimism) which mitigates issues of unobserved heterogeneity. Second, we want to have an outcome variable over which individuals possess a high degree of control. For a large part of the population, tax evasion is not a viable option since their income is predominantly taxed at source which makes the manipulation of tax returns difficult (see, e.g., Kleven et al., 2011). Work absenteeism, as we will argue, can be considered as a direct choice in the framework we use, thus reducing the risk of underestimating the behavioral potential of tax fairness perceptions.

Our findings are as follows. Perceptions of downward fairness hardly trigger behavioral responses. The only subsample where we find a significant connection between the belief that the poor are overtaxed and absenteeism behavior is the poor themselves. In contrast, upward unfairness really matters: people who perceive it do have significantly higher levels of sickness leave. This holds before and after controlling for health, income, education and several other observable characteristics. The difference in absenteeism rates is substantial: Our estimates imply that employees who believe that top earners are undertaxed show more than 20 percent higher levels of absenteeism compared to workers who do not hold this belief. This connection decreases when moving up the social ladder, but is still found for people with higher social status, and interestingly, even for the rich themselves.

In positing a positive link between perceived unfairness of taxing high-income earners and absenteeism rates, we confirm the standard result of the literature on tax evasion: beliefs about abstract features of the tax system can be highly significant drivers of economic behavior. Our findings suggest that these beliefs matter even outside the narrow realm of taxation and may shape economic incentives above and beyond the willingness to pay taxes. The novelty of this paper is that the behavioral implications of tax fairness perceptions are not symmetric in the sense that perceptions of upward unfairness in the tax system seem to impact on economic behavior, while beliefs about downward fairness do not trigger the same kind of adjustments. This asymmetry is not reflected in standard theories of justice. It seems to imply that the pity for a high tax burden of the poor is just expressive.

The rest of this paper is organized as follows. Section 4.2 presents the data and explains the estimation method. Section 4.3 sets out the results. In Section 4.4, we

discuss to what extent the behavioral asymmetry of tax fairness perceptions can be explained in light of traditional fairness theories. Section 4.5 concludes.

4.2 Data and estimation procedure

4.2.1 Data

While opinion polls regularly indicate that people have strong attitudes towards equity features of the tax system, tax fairness questions are discarded in most large-scale surveys. The 2005 wave of the German Socio-Economic Panel (GSOEP) is an exception: it asks respondents how to evaluate the burden of taxes of 'managers' and 'unskilled workers'. Given the framing of the tax fairness questions, we take these two occupational groups to represent the upper and the lower end of the income scale, i.e. the 'rich' and the 'poor'. 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'). What do you think: Is the amount of taxes paid by an unskilled worker in Germany too much compared to other groups, too little, or exactly appropriate? [...] 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?

Though respondents could principally choose that workers pay too little and managers pay too much in taxes, this virtually never happen. Only 0.8% of the GSOEP respondents say that unskilled workers pay less than their fair share of taxes whereas the share of people saying that managers (top earners) are taxed too heavily relative to others is about 4%. These views would be examples of perceived injustice in taxation, but the number of observations is too low to treat them separately in regressions. We therefore focus on the two pervasive perceptions of 'upward 'and 'downward' unfairness in the tax system, i.e. on the beliefs that the rich are under- and the poor are overtaxed. To represent the former perception, we create a dummy variable that takes on the value 1

when respondents say that managers are taxed too little and 0 when they choose that managers pay an 'appropriate amount' or 'too much' in taxes (after deleting the "don't know" responses). We will refer to this variable as the *mtax_toolittle* indicator. Perceived downward unfairness is captured by the dummy *wtax_toomuch* which is coded as 1 when individuals answer that unskilled workers are taxed too much (the reference category is that workers pay an 'appropriate amount' or 'too little' in taxes).

Table 4.1 reports the distribution of the variables *mtax_toolittle* and *wtax_toomuch* over our sample that we restrict to include employees only.[4] Two things deserve to be noticed. First, perceptions of upward unfairness are somewhat more common than that of downward unfairness. This can be seen from the total sample (first row of Table 4.1), but also when we divide the sample according to different dimensions of socio-economic class. In all subsamples, the share of employees saying that managers pay too little is roughly 15 to 20 percentage points higher than the share of respondents feeling that workers are taxed too much. Second, the subsample descriptives suggest that the response pattern is not orthogonal to social class: Both the shares of respondents stating that unskilled workers pay too much and that managers pay too little tend to decrease when moving up the social ladder. However, even in the highest categories, these beliefs are held by a considerable percentage of people, indicating that perceptions of upward and downward unfairness are deeply grounded in the German population.

The response variable to perceived tax unfairness we will use in this study is the number of days being absent from work due to illness. In Germany, there is no reduction of payments for sickness spells of up to six weeks and, for sickness spells up to three days, employees are usually not even obliged to provide a doctor's note. In addition, Germany has high levels of job protection. We follow the labor economics literature (see, e.g., Barmby et al., 1994; Johansson and Palme, 1996; Henrekson and Persson, 2004) and assume that such a legal generosity provides individuals with incentives to use a sick day for other reasons than sickness itself and take absenteeism behavior as partly

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[4]From the whole sample consisting of 20971 observations, we exclude self- and non-employed individuals. By definition, unemployed individuals cannot have sick leave. Likewise, it would be odd to interpret absenteeism from work due to illness as a measure of intrinsic work motivation for self-employed individuals since these individuals have no incentives to use sickness leave for other reasons than illness (self-employed usually do not receive 'replacement' payments). For further explanation of the German sickness insurance system, see below. The descriptives are shown for individuals having non-missings for the variables used in the main regression Table 4.2. This leaves us with a total of 5122 observations at maximum.

Tab. 4.1: TAX FAIRNESS PERCEPTIONS IN GERMANY.

	wtax_toolittle			mtax_toomuch		
	0	1	N	0	1	N
full sample	46.29	53.71	5196	27.74	72.26	5201
income quintile						
1. quintile	42.29	57.71	759	22.13	77.87	759
2. quintile	38.57	61.43	980	21.53	78.47	980
3. quintile	39.14	60.68	1068	23.27	76.73	1070
4. quintile	47.33	52.67	1215	27.14	72.86	1216
5. quintile	60.73	39.27	1174	41.24	58.76	1176
worker class						
blue	31.80	69.20	1448	18.15	81.85	1449
white	51.76	48.24	3012	32.04	67.96	3015
position in job hierarchy						
low tier	25.51	74.49	729	19.08	80.93	729
middle tier	44.92	55.08	2943	24.37	75.63	2946
management level/top tier	60.60	39.40	1358	39.93	60.07	1360

Note: Data is taken from the 2005 wave of the German Socio-Economic Panel. Sample consists of the observations used in the full specifications in Table 4.2.

reflecting an individual's intrinsic work motivation or willingness to shirk at work.

Clearly, there are other measures of individual work strain, e.g. weekly work hours, overtime work, full versus half-time employment etc. However, one problem with such variables is that they are partly determined on the market, and hence, shaped by factors beyond personal control (supply shocks, labor market regulation etc).[5] Moreover, changes in these variables are typically accompanied by monetary repercussions. Though this would not be a problem per se, since individuals have been shown to react to perceived injustice even when this is associated with losses for themselves, there is a consensus among economists that behavioral reactions to perceived unfairness are more likely with low-cost choices taking place outside competitive markets (see, e.g., Fehr and Schmidt, 2006).

Information on individual sick leave is obtained from the following GSOEP question: "How many days were you not able to work [last year] because of illness?" Because of the retrospective nature of the question we draw information on work absence from the 2006 GSOEP wave such that we get consistency with tax fairness perceptions data (stemming from 2005).[6] It would be preferable to have register data. On the other hand,

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[5]Incidentally, this also makes estimating wage elasticities of labor supply extremely challenging, see Farber (2005) and Oettinger (1999).

[6]We exclude individuals who declared that they had been absent on more than 250 days (the maximum number of workdays per year) since apparently these individuals (9 observations) misinterpret the sickness question. However, this does not affect our results. We just want to make sure that our

we think that incentives to misreport the number of sick days are comparatively low since 'sickness absence' is not an illegal behavior per se (in contrast to tax evasion). Note also that there is evidence by medical scientists that there is a high agreement between the annual number of self-reported and recorded sickness absence days as provided by employers' registers (Ferrie et al., 2005).

Figure 4.1 visualizes the mean days absent from work due to illness for both unfairness concepts. There is a remarkable difference in absenteeism rates between workers saying that managers pay too little in taxes and those who do not say so. The mean for the former group of workers is 8.3 days per year, while the mean of the latter is 5.4, i.e. almost three days less. There is also a substantial difference in mean days when the sample is divided according to the categories of the variable *wtax_toomuch* (see right panel of Figure 4.1). On average, employees who say that unskilled-workers pay more than their fair share spend 8.1 days absent from work, whereas those who do not hold this belief are absent 6.7 days, indicating a 'fairness gap' of 1.4 days.

Fig. 4.1: Days absent from work due to illness and tax fairness perceptions.
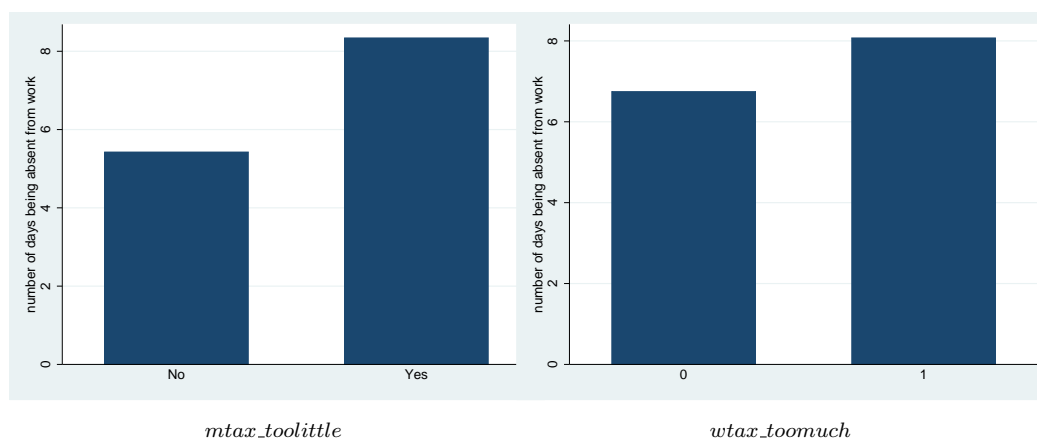
Note: Data is taken from the 2005 wave of the German Socio-Economic Panel.

4.2.2 Method

Our dependent variable, the number of days absent from work due to illness, takes on positive integer values. Therefore count data methods might be given the edge over least squares since OLS would allow for negative values. The standard distribution for count

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parameter estimates are not driven by outliers.

data is the Poisson distribution. However, the Poisson model implies equidispersion, i.e. that the variance is equal to the mean. This property is often violated in a wide range of applications as in our case: The sample mean of sickness days is 7.6, while the variance is about 2-2.5 times larger (17.3). In such cases of 'overdispersion', a model that is often used is the NegBin II model by Cameron and Trivedi (1986). It imposes a variance greater than the mean, and thus, takes account for overdispersion in the dependent variable. NegBin II estimates are consistent given that its distributional assumptions hold. However, this might be considered as too restrictive. We therefore employ a quasi-maximum likelihood variant of the NegBin II estimator which yields consistent estimates under a correct mean assumption only.

The idea of this estimator proposed by Wooldridge (2002) is as follows. The NegBin II model can be derived from a Poisson model with random unobserved heterogeneity. Carried over to our framework, the conditional density assumption can be written as

$$y|T, \mathbf{x}, \theta \sim Poisson[\theta \cdot m(\alpha_0 + \alpha_1 T + \mathbf{x}\boldsymbol{\beta})], \tag{4.1}$$

where y denotes the number of days absent, T and $\mathbf{x}$, respectively, represent an indicator of perceived tax unfairness and a control vector and $m(\cdot)$ is the conditional mean (we use an exponential link function to ensure positivity). The error $\theta \sim Gamma[1, \eta^2]$ captures unobserved heterogeneity and is assumed to be independent of T and $\mathbf{x}$. The conditional variance is given by

$$Var(y|T, \mathbf{x}) = m(T, \mathbf{x}; \alpha_0, \alpha_1, \boldsymbol{\beta})[1 + \eta^2 m(T, \mathbf{x}; \alpha_0, \alpha_1, \boldsymbol{\beta})], \tag{4.2}$$

implying overdispersion for $\eta^2 > 0$. While the parameters $\alpha_0, \alpha_1, \boldsymbol{\beta}$ and η^2 are jointly estimated in the NegBin II model by maximum likelihood, we estimate the overdispersion parameter η^2 separately and use its predicted values to estimate equation (4.1). The reason is that for a fixed η^2, the log-likelihood of equation (4.1) can be shown to be in the linear exponential family where the quasi-maximum likelihood estimator is consistent even if (4.1) and (4.2) are violated. In order to get conservative inference statistics, we additionally adjust the covariance matrix to be robust against heteroskedasticity. We will refer to this estimator as the 'Two-step QMLE'.

4.3 Results

From the descriptive analysis of Figure 4.1, one might infer a difference in the relevance of upward and downward unfairness for economic behavior. The gap in absenteeism days associated with the belief that the rich are taxed too little is more than twice as large as that related to the belief that the poor are overtaxed. However, these mean differences in absenteeism rates are likely driven by unobservables which makes it impossible to compare them in a meaningful way. It may well be that they are biased to different extents, if not entirely spurious each. We therefore conduct an extensive control analysis. Specifically, we run absenteeism regressions of the form (4.1) including the variables *mtax_toolittle* and *wtax_toomuch* both separately and together carefully conditioning on a huge set of potential confounders. We then compare the coefficients of the two unfairness indicators to see whether the magnitudes of the fairness gaps are different when unobserved heterogeneity is taken into account. Finally, we will show subsample regressions to analyze whether the coefficients differ between socio-economic groups.

4.3.1 Full sample estimates

Upward unfairness

We start our full sample analysis by regressing the number of absent days on the variable *mtax_toolittle*, successively adding controls.[7] Table 4.2 presents the regression outputs using the Two-step QMLE. Since the mean function is exponential, coefficients are to be interpreted in a log-linear fashion, i.e. as the percentage change in days absent from work stemming from a one-unit increase in the explanatory variable (holding other factors constant). The estimation results for the overdispersion parameter are in the last row; fully robust standard errors are reported in parenthesis. Column (1) displays the coefficient for *mtax_toolittle* as obtained from a bivariate regression model. A value of 0.43 means that workers perceiving upward unfairness the tax system have a about 40 percent higher level of absenteeism corresponding to the mean jump of 2.9 days reported in Section (4.2.1).

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[7]The descriptives for the control variables are found in the Appendix.

Tab. 4.2: Quasi-Maximum likelihood results (Two-step QMLE), dependent variable: days absent from work.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
main explanatory variable							
mtax_toolittle	0.43*** (0.06)	0.30*** (0.06)	0.30*** (0.06)	0.21*** (0.06)	0.22*** (0.06)	0.22*** (0.06)	0.22*** (0.06)
health status							
health score		−0.36*** (0.04)	−0.38*** (0.05)	−0.36*** (0.05)	−0.36*** (0.05)	−0.36*** (0.05)	−0.35*** (0.05)
health satisfaction		−0.10*** (0.02)	−0.10*** (0.02)	−0.10*** (0.02)	−0.11*** (0.02)	−0.11*** (0.02)	−0.10*** (0.02)
other beliefs and attitudes							
unfair pay			0.10* (0.06)	0.04 (0.06)	0.03 (0.06)	0.02 (0.06)	0.00 (0.06)
pessimist view			0.08 (0.06)	0.02 (0.06)	0.02 (0.06)	0.02 (0.07)	0.03 (0.07)
willingness to take risks			0.03** (0.01)	0.02* (0.01)	0.02* (0.01)	0.01 (0.01)	0.01 (0.01)
leftist/right			−0.02 (0.02)	−0.03 (0.02)	−0.02 (0.02)	−0.01 (0.02)	−0.01 (0.02)
tend to be lazy			0.03 (0.02)	0.01 (0.02)	0.00 (0.02)	−0.00 (0.02)	−0.00 (0.02)
socio-economic characteristics I							
income				−0.03* (0.02)	−0.01 (0.02)	−0.05* (0.03)	−0.03 (0.03)
white collar				0.02 (0.07)	0.02 (0.07)	0.00 (0.07)	0.00 (0.08)
public servant				0.33*** (0.10)	0.35*** (0.10)	0.19 (0.12)	0.19 (0.12)
schooling				−0.06*** (0.01)	−0.06*** (0.01)	−0.05*** (0.01)	−0.05*** (0.01)
socio-economic characteristics II							
age					−0.02 (0.02)	−0.07*** (0.02)	−0.07*** (0.02)
agesq					0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
male					−0.18*** (0.06)	−0.10* (0.06)	−0.10 (0.06)
children					−0.07 (0.07)	−0.11 (0.07)	−0.11 (0.07)
foreign					0.11 (0.11)	0.04 (0.11)	0.02 (0.11)
firm and job related variables I							
small enterprise						0.26*** (0.09)	0.25*** (0.09)
medium enterprise						0.41*** (0.09)	0.40*** (0.09)
large enterprise						0.33*** (0.09)	0.32*** (0.09)
firm and job related variables II							
tenure						0.02** (0.01)	0.02** (0.01)
tenure sq						−0.00** (0.00)	−0.00** (0.00)
full time experience						−0.01 (0.02)	−0.01 (0.02)
full time experience sq						0.00 (0.00)	0.00 (0.00)
part time experience						0.00 (0.02)	−0.01 (0.02)
part time experience sq						−0.00 (0.00)	0.00 (0.00)
part time						−0.22** (0.10)	−0.22** (0.10)
marginally employed						−0.92*** (0.21)	−0.91*** (0.23)
workplace perceptions and regional controls							
fear of job loss							−0.02 (0.06)
job satisfaction							−0.03 (0.02)
East Germany							−0.10 (0.08)
South Germany							−0.08 (0.06)
Constant	1.69*** (0.05)	3.65*** (0.11)	3.57*** (0.16)	4.51*** (0.25)	5.20*** (0.48)	5.31*** (0.53)	5.37*** (0.53)
9 sector dummies	-	-	-	-	-	✓	✓
N	7327	7304	6222	5440	5439	5220	5122
etasq	5.87	3.63	3.17	3.58	3.29	2.69	2.50

Note: Fully robust standard errors in parentheses. Reference categories are: blue-collar worker, full-time employed, working in a micro-sized enterprise (less than 20 employees), employed in the manufacturing industry. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

This strong correlation could be due to failing to control for health. Specifically, it can be argued that those who are often ill may want higher levels of redistribution since they are net benefiters of the tax system, and therefore say that taxes on the rich should be increased. At the same time, these individuals can be expected to have higher rates of absenteeism. In fact, including a respondent's self-reported health status decreases the coefficient of *mtax_toolittle* considerably, but the gap associated with the belief that managers do not contribute adequately to the tax pool is still quite large and remains significant at the one percentage level (see column 2).

In column (3), we add a number of 'soft' variables capturing perceived income fairness and general attitudes or preferences. This separates tax fairness perceptions from other psychological factors that may affect absenteeism. To make sure that our coefficient of interest is driven by perceived *tax* justice and not by *income* justice, we include an indicator whether or not one believes that own pay is unfair. We also control for an individual's degree of pessimism in order to disentangle perceived tax unfairness from complainer attitudes or general negativism. E.g., it might be that pessimists tend to have both unjust world beliefs and lower levels of intrinsic work motivation in which case the coefficient of *mtax_toolittle* would be upward biased (as it would arguably be when not controlling for 'unfair pay'). We further condition on respondents' willingness to take risks: risk-averse individuals can be expected to have a higher preference for social insurance, which in turn, may be positively correlated with having a 'soak-the-rich' attitude. If at the same time risk-averse individuals have a different inclination to shirk at work (staying at home bears the risk of getting caught) our coefficient would be (probably downward) biased. We net out political leniency, since, e.g., right wing people might have a lower taste for state intervention and therefore are less likely to feel that (manager) taxes are too low. To the extent that these people give higher priority to work-related norms, the estimated tax unfairness coefficient would exceed its true value. Finally, we directly control for a respondent's self-reported degree of laziness. Including these variables leaves our coefficient of interest stable (in fact, the coefficients stays the same) giving us some confidence that our tax unfairness indicator explains variation in worker's absenteeism which is not driven by heterogeneity of general world views or attitudes.

In column (4), we take account of socio-economic status which, as shown in the de-

scriptive analysis, seems to affect the probability of perceiving upward unfairness. We control for a respondent's monthly (gross) income, occupational status group (measured in terms of whether an individual is a blue-collar worker, white-collar worker or public servant) and educational background (proxied by years of schooling). The inclusion of these factors drops the *mtax_toolittle* coefficient by roughly one third (the coefficient decreases from .30 to .21), but it remains highly significant. Note that the other psychological variables loose their significance underpinning the explanatory power of *mtax_toolittle*.

Conditioning on further socio-economic characteristics (e.g. age, gender, having children) leaves the coefficient virtually unchanged (see column (5)). The same applies when controlling for variables at the firm and job level (column (6)). We include dummies for firm size (it may be argued that the probability of being detected when shirking is higher in smaller firms) as well as tenure, work experience and whether a respondent is full-time (reference category), half-time or marginally employed. A set of sectoral dummies is taken into the regression to allow for the possibility that people with different work attitudes may self-select into different branches (e.g. employers in the public sector may be less prone to competitive world views which may affect the willingness to 'go the extra mile' as well as the opinion of what constitutes just policy.) Some of these variables turn out to be quite successful in predicting absenteeism but they but do no harm to our coefficient of interest.

One might object that set of controls does not sufficiently take into account the specific situation and conditions at the workplace (relationship to co-workers and supervisors, workload etc). To the extent that these factors affect beliefs about tax fairness (and only then), our results would be still biased. The GSOEP provides information about respondent's job satisfaction and fear of job loss which should capture a lot of this kind of unobserved heterogeneity. When including these variables the coefficient of *mtax_toolittle* remains quite the same (see column (7)) suggesting that the control set used so far is already effective in holding workplace characteristics constant.[8]

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[8]We also include geographic dummies that may grasp regional variations in economic development as well as differences in culture.

Tab. 4.3: QUASI-MAXIMUM LIKELIHOOD RESULTS (TWO-STEP QMLE), DEPENDENT VARIABLE: DAYS ABSENT FROM WORK.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
main explanatory variable							
wtax_toomuch	0.18***(0.06)	0.16***(0.05)	0.16***(0.05)	0.06 (0.05)	0.06 (0.06)	0.06 (0.06)	0.05 (0.06)
health status							
health score		−0.38***(0.04)	−0.38***(0.05)	−0.35***(0.05)	−0.35***(0.05)	−0.35***(0.05)	−0.33***(0.05)
health satisfaction		−0.10***(0.02)	−0.11***(0.02)	−0.10***(0.02)	−0.11***(0.02)	−0.11***(0.02)	−0.11***(0.02)
other beliefs and attitudes							
unfair pay			0.13**(0.06)	0.08 (0.06)	0.08 (0.06)	0.06 (0.06)	0.05 (0.06)
pessimist view			0.11*(0.06)	0.06 (0.07)	0.06 (0.07)	0.07 (0.07)	0.08 (0.07)
willingness to take risks			0.03**(0.01)	0.02 (0.01)	0.02 (0.01)	0.01 (0.01)	0.01 (0.01)
leftist/right			−0.03*(0.01)	−0.03*(0.02)	−0.03*(0.02)	−0.02 (0.02)	−0.02 (0.02)
tend to be lazy			0.01 (0.02)	−0.00 (0.02)	−0.01 (0.02)	−0.01 (0.02)	−0.01 (0.02)
socio-economic characteristics I							
income				−0.03*(0.02)	−0.00 (0.02)	−0.06*(0.03)	−0.07***(0.03)
white collar				−0.04 (0.07)	−0.05 (0.07)	−0.11 (0.08)	−0.11 (0.08)
public servant				0.26**(0.10)	0.26***(0.10)	0.09 (0.12)	0.08 (0.13)
schooling				−0.06***(0.02)	−0.07***(0.02)	−0.06***(0.02)	−0.06***(0.02)
socio-economic characteristics II							
age					−0.03 (0.02)	−0.04 (0.03)	−0.03 (0.03)
agesq					0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
male					−0.10 (0.07)	−0.13*(0.07)	−0.13*(0.07)
children					−0.15**(0.06)	−0.08 (0.06)	−0.08 (0.06)
foreign					0.08 (0.12)	0.01 (0.11)	−0.03 (0.11)
firm and job related variables I							
small enterprise						0.25***(0.09)	0.24***(0.09)
medium enterprise						0.37***(0.09)	0.35***(0.09)
large enterprise						0.32***(0.09)	0.30***(0.09)
firm and job related variables II							
tenure						0.02*(0.01)	0.02 (0.01)
tenure sq						−0.00*(0.00)	−0.00*(0.00)
full time experience						−0.01 (0.02)	−0.02 (0.02)
full time experience sq						0.00 (0.00)	0.00 (0.00)
part time experience						−0.01 (0.02)	−0.02 (0.02)
part time experience sq						−0.00 (0.00)	0.00 (0.00)
part time						−0.23**(0.10)	−0.22**(0.10)
marginally employed						−0.99***(0.23)	−0.97***(0.25)
workplace perceptions and regional controls							
fear of job loss							−0.03 (0.06)
job satisfaction							−0.03 (0.02)
East Germany							−0.15*(0.08)
South Germany							−0.08 (0.06)
Constant	1.91***(0.04)	3.85***(0.11)	3.80***(0.16)	4.73***(0.24)	5.46***(0.48)	5.51***(0.54)	5.57***(0.54)
9 sector dummies	–	–	–	–	–	✓	✓
N	7239	7216	6137	5375	5374	5148	5048
etasq	6.00	3.53	3.06	3.60	3.18	2.53	2.40

Note: Fully robust standard errors in parentheses. Reference categories are: blue-collar worker, full-time employed, working in a micro-sized enterprise (less than 20 employees), employed in the manufacturing industry. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4.3.2 Downward unfairness and interaction effects

While the *mtax_toolittle* turned out to be a quite strong predictor of absenteeism behavior, the same does not apply to the variable *wtax_toomuch*. Table 4.3 shows the results from analogous regressions to those of Table 4.2. Somewhat surprisingly, the initial huge coefficient of the worker tax indicator is brought close to zero and becomes insignificant even with a fairly small set of socio-economic characteristics (see column 4). In fact, based on specification (3), controlling for income and schooling alone would suffice to render the coefficient insignificant and to produce the large drop from 0.16 to 0.06. Thus, over and above its correlation with socio-economic status, the downward unfairness has no explanatory power in terms of predicting absenteeism behavior.

Table 4.4 reports the results from different specifications including both tax unfairness indicators in the absenteeism regression (we only report the coefficients of main interest). As can be seen from column 1, the coefficient for *wtax_toomuch* flips the sign, but is still insignificant when included simultaneously with *mtax_toolittle*.[9] In specification 2, we allow for interaction effects. E.g., it might be that perceived downward unfairness makes a behavioral difference when co-occurring with perceptions of upward unfairness. This is not supported by our data as the interaction term is far from being significant.

To sum up, there is no evidence that perceived downward unfairness is statistically associated with our behavioral outcome variable after taking into account unobserved heterogeneity. In contrast, the indicator representing the belief that the rich are taxed too little is a strongly related to absenteeism behavior, and this throughout the entire specifications. Given the quality of the control set, we are confident that the connection between *mtax_toolittle* and sickness absence does not reflect a mere statistical artefact. Taken together, our results provide strong evidence that behavioral responses to perceived upward and downward tax fairness are not symmetric.[10]

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[9]That *mtax_toolittle* is only significant at a 10% level in this specification should give no concern. The joint of effect of *mtax_toolittle* and the interaction term is significant at a 1% level (as opposed to the joint effect of *wtax_toomuch* and the interaction term which is largely insignificant).

[10]To formally test for equality of the coefficients of *mtax_toolittle* (β_1)and *wtax_toomuch* (β_2), we can use (based on specification (1) of Table 4.4) the t-statistics $\frac{\beta_1 - \beta_2}{\sqrt{Var(\beta_1 - \beta_2)}}$, which equals 2.4. Thus, the $H_0 : \beta_1 = \beta_2$ can be rejected at a 95% level of confidence.

Tab. 4.4: TWO-STEP QMLE RESULTS, INTERPLAY BETWEEN THE TAX UNFAIRNESS BELIEFS.

	(1)	(2)
mtax_toolittle	0.19***	0.15*
	(0.06)	(0.09)
wtax_toomuch	−0.03	−0.09
	(0.06)	(0.10)
mtax_toolittle*wtax_toomuch		0.09
		(0.12)
full set of controls	√	√
N	4718	4718

Note: All regressions include the same set of control variables as specification (7) of Table 4.2. Fully robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4.3.3 Subsample regressions: results by social status

In the regressions so far perceived upward unfairness is significantly associated with absenteeism behavior while no such relationship appears to exist for the belief that the tax system is unfair to the poor. In this section, we analyze whether this tendency prevails when splitting up the sample by social class categories.

Table 4.5 presents subgroup results obtained from regressing sickness absence on the variable *mtax_toolittle* using the same set of controls as in the full specification of Table 4.2. As the first part of Table 4.5 shows, the difference in absenteeism days associated with the belief that those in charge do not pay their due tax is twice as large for blue collar workers, compared to white collar workers. In both subgroups the coefficient of *mtax_toolittle* is highly significant. The middle part of Table 4.5 distinguishes between individuals at lower, medium or higher levels of job hierarchy. The coefficients are always positive, but the magnitude decreases with hierarchy level. When dividing the sample by income quintiles (bottom panel of Table 4.5), we obtain a similar pattern. The upward fairness gap is by far largest for the lowest-ranked group, where it is more than three times the size of the gap in the other groups. The coefficient for the fifth income quintile is still significant which is somewhat surprising since this quintile includes the rich themselves.[11] Thus, the positive link between perceived upward unfairness and sickness leave is not a 'local' phenomenon, but found across the social spectrum.

This is to be contrasted with the belief that unskilled labor is overtaxed. When running the corresponding subgroup regressions for *wtax_toomuch*, we find a significant

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[11]The fifth income quintile goes from roughly 3.500 to more than 20.000 Euro gross income per month.

Tab. 4.5: TWO-STEP QMLE ESTIMATIONS, SUBSAMPLES.

	by worker class [a]	
	(blue collar)	(white collar)
mtax_toolittle	0.36***	0.21***
	(0.12)	(0.08)
N	1410	2981

	by job hierarchy level[b]		
	(low-tier)	(middle-tier)	(management level)
mtax_toolittle	0.50***	0.16**	0.17*
	(0.15)	(0.08)	(0.10)
N	708	2899	1350

	by income quintile [c]				
	(1st Q)	(2nd Q)	(3rd Q)	(4th Q)	(5th Q)
mtax_toolittle	0.49**	0.34**	0.09	0.20*	0.23**
	(0.22)	(0.14)	(0.12)	(0.11)	(0.11)
N	583	955	1049	1202	1168

Note: The full sample is split by: (a) blue and white collar respondents, (b) position in the job hierarchy and (c) income quintiles of the 2005 SOEP wave. All regressions include the same control variables as specification (7) of Table 4.2. Fully robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

coefficient in only one subgroup: in the first income quintile. For all other subsamples the coefficient is not statistically different from zero. This is reported in Table 4.6, where we show the results for the lowest ranked categories (see Appendix). Overall, the subgroup results are in line with the findings for the total sample. For almost every subsample, we find a sizable link from the belief that the rich are taxed too little and worker's absenteeism and a no effect of the view that the poor are overtaxed. In the sample where we do find a statistical connection between downward unfairness and intrinsic work motivation (in the first income quintile), the coefficient for *wtax_toomuch* is much smaller (0.23) than that for *mtax_toolittle* (0.49), suggesting that there are asymmetric responses even here.

4.4 Interpretation of the results

In this section we discuss our findings in light of existing theories of fairness or social comparison. We follow the classical distinction in the literature on social psychology between theories of distributional, procedural and retributive justice (see Tyler and Smith, 1998). In particular, we will study the question to what extent these theories can explain why individuals reduce work effort when perceiving the tax system as unfair and

why these adjustments are asymmetric in the sense that expressed upward unfairness is associated with changes in work effort but downward unfairness not.

4.4.1   Distributional justice/equity theory

Theories of distributional justice state that individuals evaluate the fairness of a situation by looking at outcomes rather than at how (i.e., by what process) these were generated. A prominent approach of distributive justice is equity theory, going back to Adams (1963, 1965). According to this approach, individuals think in terms of what they contribute to a certain social situation and what they get out of it. They perceive a situation as fair when their (or their in-group's) ratio of 'inputs' to 'outputs' is in line with that of comparable others. Equity theory also provides a behavioral prediction: individuals who feel inequity will take actions that bring the input-output ratios back into balance (see Walster et al., 1973).

One way to apply this approach to our framework is to interpret tax payments and work effort as the relevant inputs. Individuals who say that the rich do not pay their fair share of taxes may feel inequity in the sense that other's contributions to the tax system are too low in relation to what they receive in return (e.g., the amount of public goods might be considered the same for all citizens but the inputs differ). According to equity theory, this perceived imbalance would provide incentives to reduce one's own inputs. However, since possibilities to adjust 'inputs' to the tax system are limited, individuals withhold their contributions in areas where adjustments are possible, e.g. by cutting back effort at work. Similarly, individuals would increase their absenteeism when perceiving downward unfairness since they would see their own contributions to the system as too high.

One objection against this interpretation is that tax payments and work effort are inputs to different systems: work effort is a contribution to the goals of the company but not an input to the tax system. However, equity theorists argue that the behavioral reactions to perceived inequity can be indirect in the sense that people do not (only) restore equity in the area from where the event of injustice originated but also try to correct input-output ratios in seemingly unrelated domains – especially when a direct response is not easy feasible or costly. As Austin and Walster (1975) put it, individuals

not only maintain situation-specific equity but also 'equity with the world'. Adjusting work effort when perceiving inequities in the realm of taxation might be such a 'fairness spillover' (see also Cornelissen et al., 2010). Alternatively, paying taxes and working hard can be interpreted as inputs to one and the same system, e.g., as contributions to the broader goals or functioning of society – a reading which is not uncommon in the literature.[12] Thus, equity theory may provide an explanation for why people adjust work effort when perceiving inequities in the tax system.[13]

However, equity theory overpredicts the equity corrections. Individuals who feel overprivileged in the sense that their input-output ratio is bent to their advantage are expected to increase their inputs. Consequently, we should observe that non-poor individuals should have a higher propensity to provide work effort when saying that the poor are overtaxed.[14] But this does not seem to be the case; in these subsamples we do not find a significant relationship between downward unfairness and absenteeism. Hence, the behavioral asymmetry we find cannot be not explained in terms of equity theory.

4.4.2 Procedural justice

When individuals state that tax burdens are unevenly distributed in society, this might also express concerns over the procedures underlying tax payments. Several studies report that the feeling that the wealthy are taxed too little in relation to lower-income groups can often be traced back to beliefs that there are unequal opportunities to avoid taxes (tax loopholes for big corporations, preferential treatment of certain kinds of income, etc.) or that tax authorities employ different enforcement strategies (see e.g. Wallschutzky, 1984; Roberts et al., 1994; Kinsey and Grasmick, 1993 and Hobson,

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[12]E.g., Feld and Frey (2007) argue that tax payments are often understood as contributions to the 'summum bonum'. Similarly, work effort is not only interpreted as a means to own life goals but also as a contribution to higher-order goals such as society's prosperity, wealth and economic growth (see, e.g., Lipset, 1992).

[13]An alternative interpretation could be that individuals perceiving tax inequity try to get back their fair share: reducing work effort or staying at home increases leisure, and thus, restores equity via outputs.

[14]With the same kind of argument one might expect that the rich must have less absenteeism when saying that the rich are undertaxed. However, we also find a positive coefficient for $mtax\_toolittle$ in the highest income quintile. This tension can be solved by assuming that that high-income earners think of even richer individuals when expressing upward unfairness. Note that this does not automatically mean to postulate irrationality since the GSOEP refers to CEOs as representing the rich, i.e. to the extreme of the income distribution.

2002). This would conflict with core principals of procedural fairness, e.g., impartiality, consistency and representativeness (Wenzel, 2003).

That procedural unfairness may result in deviant behavior is a key finding in research on social justice (see, e.g., Tyler and Blader, 2003). To allow grievances over tax procedures to affect compliance-related behavior at the workplace, one would again need either some kind of 'fairness spillover' reasoning or the assumption that agents view the tax system and their company as institutions of 'broader society' from which they want to withdraw when witnessing unfair procedures in one of its instances (absenteeism as, say, a silent protest behavior against society's rules.) In fact, social psychology research shows that indirect adjustments may occur to perceived procedural injustice. E.g., Mullen and Nadler (2008) found that probands who were confronted with a newspaper article reporting a flawed court decision were more likely to steal the pen that they were given to fill in the experiment's questionnaire. Likewise, Zajac (1995) reveals that perceived fairness of their firms' policies affect employees' support for the regulation of private industries which may be considered as a transgression from the firm's to the political sphere (and not vice versa as in our case).

However, if concerns about procedural justice were the driving force behind our results, then we should observe that individuals show similar behavioral responses to the statements that managers are taxed too little and that low-skilled workers are taxed too much: from a perspective of procedural justice it should make no difference whether the bias in the tax system is at the upper or at the lower end of the income scale; both cases would conflict with the norm that 'equals should be treated equally', and hence, indicate unwarranted preferential treatment in taxation. Hence, procedural justice alone cannot explain the asymmetry we found in the data.

4.4.3 Retributive justice

Our results could also be related to motives of retaliation. Injustice in the tax system is often based on the view that affluent taxpayers and corporations make overly use of tax avoidance schemes or, even worse, engage in illegal behavior by evading taxes (see, e.g., Spicer and Lundstedt, 1976; Furnham, 1983). Thus, it might be argued that workers use sickness leave (staying at home while getting paid) as a device to punish bosses or

company owners who are as considered as norm violators or moral wrongdoers.

This provides a rationale for why abstract beliefs about tax fairness may become manifest at workplace. It also can explain why the behavioral responses to perceived injustice in taxation are asymmetric, since (by construction) one would have no reason to expect that individuals show higher levels of absenteeism when saying that the poor are overtaxed.

To directly check whether motives of punishment are at play, we can use further information from the GSOEP. In the personality module respondents were asked to what degree (on a scale from 1 to 7) the following statement applies to their character: 'If I suffer a serious wrong, I will take revenge as soon as possible, no matter what the cost". We classify a respondent as a vengeful person when choosing values larger than 4 and interact this dummy with $mtax\_toolittle$ in the absenteeism regression model. Surprisingly, the interaction term is not significant and negative in sign. This does not support (from the sign it would even contradict) the interpretation that retaliation is a reason why sick leave is positively associated with perceived upward unfairness.

To sum up, traditional theories of justice can well explain why perceived injustice in taxation may induce changes in workplace behavior. The asymmetry we find is not incorporated in equity theory as well as in procedural justice. Though retributive justice may provide an explanation, we find no evidence that motives of retaliation play a role in our case.

4.5 Conclusion

In this paper, we find evidence consistent with the view that abstract tax fairness perceptions exhibit a strong influence on economic behavior, but only if they refer to the top of the income distribution. Concerns about taxing the poor do not seem to trigger any behavioral changes, except than for the poor. While this behavioral asymmetry is hard to explain by existing fairness theories, our results suggest that a distinction between upward and downward fairness might be informative in other research areas analyzing the economic relevance of social justice beliefs, e.g., income fairness, reciprocity, the allocation of rights or institutional fairness.

4.6   Appendix

Fig. 4.2: PERCEIVED TAX BURDEN ON HIGH-INCOME EARNERS
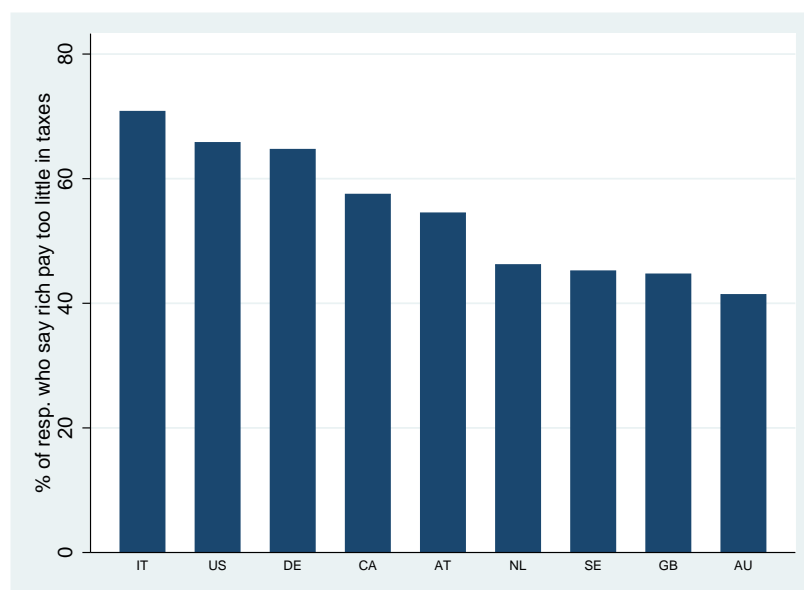
Note: Data is taken from the 1992 wave of the Social Inequality data. The question wording is: "Generally, how would you describe taxes in your country today. (We mean all taxes together, including social security, income tax, VAT and all the rest.) Please tick one box. First, for those with high incomes, are taxes ... 1. much too high 2. too high 3. about right 4. too low [or] 5. much too low?" The total number of repondents varies between 749 (Sweden) and 2166 (Australia). Horizontal axis: percentage of respondents answering with 'too low' or 'much too low'.
Source: Social Inequality II, 1992.

Fig. 4.3: PERCEIVED TAX BURDEN ON LOW-INCOME EARNERS
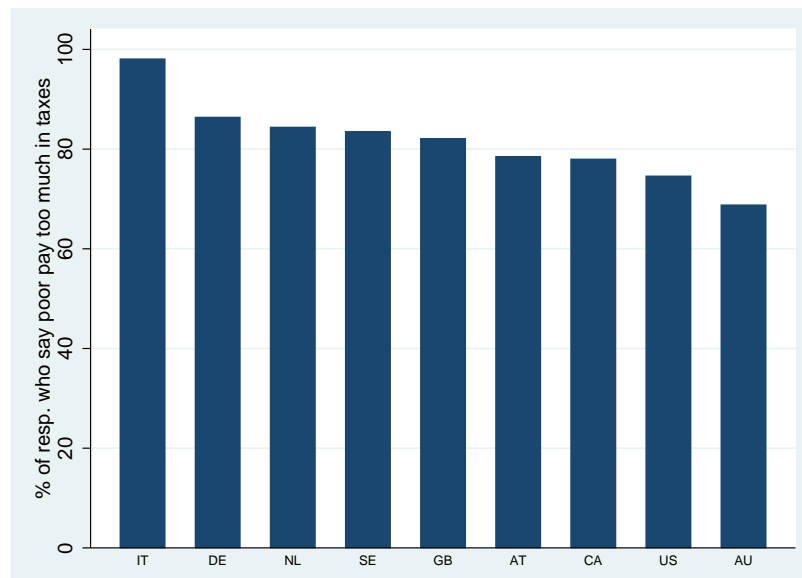
Note: Data is taken from the 1992 wave of the Social Inequality data. The question wording is: "[...], for those with low incomes, are taxes ... 1. much too high 2. too high 3. about right 4. too low [or] 5. much too low?" The total number of repondents varies between 749 (Sweden) and 2166 (Australia). Horizontal axis: percentage of respondents answering with 'too high' or 'much too high'.
Source: Social Inequality II, 1992.

Tab. 4.6: TWO-STEP QMLE ESTIMATIONS, SUBSAMPLES.

	blue collar	low-tier	1st income quintile
wtax_toolittle	-0.05	0.19	0.26*
	(0.10)	(0.14)	(0.15)
N	1478	777	719

Note: The full sample is split by: (a) blue and white collar respondents, (b) position in the job hierarchy and (c) income quintiles of the 2005 SOEP wave. All regressions include the same control variables as specification (7) of Table 4.2. Fully robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Tab. 4.7: SUMMARY STATISTICS.

	Mean	Std. Dev.	Min	Max	N
dependent variable					
absenteeism	7.612	17.26	0	245	5122
main explanatory variables					
mtax_toolittle	0.721	0.448	0	1	5122
wtax_toomuch	0.535	0.499	0	1	5117
health status					
health score	3.558	0.819	1	5	5122
health satisfaction	7.015	1.904	0	10	5122
other beliefs and attitudes					
unfair pay	0.329	0.47	0	1	5122
pessimist view	0.257	0.437	0	1	5122
willingness to take risks	4.886	2.134	0	10	5122
leftist/right	4.71	1.745	0	10	5122
tend to be lazy	2.236	1.468	1	7	5122
socio-economic characteristics					
income	2.728	1.85	0.25	35	5122
schooling	12.845	2.783	7	18	5122
blue collar	0.275	0.447	0	1	5122
white collar	0.582	0.493	0	1	5122
public servant	0.111	0.314	0	1	5122
age	42.41	10.598	17	74	5122
male	0.568	0.495	0	1	5122
children	0.371	0.483	0	1	5122
foreign	0.052	0.222	0	1	5122
firm and job related variables					
micro-sized enterprise	0.208	0.406	0	1	5122
small enterprise	0.301	0.459	0	1	5122
medium enterprise	0.229	0.42	0	1	5122
large enterprise	0.263	0.44	0	1	5122
tenure	11.859	10.141	0	48.8	5122
full time experience	16.326	11.109	0	47	5122
part time experience	2.553	5.23	0	45	5122
part time	0.184	0.387	0	1	5122
marginally employed	0.03	0.17	0	1	5122
low-tier	0.143	0.35	0	1	4957
middle-tier	0.585	0.493	0	1	4957
management level	0.272	0.445	0	1	4957
agriculture	0.011	0.105	0	1	5122
mining/energy	0.014	0.118	0	1	5122
manufacturing	0.212	0.409	0	1	5122
processing	0.049	0.217	0	1	5122
traffic/media	0.061	0.239	0	1	5122
construction	0.047	0.212	0	1	5122
wholesale	0.114	0.317	0	1	5122
services	0.137	0.344	0	1	5122
banking/insurance	0.054	0.227	0	1	5122
public sector	0.301	0.459	0	1	5122
workplace perceptions and region					
fear of job loss	0.602	0.49	0	1	5122
jobsatisfaction	7.04	1.928	0	10	5122
East Germany	0.202	0.402	0	1	5122
South Germany	0.285	0.452	0	1	5122

Note: Data is taken from the 2005 wave of the German Socio-Economic Panel (GSOEP).

Chapter 5

Perceived Unfairness in CEO Compensation and Work Morale[1]

5.1 Introduction

'Nothing in business excites so much interest in the wider world as the pay of top executives.' the *Economist* wrote in a 2003 article titled 'Fat cats feeding - Executive pay'. Indeed, it seems that the dizzying heights to which CEO compensation has risen trigger stronger feelings than just plain *interest.* The Enron scandal inspired the *Forbes* headline 'Pay Madness at Enron', and in March 2009 the *Economist* published an opinion poll in which 66% of respondents claimed to be 'very angry' about AIG bonuses, accompanied by an article entitled 'Will there be blood?'.

It is likely that public protests are only the tip of the iceberg, considering that social psychologists and economists have shown that unfairness leads to a wide range of behavioral consequences.[2] One margin of adjustment that is likely to respond to fairness perceptions related to labor market income is work morale. Observing a close link between perceived pay inequities and work effort, Adams (1965) argued in his *equity theory* that individuals compare their effort-to-pay-ratio to that of others and adjust it whenever they differ. Along these lines, reduced work effort of individuals who perceive manager incomes to be excessively high could be interpreted as a means of restoring equity.

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[1]This chapter is co-authored with Thomas Cornelissen and Oliver Himmler. The chapter is available as Discussion Paper No. 435 of the discussion paper series of the Faculty of Economics and Business Administration at Leibniz University of Hannover. The chapter was published as: 'Perceived Unfairness in CEO Compensation and Work Morale', *Economics Letters*, 110, 2011, 45-48. Publication within this thesis with kind permission of the editor.

[2]See Fehr and Schmidt (2006) and Tyler and Smith (1998) for literature surveys.

We empirically investigate whether fairness perceptions of CEO compensation indeed affect work morale. We use absenteeism from work due to sickness as a measure of work morale, based on data from the German Socioeconomic Panel (GSOEP). The results suggest that perceiving CEO compensation to be unfair is associated with up to 20% higher levels of absenteeism, even after conditioning on health and an exhaustive set of individual characteristics. Our research complements the social comparison literature, which suggests that higher income of a reference group affects subjective well-being negatively (Clark and Oswald, 1996; Ferrer-i-Carbonell, 2005; Luttmer, 2005). These studies look into the direct effects on utility in terms of stated happiness or satisfaction, while our outcome is an *observable economic behavior*. A further contribution of our study is to show that the mere *perception* of unfairness of others' incomes, rather than the true relative income position, affects behavior.

5.2   Data and estimation strategy

The 2005 wave of the GSOEP asked respondents whether they believed that the income of a manager on the board of directors of a large company had a 'just relation to the job demands'. Roughly three out of four respondents thought that this was not the case. If perceived unfairness triggers adjustment behavior, we expect to observe lower levels of work effort for these individuals. A particularly appealing way of adjusting effort is by increasing absenteeism. Unlike other measurable effort indicators such as hours worked or overtime hours, absenteeism does not come with monetary repercussions in the German system. There is no reduction of payments for the first six weeks of a sickness spell, and for the first three days of each spell, employees are usually not even obliged to produce a doctor's note. At the same time the legal barriers to dismissing employees are high. Such a setup provides incentives and leeway for behaving opportunistically by feigning sickness. While we do not intend to imply that everyone on sick absence is a shirker, it is widely accepted in the labor economics literature (Barmby et al., 2002; Johannsen and Palme, 2005) that absenteeism is not purely a response to medical conditions. In accordance with perceived injustice increasing the propensity to display such behavior, Table 5.1 shows that those who thought CEO pay to be unfair displayed significantly higher levels of absenteeism from work due to illness.

Tab. 5.1: ABSENTEEISM BY OPINION ON CEO PAY.

| | CEO pay unfair | | Difference |
	no	yes	
Days absent	5.79	8.32	2.53***
	(0.43)	(0.37)	(0.68)
Observations	901	2682	

Note: Mean days absent by opinion on whether CEO compensation is perceived to be unfair. Standard errors in parentheses. T-test of difference in means: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Obviously, there are many other factors that may determine absenteeism. In the following regressions we include a large number of these possibly confounding variables. The main driver of absenteeism should be an individual's physical constitution. Our dataset provides a variable 'health score' that accounts for the level of individual health, but as different individuals may judge the same health score differently, the respondent's rating of 'health satisfaction' is also included. If there was no fraudulent use of sick days, other factors should not have any significant impact on absenteeism once the effect of health is netted out. However, because of the aforementioned institutional setup it is clear that such a naive control approach may be insufficient. A standard predictor of shirking is the probability of getting caught, as reflected in the firm size variables. Higher stakes are represented by controlling for gross income. Job security is mirrored in the personal fear of job loss as well as a control for being marginally employed. We also add standard Mincer equation variables, 'occupational status' dummies indicating an individual's rank in the firms's employment hierarchy as well as sectoral and regional dummies. The GSOEP also allows accounting for attitudes and personal traits that are typically not collected in other surveys and may cause endogeneity if omitted from the regression. We include the level of job satisfaction, general negativism, laziness, risk aversion, and leftist political views because they may drive both beliefs on fairness of CEO pay as well as work effort. Summary statistics and variable descriptions are given in Table 5.3.

Since the dependent variable only takes on non-negative integer values, count data methods are in order and our baseline estimations employ the two-step negative binomial quasi maximum likelihood estimator (QMLE) as described in Wooldridge (2002). This estimator is consistent under the correct conditional mean, which we model as an exponential function. It has an edge over Poisson and Negbin II approaches since

it accounts for overdispersion and is robust against violations of the distributional assumptions.

5.3   Results

Estimates of the association between perceived fairness of CEO compensation obtained from various specifications are displayed in Table 5.4. Coefficients must be interpreted as semi-elasticities and the bivariate specification in column (1) reflects the descriptive finding from Table 5.1: those who think CEO pay is unfair show a larger number of days absent. Somewhat surprising is that the inclusion of health and income variables doesn't even scale down the coefficient by half in column (2). While the controls are all highly significant and the coefficients have the expected sign, the effect of perceived unfairness remains strong. It still suggests that those who believe CEO pay to be excessive have roughly one fifth more sick days. The naive estimator from column (2) already provides a very good approximation of the coefficient magnitude when all controls are included in column (6). Successively adding further controls does not decrease the coefficient. Backed by the striking robustness of the coefficient to various specifications, these results imply massive behavioral consequences of perceiving the income of top managers to be unfairly high.

Robustness checks are applied in Table 5.2, where all control variables are as in column (6) of Table 5.4. A linear probability model in column (1) shows the effect of perceived unfairness on the probability of having at least 1 sick day. The coefficient is rather small and only significant at the 11% level. This is not very surprising, as this probability is pretty much out of the hands of the individual. Whether one gets sick for a day or not should be largely random and we also believe that shirkers may often simply add a day or two when they were truly sick in the first place. Columns (2)-(4) further underscore the robustness of our results. OLS estimates in column (2) imply a difference of 1.4 days, which nicely translates to the 20% effect obtained via the QMLE estimations. Two alternative count data estimators are shown in columns (3) and (4). Neither the Poisson nor the Negative Binomial model suggests effects different from those obtained earlier. Taken together, the stability of our main coefficient of interest across specifications and estimation methods makes us confident that the estimates

Tab. 5.2: ROBUSTNESS CHECKS.

	LPM (1)	OLS (2)	Poisson (3)	Negbin (4)	QMLE (5)
CEO pay unfair	.03 (0.02)	1.37** (0.54)	.19*** (0.02)	.22*** (0.08)	.23** (0.09)
CEO pay unfair * Leftist > median					−.005 (0.15)
Leftist > median					.14 (0.13)
60 controls	Yes	Yes	Yes	Yes	Yes
Obs	3583	3583	3583	3583	3583
R^2	0.10	0.12			
log-l.	-2384	-15200	-30351	-9340	-9407

Note: Column (1) is a linear probability model (LPM) with dependent variable taking on value 1 if absenteeism >0. Column (2) is standard OLS, columns (3) and (4) are standard Poisson and Negbin II count data estimators. In column (5), the two-step QMLE estimator described in Section 2 is used. The dependent variable in columns (2)-(5) is 'number of days absent'. The regressor 'leftist > median' is an indicator variable taking on the value 1 if the variable 'leftist' is greater than its median of 5, and taking on the value 0 otherwise. Standard errors in columns (1)-(2) allow for clustering at the household level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

come close to the true causal effect.

It can be argued that the reaction to perceived unfairness depends on political views. Therefore, we introduce an interaction term of 'CEO pay unfair' with a dummy variable taking on the value 1 if our 11-point indicator of leftist political views is above its median of 5, and zero otherwise. As can be seen in column (5) of Table 5.2, the interaction term is insignificant. It remains also insignificant when we interact 'CEO pay unfair' with a full set of dummies for each value of 'leftist' (results not reported here). This suggests that the reaction to perceived unfairness of CEO compensation is not confined to individuals with narrow political views, but that it holds throughout the political spectrum.

5.4 Conclusion

That discontent with CEO compensation may have behavioral consequences could frequently be observed when people took to the streets in protest during the recent financial crisis. In this paper we have shown that perceived unfairness of CEO pay may also lead to 'hidden' protest behavior that bears the potential of large economic costs, even outside times of financial crisis.

That the income others supposedly earn has an effect on own economic behavior is in stark contrast to standard neoclassical theory. The results are consistent with equity

theory, yet they can also be reconciled with other adjustment triggering mechanisms such as envy – which are typically hard to distinguish from fairness. An interesting implication of our study is that the mere *perception* of what others earn may suffice to trigger adjustment behavior. This adds a new angle to the recent social comparisons literature.

5.5 Appendix

Tab. 5.3: DESCRIPTION OF VARIABLES AND SUMMARY STATISTICS.

Variable	Description	Mean	Std. Dev.
absenteeism	number of days absent in year of survey.	7.68	17.92
absenteeism dummy	indicator variable, 1 if absenteeism >0.	0.56	0.50
CEO pay unfair	indicator variable, 1 if respondent thinks CEOs pay is unfair.	0.75	0.43
health score	self reported current health. 'Poor' (1) to 'Very good' (5).	3.58	0.83
health satisfaction	satisfaction w/ health. Scale: 'totally unhappy' (0) to 'totally happy' (10).	7.07	1.88
gross income	gross monthly household income in 1000s of Euros.	2.98	1.96
age	age in years.	42.92	10.06
male	indicator variable, 1 if male.	0.59	0.49
children	the number of children <16 years in the household.	0.37	0.48
foreign	indicator variable, 1 if non-German citizen.	0.05	0.22
schooling	year of schooling (includes tertiary education and vocational training).	13.16	2.85
tenure	tenure with current employer.	12.29	10.13
full time experience	years of full time experience.	16.88	10.84
part time experience	years of part time experience.	2.37	4.94
part time	indicator variable, 1 if currently part time employed.	0.17	0.38
marginally employed	indicator variable, 1 if currently marginally employed.	0.03	0.16
< 20 employees	current employer firm size indicator variable.	0.19	0.39
20<=employees< 200	current employer firm size indicator variable.	0.29	0.45
200<=employees<2000	current employer firm size indicator variable.	0.24	0.43
employees>=2000	current employer firm size indicator variable.	0.29	0.45
afraid to lose job	indicator variable, 1 if individual concerned about job security.	0.58	0.49
satisfied w/ job	satisfaction w/ job. Scale: 'totally unhappy' (0) to 'totally happy' (10).	7.09	1.92
pessimist	indicator, 1 if pessimistic about the future.	0.25	0.43
lazy	Self reported laziness. Scale: 'not at all' (1) to 'applies perfectly' (7).	2.21	1.46
leftist	political views. Scale: 'Far right' (0) to 'Far left' (10).	5.31	1.75
risk taker	prepared to take risks. Scale (0) to (10).	4.88	2.13
sector dummies	9 indicator for the industry respondent is employed in.		
region dummies	16 indicator variables for the German states.		
occupation dummies	3 blue collar indicator variables: low, medium, high job level.		
	3 white collar indicator variables: low, medium, high job level.		
	3 public servant indicator variables: low, medium, high job level.		

Note: The number of observations for all variables is N=3583.

Tab. 5.4: PERCEIVED FAIRNESS OF CEO PAY AND ABSENTEEISM. TWO-STEP QMLE ESTIMATIONS.

	(1)	(2)	(3)	(4)	(5)	(6)
Main explanatory variables						
CEO pay unfair	.3384***	.1896***	.1932***	.1822**	.1907***	.2202***
	(0.074)	(0.068)	(0.069)	(0.071)	(0.072)	(0.072)
health score		−.3609***	−.3599***	−.3582***	−.36***	−.3437***
		(0.052)	(0.052)	(0.053)	(0.054)	(0.055)
health satisfaction		−.1254***	−.1266***	−.1252***	−.1281***	−.1352***
		(0.024)	(0.024)	(0.024)	(0.025)	(0.026)
gross income (1000s Euro)		−.0833***	−.0249	−.0529**	−.0664***	−.0594**
		(0.015)	(0.020)	(0.023)	(0.023)	(0.025)
Personal characteristics						
age			−.011	−.0162	−.0403	−.0199
			(0.020)	(0.033)	(0.034)	(0.034)
agesq / 100			.0085	.0073	.0383	.0171
			(0.025)	(0.038)	(0.039)	(0.039)
male			−.0888	−.173**	−.1287*	−.0849
			(0.067)	(0.076)	(0.078)	(0.078)
children			−.2017***	−.0946	−.0957	−.085
			(0.068)	(0.069)	(0.070)	(0.071)
foreign			.0903	.0876	.1043	.0436
			(0.127)	(0.127)	(0.128)	(0.134)
schooling			−.055***	−.037**	−.0319*	−.0418**
			(0.012)	(0.016)	(0.016)	(0.017)
Job related variables						
tenure				.0225**	.019	.0191
				(0.011)	(0.012)	(0.012)
tenure sq / 100				−.0435	−.0451	−.0412
				(0.031)	(0.031)	(0.031)
full time experience				−.0093	−.0103	−.019
				(0.017)	(0.018)	(0.018)
full time experience sq / 100				.0358	.0321	.0472
				(0.037)	(0.038)	(0.039)
part time experience				−.0067	−.0056	−.0168
				(0.019)	(0.019)	(0.020)
part time experience sq / 100				.0093	.0033	.0356
				(0.071)	(0.071)	(0.072)
part time[a]				−.1972*	−.1885	−.1677
				(0.118)	(0.120)	(0.121)
marginally employed				−1.129***	−.9265***	−.7908***
				(0.268)	(0.270)	(0.298)
Firm level variables						
20<=employees<200[b]					.4001***	.3979***
					(0.100)	(0.102)
200<=employees<2000					.4816***	.4517***
					(0.102)	(0.104)
employees>2000					.4396***	.4451***
					(0.101)	(0.103)
Personal attitudes						
afraid to lose job						.0129
						(0.069)
satisfied w/ job						−.0222
						(0.017)
pessimist						−.0863
						(0.071)
lazy						−.0166
						(0.022)
leftist						.0336*
						(0.017)
risk taker						.0159
						(0.016)
constant	1.759	4.127	5.088	5.241	5.31	5.291
	(0.063)	(0.144)	(0.422)	(0.665)	(0.691)	(0.714)
9 sectoral dummies	No	No	No	No	Yes	Yes
9 occupation dummies	No	No	No	Yes	Yes	Yes
16 region dummies	No	No	No	Yes	Yes	Yes
observations	5200	4223	4131	3970	3747	3583
log-pseudolikelihood	-13468	-11092	-10846	-10351	-9851	-9398

Note: Reference categories are (a) full-time for 'job status', (b) less than 20 employees for 'firm size'. All estimations are two-step quasi-maximum likelihood (QMLE) implying fully robust standard errors. The dependent variable is 'number of days absent'. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Chapter 6

(Post-)Materialist Attitudes and the Mix of Capital and Labor

Taxation[1]

6.1   Introduction

Among political and social scientists, it is widely held that a deep change in value orientations has taken place throughout advanced industrial societies over the past decades. In seminal contributions, Ronald Inglehart and others argue that people nowadays put lesser emphasis on material goods such as consumption, wealth, and income but give higher priority to immaterial goods, such as esteem, self-expression, freedom of choice and other intangible aspects of the quality of life (Davis and Davenport, 1999; Hellevik, 1993; Inglehart, 1971, 1997, 1999; Inglehart and Welzel, 2005; Moors and Vermunt, 2007; Duch and Taylor, 1993).

This so-called "value change hypothesis" is largely supported by empirical evidence derived from the *World Values Surveys*, the largest investigation on attitudes, values, and beliefs around the world. In these surveys, a rising share of respondents say that less emphasis on material possessions is a desirable change in our way of life; a growing number of people consider "hard work" or "saving money" as less valuable qualities to be taught to a child than tolerance and respect; people to a greater extent emphasize the importance of leisure; respondents increasingly think that, when seeking a job,

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good pay is less important than a feeling of accomplishment and working with people one likes; people are increasingly interested in arts, music, entertainment and culture; and respondents are more inclined to view economic growth as a less important policy objective than, say, the protection of the environment (Inglehart, 1997; Inglehart and Welzel, 2005).

The change in basic values, thus, involves that people shift priorities from materialist issues to "postmaterialist" or quality-of-life goals, as Inglehart and others call the objectives ranked higher in Maslow's hierarchy. Occurring on a large scale, this trend can be expected to impact on political decisions, processes, and policy choices. Indeed, political scientists argue that postmaterialism helped to promote good governance (see, e.g., Inglehart and Welzel, 2005) and fostered the emergence of social movements with concerns about civil rights, inequality, the environment, or globalization (Inglehart, 1997; della Porta and Diani, 1999). In this paper we argue that the rise of postmaterialism may also affect tax policies. Inglehart (1971) defines postmaterialism as the relative importance people ascribe to immaterial values relative to material goods. Put simpler, it is the degree of how little people are impressed by money. As taxation is foremost associated with a smaller purse, people's attitude towards money may have an effect on how strongly governments can tax them or how elastically they try to escape from governments' grabbing hands. Value-induced changes in the perception of the burden imposed by taxes and in the responsiveness to taxation will then translate into changes of the optimal tax mix in a society. Taxation will shift to those items that are complementary with material values.

This is the vantage point of our paper. Specifically, we ask whether a society's (non-) materialistic attitude may affect its mix of capital and labor taxation. This exercise seems especially worthwhile as the shift in the fiscal importance and in the tax burden from taxes on capital to taxes on labor has been one of the most pronounced (and most hotly debated) trends in the structure of taxation over the past decades. A standard explanation for this trend is the pressures of "globalization", i.e., a higher mobility – and, thus, a higher tax sensitivity, of capital (see below). We complement this explanation by arguing that the reduced relative tax burden on capital may also be driven by changes in the values held in the populations.

In a first step, we propose a simple model of capital and labor taxation for open

economies with mobile capital and immobile, but elastically supplied labor (Nash tax competition). We incorporate the notion of postmaterialism via a preference parameter. This parametric approach comes at the cost of some loss of generality, but allows for a reduced-form solution for the equilibrium mix of capital and labor taxes.

As a testable hypothesis we derive that a higher degree of postmaterialism will lower the ratio of capital to labor taxes. The intuition behind this result is the following. Both capital and labor are elastic tax bases: capital can move abroad and labor, though internationally immobile, avoids taxation by fleeing into leisure. If people place lower relative emphasis on material aspects, they are less sensitive to their labor income being taxed. The wage tax elasticity of their labor supply decreases with postmaterialism. In turn, this implies that governments increase the relative tax burden on labor.

In a second step, we empirically test our theoretical results using a panel data set comprising 17 OECD countries over the period covering 1981 to 2001. We employ a modified version of the so-called *Inglehart Four Items Index* but also develop two other proxies for postmaterialist attitudes from the *World Values Surveys*. Controlling for country-specific and time fixed effects, these proxies, a measure of capital mobility, and a set of control variables are used as regressors for explaining the ratio of the effective marginal tax rate on capital (EMTR) to the tax wedge on labor. The estimates for the postmaterialism parameter exhibit the predicted signs and are highly significant in all regressions, indicating a substantial impact of non-material values on tax design.

Our research adds to a recent trend in the literature with focus on the complementarity between norms, values, and beliefs, and tax policies. E.g., Alesina and Angeletos (2005) trace back differences in the volume of redistributive taxation between Western Europe and the United States to different perceptions about how fair market outcomes are. Hodler (2008) points out that different attitudes towards leisure (in our terminology, varying degrees of postmaterialism) are responsible for the variation in the size of welfare states and, by and large, in the *overall* tax burden. Franzen (2003) and others report evidence that appreciation for eco-taxes is greater in postmaterialist than in materialist countries. It remains unclear, however, whether this reflects "merely" an increased concern for the environment or a generally reduced price sensitivity. Qari et al. (2011) explicitly build on the assumption that individual attitudes shape tax sensitivities. Specifically, they posit that patriotic values makes mobile rich more attached

to their home country; governments in turn can exploit this when financing a redistributive tax-transfer system. However, none of the studies we are aware of attempts to relate values and norms to the composition of the tax burden or to the tax mix. This is our focus.

Traditionally, the (relative) reliance on capital taxation is explained by the degree of capital market integration. It is reckoned that more open economies face a greater danger of capital flight. They, thus, have stronger incentives to shift the tax burden to immobile factors – which is mainly labor, but also consumption (for a survey, see Wilson, 1999). By and large, this argument seems well in line with the experience from the last two decades, a period that was characterized by both deeper economic integration and a decline in the ratio of capital to labor taxes (see Haufler et al., 2008). Many of the empirical papers do, however, fail to find a robust negative link between capital mobility and the relative tax burden on capital and labor.[2] Thus, it appears natural to search for further factors that drive the mix of capital and labor taxation. This paper suggests that postmaterialist attitudes in the population are a potential candidate – and substantiates this claim theoretically and empirically.

This paper proceeds as follows: Section 6.2 sets out the model and derives predictions on optimal tax structures. Section 6.3 tests these hypotheses empirically. Section 6.4 concludes.

6.2 The model

6.2.1 Framework

We incorporate postmaterialism into a standard tax model for open economies. We borrow the main components of the modelling framework from Bucovetsky and Wilson (1991), Persson and Tabellini (1992, 2002), and Haufler et al. (2008). These studies explain the relative reliance on capital taxation by economic factors; we will put the spotlight on the role values might play.

We consider an integrated economic area with two small open economies that are identical in every respect. In particular, they face the same exogenously given gross

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[2]Haufler et al. (2008) survey the empirical literature on the relationship between the openness of an economy and its tax mix.

return on capital. Capital is assumed to be imperfectly mobile and taxed at source. The populations in both countries are identical in structure and tastes; individuals are internationally immobile. For convenience, we refer to one of the two countries as the "home" and to the other as the "foreign" country. If necessary, we shall correspondingly index country variables with subscripts h and f, respectively. Without loss of generality we introduce model features from the home country's point of view.

Each country is inhabited by capitalists and workers. Within each class, individuals are identical. Workers are assumed to outnumber capitalists. Governments, driven by (re-)election concerns, choose policies (i.e., the capital-labor tax mix) as to maximize the utility of workers.

Capitalists receive income from capital (which may include income from abroad). Workers receive only wage income. Workers have convex and monotone preferences over consumption c, leisure – negatively represented by working hours ℓ –, and a publicly provided good g that is financed by domestic taxes on capital and labor.

We will interpret leisure as to reflect non-materialist goods and, thus, assume that (post-) materialist attitudes are incorporated in the preferences over leisure. This assumption is motivated by phenomena cited as evidence for the so-called "value change hypothesis". Inglehart and Welzel (2005), together with others, assert that people turn their minds away from consumer goods towards arts, music and culture or, in short, towards a "better quality of life". As many of these quality activities are genuine leisure time activities, it seems quite natural to suppose that postmaterialist societies tend to have higher levels of leisure or, equivalently, lower volumes of work. Seen from that angle, postmaterialism may be linked to the observation that Western European countries (which count as highly postmaterialist) experienced a sharp fall in average working hours over the last decades (see Alesina et al., 2005).[3]

Specifically, the utility of workers is assumed to be quasi-linear and given by

$$U(c, \ell, g; \gamma, \delta) = c - \frac{1}{1+\gamma} \cdot \ell^{1+\gamma} + \delta \cdot g \tag{6.1}$$

with $\delta > 1$ and $\gamma > 0$. The marginal utilities from private and public consumption are

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[3]This unrealistically rules out that non-materialist goals (such as self-expression or self-actualization) can be achieved during work time. However, as mentioned above, leisure seems to play a more important role for satisfying non-materialist needs.

constant, with the latter being larger than the former ($\delta > 1$). This assumption ensures that workers wish to have some positive amount of the public good even if it has to be financed by distortionary taxes.[4]

In (6.1), the parameter γ will be interpreted as the degree of postmaterialism. Two arguments support this interpretation: First, the higher γ, the larger the willingness to pay (measured in terms of material consumption) for an increase in leisure. The relative weight that people give to non-material over materialist consumption is, however, the genuine definition of postmaterialism according to Inglehart (1997). A higher γ, i.e., a higher marginal disutility from work, implies a shift away from consumption and towards leisure . In this respect, postmaterialism is related to "laziness" in Alesina and Angeletos (2005) or Hodler (2008).

Second, $1/\gamma$ equals the elasticity of labor supply with respect to net wages (also see below). Higher values of γ then reflect a reduced sensitivity of individuals to material incentives (or changes in their budgets). This is in line with Inglehart's (1990, pp. 176f) observation that postmaterialists are lesser motivated by income than materialists and that they earn less for the same amount of labor and at comparable levels of education ("economic underachievement").[5]

To summarize, a higher γ translates, first and *ceteris paribus*, into an absolute reduction in labor supply and, second, into a larger indolence of individuals with respect to monetary rewards. The simple parametrization of the utility function (6.1) by γ, thus, encompasses two important aspects of the sociological concept of postmaterialism.

We assume that γ and changes to it are exogenous. Empirically, postmaterialist attitudes are highly and positively correlated with economic well-being. However, as Inglehart (1990) shows, changes in postmaterialist attitudes occur at a much slower pace than changes in economic conditions. Postmaterialism is a cultural value embedded in society; since changes in γ should therefore reflect changes in attitudes over and above those triggered by economic factors, we treat it as exogenous.

Workers' consumption c equals their after-tax income $(w - \tau) \cdot \ell$, where w and τ

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[4]While not innocent, the assumption of separable utility is the simplest way to generate the results we are aiming at.

[5]Uhlaner and Thurik (2007) empirically show that the more postmaterialist a culture, the lower the rate of entrepreneurial activities. As they argue that entrepreneurship is associated with (the hope of) making a lot of money, this, too, corroborates the view that postmaterialists respond less elastically to monetary incentives.

denote the real gross wage and the wage tax, respectively. Using this when maximizing (6.1) with respect to c and ℓ, taking wages, taxes and the amount of the publicly provided good as given, optimal labor supply L amounts to

$$L(w - \tau; \gamma) = (w - \tau)^{\frac{1}{\gamma}}. \tag{6.2}$$

As mentioned earlier, the elasticity of labor supply with respect to the wage tax equals

$$\eta_{L,\tau} := \frac{\partial L}{\partial \tau} \frac{\tau}{L} = -\frac{1}{\gamma} \frac{\tau}{w - \tau} < 0. \tag{6.3}$$

Eqs. (6.2) and (6.3) formally justify why γ is a meaningful proxy for postmaterialism: First, the higher γ, the higher the consumption of "non-materialist" leisure. Second, the higher γ, the more difficult are people to motivate via monetary incentives. Equivalently, less materialist people are less easily deterred by monetary disincentives like wage taxes – an observation that will drive optimal tax policies.

Domestic and foreign capitalists each own a fixed stock $\bar{K}$ of capital, which they can allocate between their home and the foreign country. Given that both economies are small, capitalists have to receive the real rate r of return on worldwide markets, gross of taxes, independently of where they invest.

We denote by k_{ij} (with $i = f, h$) the amount of capital originating from country i that is invested in country j. Investing abroad is associated with mobility costs (with increasing marginal costs). These costs contain all extra costs that foreign investment entails over domestic investment, e.g., when gathering information about legal issues, tax planning, purely tax-driven misallocations of factors. We follow Haufler et al. (2008) by assuming mobility costs M to be a quadratic function in the amount of capital invested abroad. For an investor from h, they amount to $M_h = \frac{1}{2\beta} \cdot k_{hf}^2$. The cost parameter β is common to both countries; it serves as a proxy for the degree of capital market integration between the two countries. After-tax income of capital owners from h amounts to

$$(r - t_h)k_{hh} + (r - t_f)k_{hf} - \frac{1}{2\beta}k_{hf}^2 = (r - t_h)\bar{K} + k_{hf}(t_h - t_f) - \frac{1}{2\beta}k_{hf}^2, \tag{6.4}$$

where t_h and t_f denote the rates of the source tax on capital in country h and f,

respectively.

We assume that capitalists are just interested in maximizing their after tax income. They, thus, remain unaffected by postmaterialist tendencies. At first sight, this seems to contradict Inglehart's findings that rising postmaterialism can be observed throughout all classes and strata of society. Yet, this assumption can be justified on several grounds: In practise, the allocation of capital across countries is decided by professionals who, by virtue of their job as bankers or managers, have to aim at maximizing after tax profits, irrespective of what their personal attitudes towards material goods might be. Moreover, one might also view capital owners as non-working *rentiers* who live on their wealth. For such leisure-class people, increased tendencies towards postmaterialism would not make a behavioral difference.[6]

Maximizing (6.4), the domestic capitalist's optimal amount of foreign investment is given by

$$k_{hf} = \beta \cdot (t_h - t_f) =: K_{hf}(t_h - t_f; \beta). \tag{6.5}$$

Combined with labor input, capital produces economic output. In a general equilibrium of a competitive economy, remunerations of factors will depend on the amounts of factors employed. Assuming that factors of production are complements, a higher capital stock would increase the marginal productivity of labor and, thus, lift gross wages. Short-cutting that investment decisions impact on gross wages of workers, we follow Haufler et al. (2008) and assume that gross wages vary proportionally with the total amount of capital invested at home, i.e.,

$$w_h = \alpha \cdot (\bar{K} - K_{hf}(t_h - t_f; \beta) + K_{fh}(t_f - t_h; \beta)) =: w_h(t_h - t_f; \beta) \tag{6.6}$$

with $0 < \alpha < 1$. Note that α being positive precludes that workers wish to expropriate

---

[6]There is a more fundamental objection against the assumption that capitalists be postmaterialist in our model. In a dynamic framework, capital income would be derived from savings, i.e., from income that is not consumed at the moment of its generation. However, we did not find any evidence that postmaterialism is related to the postponement of consumption or the intertemporal (re-)allocation of some given wealth. Rather, postmaterialism involves incentives to the generation of income in the first place. Accordingly, even a more complete modelling of postmaterialist attitudes ought not to include "inefficient" invstment strategies (in the sense that maximizing (6.4) is questioned). Rather, the generation of $\bar{K}$ should be modelled. However, such intertemporal problems are beyond the scope of this paper.

capitalists entirely when it comes to generate positive tax revenues.

Now, let us turn to the government sector. The government uses tax revenues to provide a public good. As only source-based taxes are available, the home government's budget constraint is given by

$$
\begin{aligned}
g_h \quad &= \tau_h \cdot L(w_h(t_h - t_f; \beta) - \tau_h; \gamma) + t_h \cdot (\bar{K} - K_{hf} + K_{fh}) \qquad (6.7)\\
&=: G(\tau_h, t_h; t_f, \beta, \gamma).
\end{aligned}
$$

The foreign country is identical to the home country in every respect. By symmetry, we get

$$
\begin{aligned}
K_{fh}(t_f - t_h; \beta) &= -K_{hf}(t_h - t_f; \beta), \qquad\qquad (6.8)\\
\frac{\partial K_{fh}}{\partial t_h} &= -\frac{\partial K_{hf}}{\partial t_f} = \beta. \qquad\qquad (6.9)
\end{aligned}
$$

From (6.8) and (6.9), the elasticity of the home country's capital tax base with respect to the own capital tax rate t_h equals:

$$
\varepsilon_{K_h, t_h} = \frac{\partial (\bar{K} - K_{hf} + K_{fh})}{\partial t_h} \cdot \frac{t_h}{\bar{K} - K_{hf} + K_{fh}} = -\frac{2\beta t_h}{\bar{K} - K_{hf} + K_{fh}}. \qquad (6.10)
$$

6.2.2   The tax mix in an equilibrium

Both governments are interested in getting majority support for their politics in the domestic electorate. They are unwilling or unable to coordinate on policy decisions with their neighbour. Since workers outnumber capitalists by assumption, governments choose a mix of capital and labor taxes as to maximize utility of workers, thereby taking the foreign tax policy as given. The indirect utility of the home workers is derived by substituting (6.2), (6.6), and (6.7) into (6.1):

$$
\begin{aligned}
V_h = V(\tau_h, t_h; t_f, \beta, \gamma, \delta) \quad &= \quad (w_h(t_h - t_f; \beta) - \tau_h) \cdot L(w_h(t_h - t_f; \beta) - \tau_h; \gamma) \qquad (6.11)\\
&\quad - \frac{1}{1+\gamma} \cdot L(w_h(t_h - t_f; \beta) - \tau_h)^{1+\gamma} + \delta \cdot G_h(\tau_h, t_h; t_f, \beta, \gamma).
\end{aligned}
$$

The FOCs for the home government's maximization problem are given by the following equations, where we use general functional forms, exploit the Envelope Theorem

and suppress parameters for reasons of simplicity:

$$\frac{\partial V_h}{\partial t_h} = \frac{\partial w}{\partial t_h}L + \delta\left[\bar{K} - K_{hf} + K_{fh} + t_h\frac{\partial(K_{fh} - K_{hf})}{\partial t_h} + \tau_h\frac{\partial L}{\partial w}\frac{\partial w_h}{\partial t_h}\right] = 0 \quad (6.12)$$

$$\frac{\partial V_h}{\partial \tau_h} = -L + \delta\left[L + \tau_h\frac{\partial L}{\tau_h}\right] = 0. \quad (6.13)$$

In a symmetric Nash equilibrium, the domestic and the foreign capital tax rates will be equal ($t_h = t_f$). Consequently, no cross-border capital flows occur ($K_{hf} = K_{fh} = 0$) and equilibrium capital stocks equal initial endowments. Therefore, the equilibrium gross wage in both countries is given by $w = \alpha \cdot \bar{K}$. We shall henceforth abandon with country indexes.

To arrive at an explicit solution for the government's choice of τ, observe that (6.13) yields the Atkinson-Stern rule that the willingness-to-pay for public consumption must equal the marginal costs of public funds through labor taxes:

$$\delta = \frac{1}{1 + \eta_{L,\tau}}.$$

Substituting for $\eta_{L,\tau}$ and using $w = \alpha\bar{K}$, we obtain the equilibrium tax rate on labor as

$$\tau^* = \frac{\bar{c}\gamma}{1 + \bar{c}\gamma}\alpha\bar{K}, \quad (6.14)$$

where we set $\bar{c} := 1 - 1/\delta$. The wage tax is always positive since we assumed $\alpha > 0$ and $\delta > 1$. If wages were independent of the amount of domestic capital ($\alpha = 0$), workers would wish to exclusively rely on capital taxes, leaving wage income untaxed. Thus, a positive value of α (generally: a positive relation between capital and labor productivity) opens the door for taxing both capital and labor. Similarly, the assumption $\delta > 1$ triggers positive levels of taxation as it implies that the economy is willing to finance the public good via distortionary taxes.

The impact of the postmaterialism parameter γ on labor taxation can be seen directly from (6.14): A stronger degree of postmaterialism will unambiguously lead to a higher wage tax ($\partial\tau^*/\partial\gamma > 0$). Intuitively, as workers respond less sensitively to their labor income being taxed away, the marginal opportunity costs of wage taxation become lower, too.

Using (6.2) and substituting for w and τ by using (6.14) and $w = \alpha\bar{K}$, labor supply

in the equilibrium turns out to be

$$L^* = \left[\frac{\alpha \bar{K}}{1 + \bar{c}\gamma} \right]^{1/\gamma}. \tag{6.15}$$

Note that the effect of a greater postmaterialism on equilibrium labor supply is unambiguously negative. For any given tax rate, a higher γ makes workers prone to consume more of (non-material) leisure such that labor supply decreases. This effect is amplified by the effects of postmaterialism on wage taxes. Due to the increasing sensitivity of workers with respect to taxation, tax rates rise and net wages decrease. Thus, the direct effect and the indirect effect of postmaterialism via taxing wages work in the same direction.

For the equilibrium tax rate on capital, combine (6.12) and (6.13) to obtain

$$\frac{K}{L} \cdot [1 + \epsilon_{K,t}] = -\frac{\partial w}{\partial t}.$$

Combining this equation with (6.6), (6.10) and (6.15) yields the reduced-form solution for capital taxes:

$$\begin{aligned} t^* &= \frac{\bar{K}}{2\beta} - \alpha \cdot L^* \\ &= \frac{\bar{K}}{2\beta} - \alpha \cdot \left[\frac{\alpha \bar{K}}{1 + \bar{c}\gamma} \right]^{1/\gamma}. \end{aligned} \tag{6.16}$$

The optimal tax rate is, thus, driven by two concerns (see also Haufler et al., 2008): First, capital taxes contribute to financing the public good, which *ceteris paribus* calls for a strictly positive tax rate (see the first term on the RHS of (6.16)). By contrast, and represented by the second term, capital taxation also has the negative effect of reducing wages. Thus, workers have, for given levels of labor supply, an incentive to subsidize capital. We henceforth assume that capital is taxed at a positive rate, presupposing that the first effect outweighs the second.

Since capital mobility, represented by β, does not affect equilibrium wages (capital flight is only perceived by governments), capital taxation unambiguously decreases the more mobile is capital. This is a standard effect in open economies.

More interestingly, a higher degree of postmaterialism reduces also the tax burden on capital. This can be explained as follows. With labor supply decreasing due to a rise

in postmaterialism, the adverse effects of capital taxation on labor income are reduced.[7] Thus, the incentives to subsidize capital (and, thus, to boost workers' wages) declines with stronger postmaterialist attitudes.

6.2.3 The effects of postmaterialism

Let us turn to the ratio of capital to labor taxes, t^*/τ^*: First, deeper capital market integration drives down this ratio (since τ^* does not depend on β and $\frac{\partial t^*}{\partial \beta} < 0$). As expected, higher capital mobility reduces the governments' relative reliance on capital taxation. Second, and more interestingly, the effect of a rise of postmaterialism on the tax ratio is unclear since both capital and wage taxes increase with γ. Hence, the effect of postmaterialism on the tax mix is ambiguous.

Fig. 6.1: POSTMATERIALISM AND THE RATIO OF CAPITAL TO LABOR TAXES
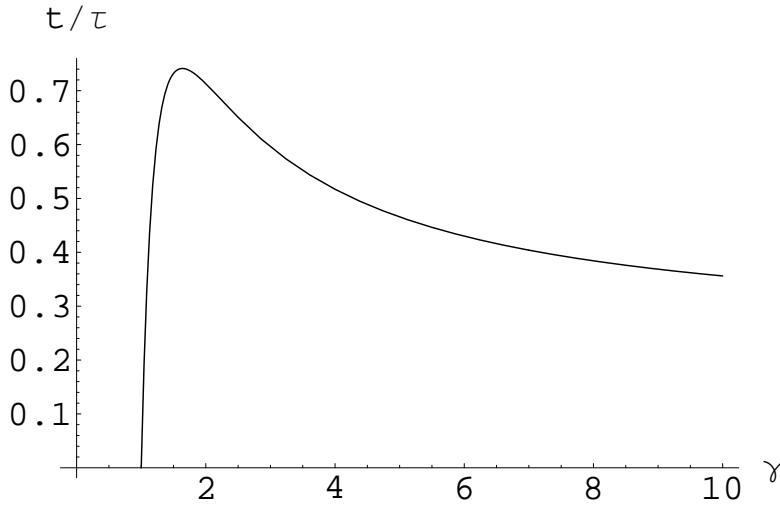
Figure 6.1 illustrates the relationship between the degree of postmaterialism γ and the tax ratio t^*/τ^*. Parameters in this plot are chosen such that both the capital and the labor tax rate are positive and, in line with reality, the tax rate on labor exceeds that on capital (i.e., $t^*/\tau^* < 1$).[8] From Figure 6.1, the relationship between

---

[7]The income loss from capital taxation, represented by $\frac{\partial w}{\partial K} \frac{\partial K}{\partial t} L$ in (6.15), decreases in L.

[8]We choose $\bar{K} = 100$, $\alpha = 0.3$, $\beta = 2$ and $\bar{c} = 0.2$. According to Sørensen (2000), the average effective tax rate on labor income was higher than the effective tax rate on capital income in Nordic countries and in Continental Europe, while the effective tax rate on capital income was higher in Anglo-Saxon countries. The time periods covered were 1981 to 1985 and 1991 to 1995. The European

Fig. 6.2: Postmaterialism and the capital and labor tax rate
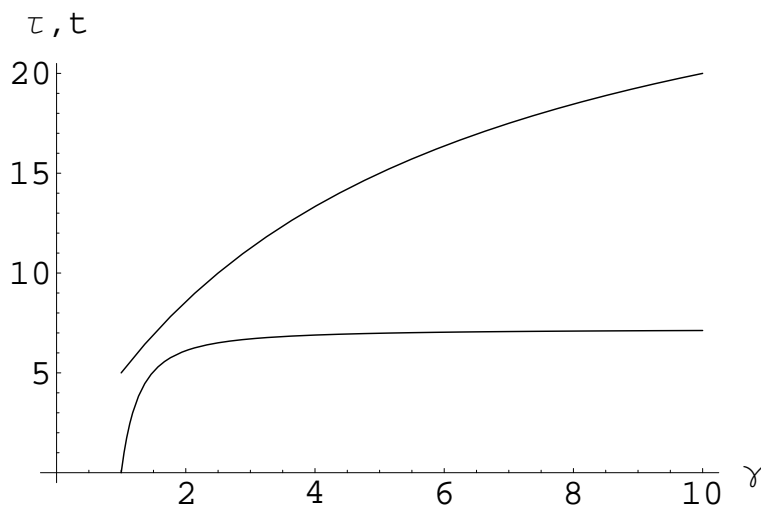

the tax ratio and postmaterialism is non-monotonic. Starting at moderate levels of postmaterialism, the tax ratio increases with the degree of postmaterialism; here, the potential of postmaterialism to reduce labor supply outweighs the positive effect via reducing the tax sensitivity of labor supply. At higher levels of postmaterialism the effects change and the tax-ratio starts to decline. This result is also apparent from Figure 6.2: the slope of $t(\gamma)$ is higher [lower] than the slope of $\tau(\gamma)$ for low [high] levels of postmaterialism.

The non-monotonic relationship between postmaterialism and the tax ratio can be explained by the response of labor supply towards changes in postmaterialism. Figure 6.3 shows that labor supply is converging to a fixed, positive level. Intuitively, even the most ardent postmaterialist needs a certain amount of labor income to survive (formally, the constant marginal utility of private consumption will eventually exceed the marginal utility from leisure). Close to this minimum level, further increases in the degree of postmaterialism have negligible effects on labor supply and, consequently, on capital taxation. Thus, above a certain degree of postmaterialism, the sensitivity effect of postmaterialism dominates and accordingly, the ratio of capital to labor taxes

Commission (2006, pp. 46ff) reports an implicit tax rate on labor income of 35.6 percent (unweighted EU average, 2003) while the implicit marginal tax rate on capital is only 25.6 percent (the average tax rate on capital and business *income* is even lower at 17.7 percent). Only in few countries (e.g., United Kingdom and Portugal) or for limited periods of time (e.g., Denmark in 2004) has capital on the margin been taxed more heavily than labor.

Fig. 6.3: POSTMATERIALISM AND LABOR SUPPLY
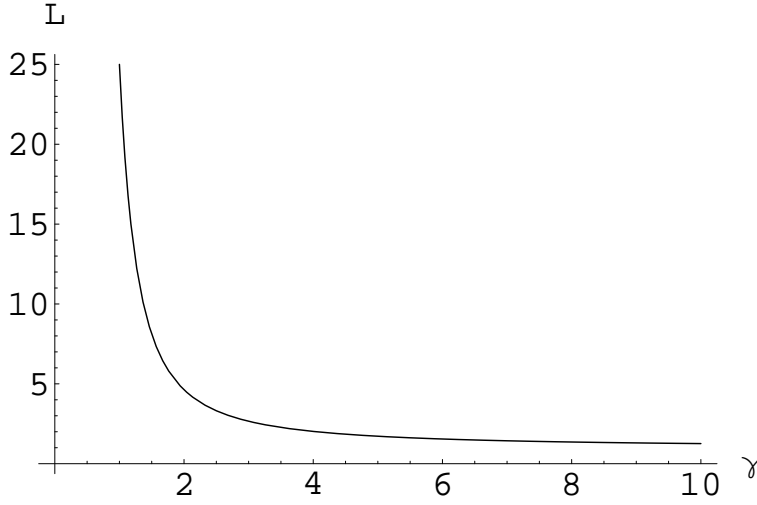
is decreasing in postmaterialism.

Observe that – with our specification – postmaterialism does not exert much impact on government expenditures (i.e., on the level of the publicly provided good). Using (6.14), (6.15), and (6.16), the size of the government budget in the equilibrium can be calculated as[9]

$$G^* = \frac{\alpha \bar{K}^2}{2\beta} - \left(\frac{\alpha \bar{K}}{1 + \bar{c}\gamma} \right)^{1+1/\gamma}. \tag{6.17}$$

Only the second term in this expression varies (positively) with the postmaterialism parameter γ. At low levels of postmaterialism, an increase in γ leads to a considerable increase in public good supply. However, in the range where increased postmaterialism triggers a decline in the capital-labor tax ratio, the variation of G^* in γ is only very mild and convergence towards the constant $\alpha \bar{K}^2/(2\beta)$ is fast. Figure 6.4 visualizes this.

A higher degree of postmaterialism does not translate into substantial changes in the demand for government-provided goods.[10] It only affects the tax mix that finances

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[9]For consistency, we also checked whether equilibrium tax rates are such that the economy is in the upward-sloped part of its Laffer curve. This is the case.

[10]As mentioned in the introduction, postmaterialism can manifest itself in a higher demand for cultural activities. To the extent that cultural goods are provided by governments, this would imply a larger government sector. In the model, this could be captured by a change in the preference for the government-provided good, i.e., in δ (and, thus, $\bar{c}$). However, this would require an interpretation of g as a "non-materialist" good. We refrain from this, allowing that g may also be quite mundane.

Fig. 6.4: Postmaterialism and government expenditures
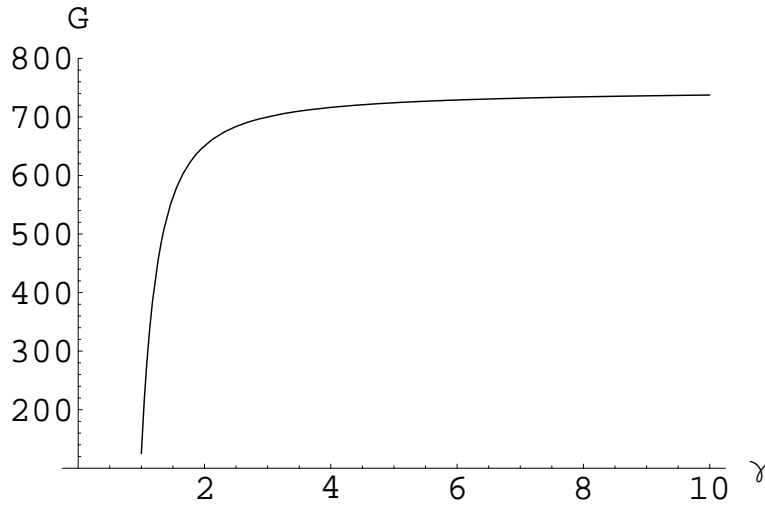
government expenditures.

6.3 Empirical analysis

In this section we test our model empirically. Our main hypothesis is that, for a sufficiently high initial degree of postmaterialism, both a greater capital mobility and a higher tendency towards postmaterialist values encourage governments to lower the tax ratio of capital to labor taxes.

Our analysis focuses on OECD countries, i.e., on countries which are characterized (according to Inglehart and his adherents) by high levels of postmaterialism. Therefore, we are confident that the collected data come from countries positioned on the downward-sloped part of the tax ratio curve in Figure 6.1. We consider the period from 1981 to 2000 which was characterized by a rise of postmaterialism (see Inglehart and Welzel, 2005), a deepening in capital market integration and a decrease in the relative reliance on capital taxation (see Haufler et al., 2008, and the references therein).

Our approach is in line with recent empirical work on the association between closer capital market integration with lower (relative) tax burdens on capital (Bretschger and Hettich, 2002; Haufler et al., 2008; Slemrod, 2004; Schwarz, 2007; Winner, 2005). We go beyond these studies by adding several proxies for postmaterialism as explanatory vari-

ables, i.e., by taking explicitly into account social values. Before presenting regression results, we discuss the data; summary information is provided in Appendix 1.

6.3.1 Proxies for postmaterialism

To operationalize the concept of postmaterialism we use data from the World Values Surveys (WVS), the largest worldwide investigation of attitudes, values, and beliefs. The WVS studies were carried out in four waves of national surveys: 1981-1982, 1990-1991, 1995-1997, and 1999-2001.[11] In each wave, respondents were confronted with more than 200 questions meant to detect their socio-cultural, moral, religious, and political attitudes. Several of these questions shed light on the valuation of non-material over material values. Using and aggregating items that were asked in each of the four waves we construct a total of three proxies for a nation's tendency towards postmaterialist goals:

Adjusted Inglehart index. Our first proxy is based on the so-called Inglehart index, which is meanwhile included in the world values database as a ready-made variable (Inglehart 1997, 1999). The Inglehart index rests on the relative importance respondents ascribe to the following four items: (1) maintaining order in the nation; (2) give people more to say; (3) fighting rising prices; and (4) protecting the freedom of speech. Items (1) and (3) are considered to reflect materialist attitudes while items (2) and (4) express postmaterialist values. Respondents were asked to indicate which two of these items they consider to be most important. Then a score of "1" is assigned to the respondent if both choices are materialist, a score of "2" if exactly one choices is postmaterialist, and a score of "3" for two postmaterialist choices. A nation's degree of postmaterialism is then measured by the mean over all scores of the national respondents on this scale. A major problem with the original Inglehart index is its potential downward bias in periods of high inflation (then respondents will probably put the fight against rising prices higher on the political agenda more often and for reasons other than being materialist; see Hansen and Tol, 2003). To correct for this bias, we use a procedure applied by Bretschger and Hettich (2002) in a different context: We perform a pooled regression

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[11]Our classification of waves follows the data file available at http://www.worldvaluessurvey.org. However, sometimes (and also on the official webpage) waves are labelled in a different way.

with the original Inglehart index as an endogenous variable and the inflation rate as an exogenous variable at the country level and take the residuals from this regression as a proxy for postmaterialism. We refer to this indicator as the *adjusted Inglehart index*.

Education qualities.   Going beyond the political sphere, our second proxy for post-materialism is developed from the following question about values in child education: "Here's a list of qualities that children can be encouraged at home. Which, if any, do you consider to be especially important?" The items respondents can choose from include the qualities "thrift saving money and things", "hard work", "independence", and "tolerance and respect". We code each quality with "1" if chosen and with "0" if not. For each individual we subtract the codes of the first two qualities, which we think to be preferred by materialists, from the other two qualities, which may be more attractive for postmaterialists. This locates each individual on a scale from -2 to $+2$ with higher values signifying a higher preference for immaterial goods. On the aggregate level, we calculate a nation's arithmetic mean on this scale and denote this variable by *education qualities*.

Future changes.   As a more direct indicator for postmaterialism, we consider the following question from the WVS: "I'm going to read out a list of various changes in our way of life that might take place in the near future. Please tell me for each one, if it were to happen, whether you think it would be a good thing, a bad thing or you don't mind." Among the scenarios to be evaluated is "Less emphasis on money and material possessions". For each country, we calculate the percentage of respondents who answered "good thing" and refer to this postmaterialism proxy as *future changes*.

These three indexes are hoped to capture important aspects of the multi-faceted concept of postmaterialism. We expect each of them to be negatively correlated to the relative reliance on capital taxation, the dependent variable to be discussed now.

6.3.2   Tax measures

To measure tax burdens on both capital and labor, many studies employ revenue-based measures, derived from national account statistics. These measures can be easily obtained for a large number of countries but have several important drawbacks (see

Devereux et al., 2002; Griffith and Klemm, 2004). When tax ratios are calculated as tax revenues over GDP, both numerator and denominator are driven by factors out of government control (say, business cycles, the profitability of the corporate sector, historical events etc.). This limits their reliability for reflecting government tax setting behavior. A related problem occurs with the implicit tax rates due to Mendoza et al. (1994) that divide tax revenues earned from one factor by its pre-tax income. These tax rates are not linear in the "real" tax burden supposed to be approximated.[12] As a consequence, a country with high tax burden might be misleadingly identified as a low tax country. In contrast to revenue-based ratios, measures based on tax laws give more direct information on how governments react to changing environments. Thus, they appear more useful in our context. For capital taxes, we use the *effective marginal tax rate (EMTR)*, provided by Devereux et al. (2002). The EMTR measures the impact of tax policy on marginal investments via its impact on capital costs[13] and allows inferences on how tax policy affects the size of the capital stock. This comes close to the capital tax rate of our theoretical model.[14] A drawback of the EMTRs is their sensitivity to underlying assumptions (financing sources etc.) and their disregard of enforcement issues.[15]

To measure the tax burden on wages, we employ the tax wedge on labor income as provided by OECD (2006). This tax wedge reflects the tax rate faced by a worker in the manufacturing sector earning average income; it includes social security contributions and payroll taxes. The tax wedge is based solely on tax laws; yet it is not a marginal tax rate, which would better capture government-induced distortions of the labor-leisure decisions.

In the regressions to follow, we use the ratio between the EMTR and the tax wedge as the independent variable.

---

[12]Let t and y denote the "real" tax rate and the pre-tax income, respectively. Suppose y is decreasing in t. When there are tax exemptions, denoted by E, the Mendoza-tax rate (M) is given by $M = t(1 - \frac{E}{y(t)})$. M first increases, and then decreases in t for $E > 0$. Only without exemptions, i.e. $E = 0$, we have $M = t$.

[13]We use the base case from Devereux et al. (2002) which applies to an (hypothetical) investment in plant and machinery, financed by equity.

[14]We do not use the statutory corporate tax rate and the effective average tax rate (EATR). As argued in Devereux et al. (2002), the former is relevant for profit shifting, the latter for locational decisions of multinational enterprises. Both aspects are not in our focus. However, as shown in Appendix 2, the statistical results are qualitatively the same when EATRs or statutory rates are used.

[15]See Stewart and Webb (2006) for further criticism of EMTRs.

6.3.3 Capital mobility and other controls

We follow previous studies by assuming that capital mobility is positively related to the overall openness of an economy. We employ a composite openness measure provided by Dreher (2006) and referred to below as *economicglob*. This measure takes into account different aspects of economic integration, such as trade and FDI flows, portfolio investments, but also restrictions on current and capital account. Dreher's index for a country's openness is scaled such that higher values indicate higher levels of economic integration. A potential drawback of the measure in our context is its broadness. E.g., it includes trade flows which might not be associated with cross-border capital movements. A more direct proxy for capital mobility would be the so called Quinn 0-4 index. However, this qualitative index does not show enough variation to be useful in fixed-effects regressions (see, e.g., Haufler et al., 2008; Bretschger and Hettich, 2002). In line with the model presented above, we expect to find a negative correlation between *economicglob* and the ratio between the EMTR on capital and the tax wedge on labor.

Clearly, the variables identified as crucial for the tax structure in our simple model (i.e., the degree of postmaterialism and capital market integration), are not the only factors driving the tax setting behavior of real-world governments. Therefore, we control for a variety of other factors. To capture an economy's relative market size, we employ a country's GDP relative to the GDP of USA (*size*). Such a variable might be relevant as Bucovetsky (1991) and Wilson (1991) show that smaller countries face a lower (per capita) capital elasticity, thus having incentives to tax capital at lower levels. We therefore expect to find a positive relationship between *size* and the ratio of capital to labor taxes.

To control for governments' ideologies, we use a partisan index (referred to as *ideology*) provided by Potrafke (2010). This index is scaled such that higher values indicate a stronger position of left-wing over right-wing parties in government and parliament. As left-wing parties are inclined to rely more heavily on capital taxation, we expect to find a positive correlation between *ideology* and the ratio of EMTR to the tax wedge on labor. To account for budgetary pressures, we include the budget saldo normalized by GDP (*budget saldo*). To control for demographic effects on the government budget, we include the percentage of the total population between 15 and 64 years (*pop15to64*).

To capture fluctuations in the business cycle, a country's unemployment rate (*unemp*) and its growth rate of real GDP (*growth*), measured at PPP, are included. As argued by Krogstrup (2004), governments might utilize the capital tax rate as an instrument of employment policy. Against this background, it could be held that *unemp* negatively impacts on the ratio of the EMTR to the tax wedge on labor.

6.3.4   Method and results

We construct a panel data set for 17 OECD countries, covering the period from 1981 to 2000.[16] As the WVS studies were carried out in four waves only (1981-1982, 1990-1991, 1995-1998, and 2000-2002), we obtain at maximum four observations for the national postmaterialism indexes during the period under study. To generate yearly values, we linearly interpolate between two waves for each country. This imputation, though rough, allows for unobserved time-invariant heterogeneity between countries, that we otherwise cannot control for. However, our data set is still "unbalanced" since not all countries participated in every wave. If, say, a country did not participate in the first wave but in each of the subsequent ones, then the time series for this country starts with the date at which the second wave was conducted. For these reasons, we come up with a maximum number of 265 observations for the postmaterialism measures derived from the WVS.

The statistical model we estimate is:

$$\left(\frac{EMTR}{\text{tax wedge on labor}} \right)_{it} = X_{it}\beta + a_i + b_t + u_{it}.$$

Here, the X_{it} are the explanatory variables in country i at time t and u_{it} is a possible heteroskedastic and serially correlated error. Variables a_i absorb all unobserved effects that differ among countries but are constant over time, whereas variables b_t represents unobserved factors that are identical for all countries but change over time.[17] To ensure conservative statistical inferences, results are presented by using heteroskedasticity and autocorrelation robust standard errors following the approach developed by Newey and

---

[16]The countries included are Austria, Belgium, Canada, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and the USA.

[17]To control for fixed effects, we include year and time dummies in our regressions below.

West (1987).[18]

Tab. 6.1: REGRESSION RESULTS

	(1)	(2)	(3)	(4)
economicglob	-0.31***	-0.28**	-0.31***	-0.23**
	(0.08)	(0.12)	(0.12)	(0.11)
size	-0.60*	-0.24	-0.02	-0.38
	(0.32)	(0.40)	(0.38)	(0.39)
ideology	0.004	0.004	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.02)
budget saldo	0.01**	0.01*	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)
pop15to64	0.002**	0.002**	0.002**	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)
growth	0.006	0.003	0.002	
	(0.01)	(0.01)	(0.01)	(0.004)
unemp	-0.03***	-0.03***	-0.02***	-0.03***
	(0.01)	(0.01)	(0.01)	(0.01)
adj. Inglehart index		-0.60**		
		(0.24)		
future changes			-1.01*	
			(0.64)	
education qualities				-0.45**
				(0.15)
observations	311	256	265	265
R^2	0.88	0.92	0.92	0.92

Note: HAC-robust standard errors with a lag-length of one in parentheses. All regressions include country-fixed and time-fixed effects. Dummies are not reported. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The main regression results are shown in Table 6.1. The basic specification, presented in column (1), does not include postmaterialism indexes and regresses the ratio between the EMTR and the tax wedge on labor on the openness measure, *economicglob*, controlling for various other factors described earlier. The relationship between *economicglob* and the tax ratio is negative and highly statistically significant. While this result is in full accordance with the theoretical prediction that deeper capital market integration involves a lower relative tax burden on capital, many previous studies fail to produce that observation. The reason why we obtain the expected sign may be due to the circumstance that we use a tax ratio as a dependent variable and not the

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[18]To obtain HAC-consistent standard errors, we use the Newey-West covariance matrix with lag one. However, our inferences remain unchanged when using two or more lags.

capital tax rate on its own.[19] However, the coefficient of the market size variable, *size*, is negative at a weak statistically significant level. This seemingly contradicts the theoretical prediction that larger countries more heavily rely on capital taxes. This "wrong" sign will survive in (almost) all specifications, but will eventually become statistically insignificant. Among the other explanatory variables, (only) the coefficients of *budget saldo*, *pop15to64*, and *unemp* turn out to be statistically significant in the expected directions.

Columns (2) to (4) in Table 6.1 extend the basic specification by separately adding our various postmaterialism indexes. Recalling that these indexes are scaled such that higher values denote a higher tendency towards postmaterialism, all coefficients show the "correct" negative sign. Moreover, all coefficients are statistically significant ranging from a ten percent to a five percent level. Thus, our cultural variables quite successfully explain the ratio of EMTR to tax wedge on labor.

As mentioned above, the effect of *size* becomes statistically insignificant after including postmaterialism measures. This might be due to fact that our market size variable is strongly positively correlated with the postmateralism proxies:[20] When omitting postmaterialism indexes from the regression, the effects of postmaterialism effect may be hidden in the market power proxy. After all, *size* (= national GDP, relative to US-GDP) also captures wealth effects, and the high correlation between *size* and the degree of postmaterialism conforms with Inglehart (1990)'s prediction that richer countries exhibit stronger tendencies towards postmaterialism.

6.3.5 Extensions and robustness

Appendix 2 reports some further robustness checks. Specifically, our results do not change when we use the ratio between the EATR (rather than the EMTR) on capital to the tax wedge on labor as the dependent variable. We still obtain a (statistically significant) negative relationship between postmaterialism and tax structure (see column (1) in Table 6.2). However, when using the ratio between the nominal corporate income tax rate and the tax wedge on labor, the (still negative) relationship becomes insignificant in some regressions (see column (2) in Table 6.2).

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[19]Schwarz (2007) arrives at a similar conclusion.
[20]E.g., the correlation between *size* and the *adjusted Inglehart index* is +0.35.

Postmaterialism remains statistically significant for the tax mix after controlling for per-capita GDP (see column (3) in Table 6.2). This indicates that cultural attitudes indeed exert a genuine influence on the tax mix that is not driven by changes in economic circumstances.

Recall that we control for country-fixed effects in all regressions. This makes variables that change only slightly over time – which is often said of attitudes and beliefs – difficult to become significant. Moreover, standard errors are estimated in a HAC-robust way which likewise depresses significance. When estimating without autocorrelation-robust standard errors, parameter estimates for the postmaterialism proxies become statistically significant at the one-percent level (see column (4) in Table 6.2). The robustness of our regression results is further supported by the fact that all coefficients that are significant in our basic regressions maintain their signs and (in almost every case) their significance when postmaterialism proxies are added.

We also tested whether government expenditures are affected by the degree of post-materialism.[21] The results are inconclusive in sign and statistically insignificant. This is in full accordance with our theoretical model which predicts that, above a certain (and relatively low) level, postmaterialism only affects the structure of taxation but not the overall budget size (see Section 6.2.3).

6.4 Conclusion and discussion

Cultural values shape policy outcomes. Starting from that premise, we investigated the impact of a growing tendency towards postmaterialism on tax policies. Specifically, we analyzed how the relative importance which society ascribes to non-consumptive values affects its choice of tax structure, i.e., the mix of capital and labor taxation.

Postmaterialism means that individuals place higher priority on non-material goods in their preferences. This includes both a reduced preference weight on goods other than (materialist) consumption and a weaker responsiveness to (dis-)incentives to make money. Understood in that way, a higher and substantial degree of postmaterialism goes along with a lower [higher] relative tax burden on capital [labor]. People who are

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[21]We use the same proxies for postmaterialism as in the estimations for the tax structure. Results for these regressions are available from the authors upon request.

less interested in material possessions are also less sensitive to higher labor taxation. Since postmaterialists put relatively lower priority on consumption, their avoidance of taxation by fleeing into leisure is low as well. Thus, a higher degree of postmaterialism has a similar effect on the tax mix as a higher degree of capital mobility, though through an entirely different channel. Changes in attitudes may, thus, complement the standard "globalization argument" for the observed decline in the relative importance of capital taxes.

Our model has clear predictive power: The rise of postmaterialist values in advanced economies triggered, on its own, reductions in the relative reliance on capital taxation. Testing the predicted negative link between postmaterialism and the relative reliance on capital taxation proved fully successful: All estimates for postmaterialism parameters show the predicted sign at high levels of statistical significance.

Several critical points – which then open avenues for future research – have to be stressed, though. Foremost, our modelling of postmaterialism is open to dispute. We limited the effects of postmaterialism to labor supply. Arguably, postmaterialism in a more complete, intertemporal framework should be modelled as to also affect the allocation of capital.

Furthermore, the simple link we assumed between postmaterialism and the elasticity of labor supply has only superficially been established empirically so far. In spite of the widespread discussion of postmaterialism (starting in the 1970s) empirical studies on the behavioral consequences of changes in attitudes towards material values are remarkably scarce. Still, we believe that our way of modelling captures, in a manageable way, important features of the complex phenomenon of dampened materialism. Moreover, our modelling of postmaterialist preferences gives rise to hypotheses that themselves turn out to have empirical content and support. If our empirical findings are not mere statistical artefacts but rest on some underlying causality, then our model might be one candidate for an explanation.

Theoretically, the relationship between postmaterialism and the capital-labor tax ratio is not monotonic, but hump-shaped. At low levels, lesser importance attached to material goods leads to a higher, rather than to a smaller, reliance on capital taxes. For the empirical part we excluded this feature, arguing that the countries in our sample are, by common standards, highly postmaterialist. Non-availability of data at present

forbids to extend our empirical analysis also to (still) more materialist countries. Closing this gap is on our agenda for future research.

Finally, we represent the [increased] importance of postmaterialist values by [the exogenous change of] an exogenous parameter. There is some evidence (also manifest in the selection of countries for the empirical analysis) that postmaterialism is an attitude dominantly found in richer economies – and, thus, is at least partly endogenous. Allowing for endogenous value formation is a further challenge – both from a theoretical and an empirical perspective.

6.5   Appendix 1: Data sources and methods

Variable	Source	Definition
EMTR	IFS data	Effective marginal tax rate for a (hypothetical) investment. Base case (investment in plant and machinery, financed by equity). For further details, see Devereux et al. (2002).
EATR	IFS data	Effective average tax rate for an project with an expected rate of economic profit of 10 percent. Base Case. For further details, see Devereux et al. (2002).
nominal	IFS data	Statutory corporate income tax rate, including local taxes and surcharges.
tax wedge	OECD Taxing Wages	Average tax wedge of a single, manufacturing worker with average income, including social security contributions and payroll taxes. Before 1993, it is reported biannually, and we interpolate linearly.
economicglob	KOF data	Openness measure taking into account different aspects of economic integration. For further details, see Dreher (2006).
gdp	AMECO	Gross domestic product at current market prices (billion US-$, PPP)
size	AMECO, own calculation	GDP of country divided by GDP of USA
budget saldo	OECD	Budget saldo, in percent of GDP
ideology	Potrafke (2010)	Partisan index, where higher values indicate a stronger position of left wing over right wing parties. For further details, see Potrafke (2010).
pop15to64	AMECO	Percentage of the total population between 15 and 64 years
growth	AMECO	Growth rate of real GDP, measured at PPP
unemp	OECD	Unemployment rate
per capita GDP	AMECO	GDP divided by total population
inflation	AMECO, OECD	Inflation rate
adj. Inglehart index	WVS, own calculation	Proxy for a country's tendency towards postmaterialism. For a detailed description, see Section 6.3.1.
future changes	WVS, own calculation	Postmaterialism proxy. For a detailed description, see Section 6.3.1.
education qualities	WVS, own calculation	Postmaterialism proxy. For a detailed description, see Section 6.3.1.

Sources:
IFS data available from `http://www.ifs.org.uk`.
All OECD data are available from `http://new.sourceoecd.org`.
AMECO data are available from `http://ec.europa.eu`.
KOF data are available from `http://globalization.kof.ethz.ch`.
WVS data are available from `http://www.worldvaluessurvey.org`.

6.6 Appendix 2: Additional regressions

Tab. 6.2: ADDITIONAL REGRESSION RESULTS

Dep. variable	(1) EATR/tax wedge	(2) Nominal/tax wedge	(3) EMTR/tax wedge	(4) EMTR/tax wedge
economicglob	-0.18**	-0.18**	-0.26**	-0.27***
	(0.08)	(0.12)	(0.11)	(0.08)
size	0.36	1.1***	0.28	-0.23
	(0.27)	(0.33)	(0.52)	(0.34)
ideology	0.005	0.002	0.01	0.005
	(0.01)	(0.01)	(0.01)	(0.01)
budget saldo	0.01**	0.02***	0.01	0.01**
	(0.004)	(0.004)	(0.01)	(0.004)
pop15to64	0.002**	0.002**	0.002	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)
growth	0.0004	0.002	0.004	0.003
	(0.003)	(0.005)	(0.005)	(0.005)
unemp	-0.01***	0.002	-0.01***	-0.03***
	(0.01)	(0.002)	(0.01)	(0.01)
adj. Inglehart	-0.37**	-0.25†	-0.51**	-0.60***
	(0.18)	(0.17)	(0.24)	(0.17)
per capita GDP			-4.18*	
			(2.28)	
observations	256	256	256	265
R^2	0.96	0.95	0.92	0.92

Note: HAC-robust standard errors with a lag-length of one in parentheses. All regressions include country-fixed and time-fixed effects. Dummies are not reported. † $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Chapter 7

## Culture and Tax Structures [1]

7.1   Introduction

Taxation varies widely internationally, not only in the details of tax codes and tariffs but also in its overall structure. Particularly pervasive differences prevail in the taxation of personal versus corporate incomes. For illustration, Figure 7.1 reports the ratios between revenues from corporate and personal income taxes in OECD countries.

The ratio between corporate and personal income taxes differs by a factor of five across OECD countries. As a tendency, the ratio is highest in Eastern European and Asian countries, in the middle range in Southern European and Anglosaxon countries, and lowest in Northern Europe and North America. This observation calls for an explanation, in particular as the relative burden of taxation on individuals ("labor") and corporations ("capital") is a highly sensitive and politically contested feature of the tax systems.

In this paper we argue that cross-country differences in tax structures could be caused by differences in values and norms. Specifically, we argue that different strengths of postmaterialist attitudes play a key role in explaining Figure 7.1. Postmaterialism roughly describes an attitude that places relatively low emphasis on material possessions and monetary incentives (we will be more specific below). Its most prominent quantitative measure is the so-called Inglehart postmaterialism index. Figure 7.2 reports the value of this index (precisely: its difference with respect to the Danish value, which we

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[1]This chapter is co-authored with Andreas Wagener. It was presented at the 2011 Annual Meeting of the Public Choice Society in San Antonio.

Fig. 7.1: CROSS-COUNTRY DIFFERENCES IN TAX RATIOS
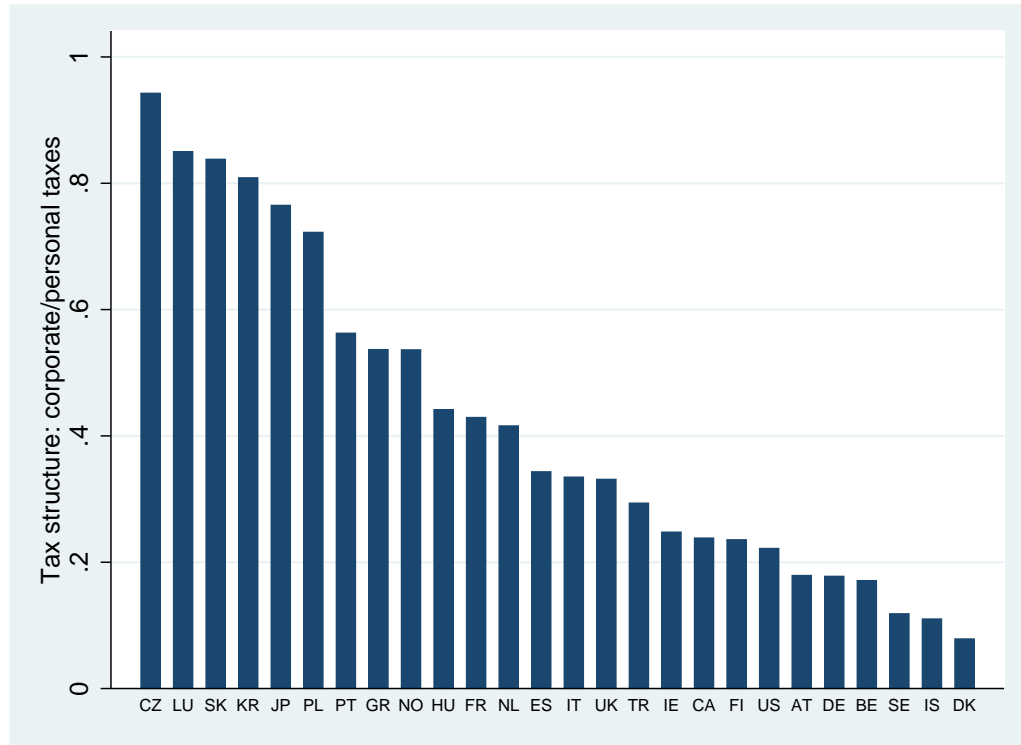
Source: OECD, Revenue Statistics, 2009. Averages for 1980, 1990, and 2000 (for details see Section 7.3).

use for normalization), with higher values indicating stronger degrees of postmaterialism in the population:

Postmaterialist attitudes appear weakest in Eastern European and Asian countries, moderate in Southern Europe, and highest in North America and Northern Europe. A quick comparison of Figures 7.1 and 7.2 already suggests an intriguing, yet not perfect correlation (Spearman's rho is at -0.63): tax policies in more postmaterialist countries seem to impose a relatively higher tax burden on individuals than on corporations. This paper argues that this finding is not coincidental but that a strong association and even a causal link from postmaterialist attitudes to tax structures prevails. We test this hypothesis empirically, controlling for reverse causality by applying an epidemiological IV approach.

Standard theories of tax structures have difficulties in explaining Figure 7.1. E.g., theories of globalization and tax competition would argue that countries more deeply integrated in international capital markets should tax mobile capital less heavily than rather immobile labor (Wilson and Wildasin, 2004). Viewing corporate taxes roughly

Fig. 7.2: CROSS-COUNTRY DIFFERENCES IN POSTMATERIALIST CULTURE: INGLE-HART INDEX
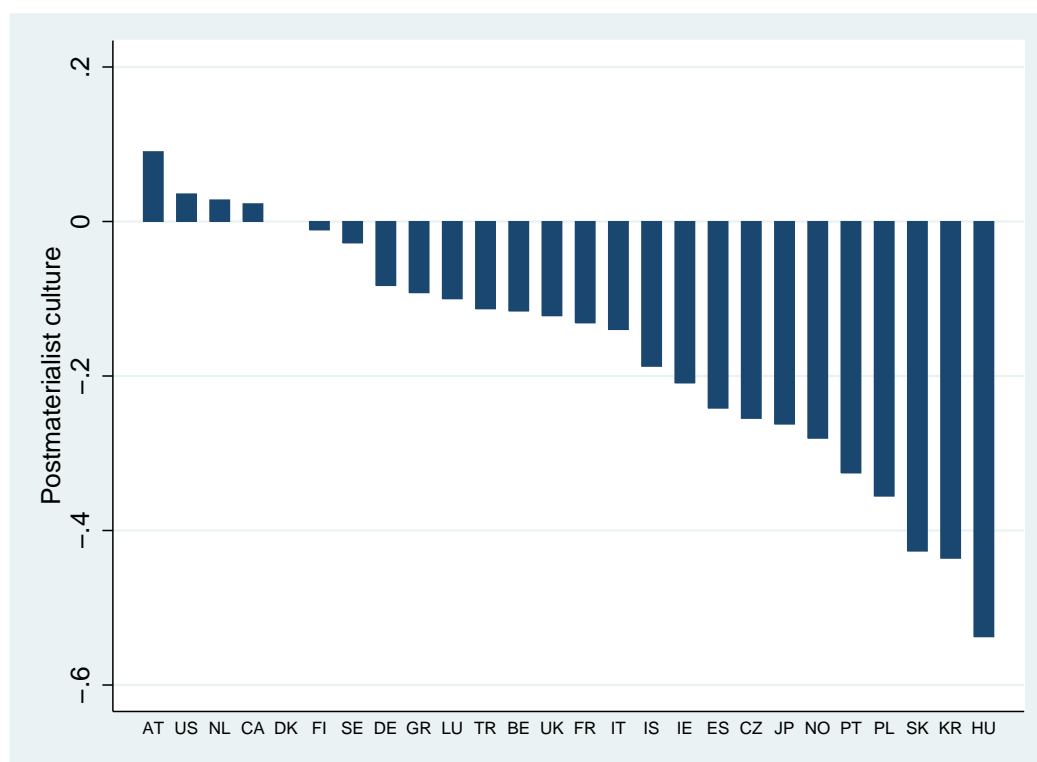
Note: Country's score on the Inglehart's postmaterialism scale. Mean deviations from Denmark. For details see Section 7.2.
Source: WVS 1980, 1990, 2000.

as taxes on capital (income) and personal income taxes largely as taxes on labor,[2] this would imply a lower corporate/personal tax ratio in more open economies. However, many of the economies of Figure 7.1 have similar degrees of openness; it appears implausible that, e.g., Scandinavian countries are subjected to globalization so much more intensely than, say, the Netherlands as to warrant such a distinctly lower relative tax burden on capital. Also political explanations appear problematic. If anything, one would expect that traditionally social-democrat Scandinavian countries burden corporations relatively more heavily than individuals than liberal or conservative countries such as the UK, the US, or Switzerland. Generally, countries with a low ratio between corporate and personal taxes might be viewed as more business-friendly and less socially equitable; in that sense, the ranking in Figure 7.1 does not match with the common reputation of the ranked countries. Different tax structures might also be linked to different structures of factor markets. E.g., Hungerbühler and van Ypersele (2009) ar-

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[2]Arlen and Weiss (1995) call this the "rational populist"-view of the corporate tax.

gue that countries with less distorted labor markets would have a higher ratio of profit to personal income taxes than countries with severe market imperfections. However, Figure 7.1 does not provide any support for this theory. To the contrary: countries with flexible labor markets (the U.S. or Denmark, say) have a lower corporate to individual tax ratio than countries with highly regulated labor markets (say, France, Japan, or Greece).

This paper argues that differences in value orientations and, in particular, varying degrees of postmaterialism may help to explain Figure 7.1 (though we do not endeavour to test the correctness of this or any other theoretical approach). Postmaterialism de-emphasises material goods (such as consumption, wealth, and income) but gives higher priority to immaterial goods: belongingness, sense of community, social equity, esteem, self-expression, freedom of choice, and intangible concerns of the quality of life (Davis and Davenport, 1999; Hellevik, 1993; Inglehart, 1971, 1997, 1999; Inglehart and Welzel, 2005; Moors and Vermunt, 2007; Duch and Taylor, 1993). Beginning in the 1970s, there has been a strong tendency towards higher degrees of postmaterialism across the globe, covering all socioeconomic classes and democratic as well as non-democratic states (Inglehart, 1997).[3] However, as Figure 7.2 evidences, large cross-country differences prevail, even between the developed democracies in the OECD.

Economically, a higher degree of postmaterialism is associated with a reduced sensitivity of individuals to monetary incentives (such as changes in prices, wages, and taxes). This is in line with Inglehart's (1990, pp. 176f; 1997) observations that, compared to materialists, postmaterialists are generally less driven by achievement motivation, are lesser responsive to economic rewards than materialists, and are willing to accept lower pay for the same amount of labor and at comparable levels of education.[4] In short, the

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[3]In the *World Values Surveys*, the largest investigation on attitudes, values, and beliefs around the world, a rising share of respondents say that less emphasis on material possessions is a desirable change in our way of life; a growing number of people consider "hard work" or "saving money" as less valuable qualities to be taught to a child than tolerance and respect; people to a greater extent stress the importance of leisure and the "higher" goods in the standard Maslow order; respondents increasingly think that, when seeking a job, good pay is less important than a feeling of accomplishment and working with people one likes; people are increasingly interested in arts, music, entertainment and culture; and respondents are more inclined to view economic growth as a less important policy objective than, say, the protection of the environment (Inglehart, 1990; Inglehart, 1997; Inglehart and Welzel, 2005).

[4]Uhlaner and Thurik (2007) empirically show that stronger postmaterialism goes along with lower rates of entrepreneurial activities. Arguing that entrepreneurship is motivated by the hope of making lots of money, they corroborate that postmaterialists respond less elastically to monetary incentives.

price (wage, rate-of-return, tax) sensitivity of income-generating household activities (labor supply, saving etc.) decreases with the strength of postmaterialism. The theory of optimal taxation demands that such goods or activities ought to be taxed more heavily that respond relatively less sensitively (inverse elasticity rule). Presupposing that OECD countries are all comparably open and that integrated capital markets equalize the tax sensitivity of investment and capital internationally, stronger postmaterialist attitudes would then call for a higher relative tax burden on personal incomes – as suggested by the correlation between Figures 7.1 and 7.2. Under this proviso, stronger postmaterialism would *ceteris paribus* also imply larger government budgets since the lower excess burden of personal income taxes reduces the marginal costs of public funds. While not our prime target, Section 7.3 will provide some tentative evidence for this hypothesis too.

In positing a link between postmaterialism and the relative tax burden on individual incomes, our research adds to a growing literature on the complementarity between values and cultures and the design of economic policy (Guiso et al., 2006; Fernandez, 2010; Fernandez and Fogli, 2009). Trust as an indicator for social capital (La Porta et al., 1997, Aghion et al., 2011), civic attitudes (Algan and Cahuc, 2009), and social identities (Shayo, 2009) are the most widely used cultural indicators; labor market institutions, mechanisms conducive to growth and development, and the design of the welfare state, education and of intergenerational transfers are important explananda. For our study, two strands in this literature are particularly relevant: approaches that relate policy changes to postmaterialism and approaches that try to explain features of the tax system in terms of culture.

Shifting priorities from materialist issues to postmaterialist, quality-of-life goals arguably impacts on political institutions, processes, and policy choices. Political scientists argue that postmaterialism helps to promote good governance and democratic participation (see, e.g., Inglehart and Welzel, 2005), fosters the emergence of social movements with concerns about civil rights, inequality, the environment, or the perils of globalization (Inglehart, 1997; della Porta and Diani, 1999). Postmaterialism has so far not been related to (changes in) tax policies. Rather, taxation has been linked to other cultural predispositions. Alesina and Angeletos (2005), e.g., trace differences in redistributive taxation between Western Europe and the United States back to different

perceptions about how fair market outcomes are. Hodler (2008) points out that different attitudes towards leisure (which one might loosely associate with postmaterialism) shape the size of welfare states and, by and large, the *overall* tax burden (without any implications for the tax structure). Franzen (2003) and others report evidence that the appreciation for eco-taxes is greater in postmaterialist than in materialist countries, leaving it open, however, whether this merely reflects increased concerns for the environment or a generally reduced price sensitivity. Qari et al. (2011) build on the assumption that individual values impact on tax sensitivities. Specifically, they posit that patriotic identification keeps mobile tax payers more attached to their home country; governments in turn can exploit this when financing a redistributive tax-transfer system. However, none of the studies we are aware of relates values and norms to the composition of the tax burden or to the tax mix. This is our focus.

We report cross-country evidence for a strong and statistically significant association between postmaterialist attitudes and tax structure: countries displaying high degrees of postmaterialist attitudes indeed tend to tax labor disproportionately more heavily than capital. However, the impact of culture on policy outcomes is potentially conflated with reverse effects: tax policy affects (post-)materialist attitudes (in an *a priori* unclear direction).[5] For instance, by heavily taxing personal incomes the government might convey a perception that an individual's material wealth, work effort or the income generated through it are in low esteem socially. Also a negative impact cannot be excluded: high taxation of personal incomes might leave less to consume for individuals whose increased marginal utility from consumption then is expressed in terms of more materialist values. To capture reverse causality, we adopt an epidemiological approach à la Fernández (2008, 2010) or Algan and Cahuc (2009): we measure postmaterialist attitudes in a country by those of American-born citizens whose ancestors emigrated from that country to the US two generations ago (see Section 7.4). These inherited values are not shaped by the instantaneous economic and institutional environment in the country where people are currently living. As the degree of postmaterialism of people born and living in the U.S. is strongly positively associated with the attitudes of

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[5]On a macro-level, Inglehart and Baker (2000) are among the first to study such a "reverse" impact of economic and institutional factors on changes in values and culture. They show that economic changes indeed have systematic and predictable cultural consequences.

today's populations in their ancestors' country of origin we can use it as an instrument for today's postmaterialism in the home country. Doing so, we are still able to identify that more postmaterialist countries tend to tax personal incomes relatively more heavily than corporate incomes.

The rest of this paper is organized as follows: Based on data from the World Values Surveys, Section 7.2 constructs estimates for the degree of postmaterialism in OECD countries. Section 7.3 regresses national tax structures on postmaterialist values, confirming the correlation apparent from Figures 7.1 and 7.2. Section 7.4 statistically identifies the validity of these correlations by use of an epidemiological IV approach. Section 7.5 concludes.

7.2 Measuring postmaterialist culture in OECD countries

To operationalize the concept of postmaterialism, we built on the so-called four-item Inglehart index (due originally to Inglehart, 1971), one of the most widely used and replicated measure of postmaterialism in political and social science literature. This index is included in most large-scale survey data sets, thus enabling us to use the epidemiological approach in Section 7.4, which is demanding in terms of data availability.[6]

The Inglehart index as employed in the World Values Surveys (WVS) is constructed from the following question:

> "If you had to choose, which one of the things on this card would you say is most important? And which would be the next most important?
>
> 1. Maintaining order in the nation;
>
> 2. Give people more to say;
>
> 3. Fighting rising prices;
>
> 4. Protecting the freedom of speech."

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[6]There is a large literature on the validity and appropriateness of the Inglehart index as a measure of postmaterialism. See, e.g., the exchange between Davis and Davenport (1999) and Inglehart and Abramson (1999). Despite some criticism, the Inglehart index continues to be widely accepted.

Items (1) and (3) are considered to reflect materialist values (economic and physical security) while items (2) and (4) express postmaterialist life goals (autonomy and self-expression). If a respondent chooses the two materialist items, he/she is scored with "1" as a degree of postmaterialism; if both postmaterialist items are given selected he/she is assigned a value of "3"; individuals with mixed choices get a score of "2". The position on this scale reflects to which extent an individual gives priority to immaterial over economic values.

Our analysis includes OECD countries for which the WVS question was asked in at least one of the three main waves 1980-1984, 1990-1994, 1999-2003. These are: Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Turkey, United Kingdom, United States.[7] We refer to the periods as the 1980, 1990 and 2000 wave.

Figure 7.2 in the introduction reports the countries' mean responses on the Inglehart index over the three main waves, diminished by the mean score for Denmark (which is 2.07). Denmark is chosen as a reference country as it is included in all waves. To look closer at cross-country differences in postmaterialist culture, we take into account respondents' demographic and socio-economic characteristics. We do so by running individual level regressions on the whole three main waves. The statistical model is

$$I_{it} = \beta X_{it} + \eta_j + \epsilon_{it}, \tag{7.1}$$

where I_{it} represents the score on the Inglehart postmaterialism index of respondent i at wave date t ($t = 1980, 1990, 2000$). The control vector X_{it} contains individual characteristics such as gender, age, education, income, employment status, religiosity and political orientation. The error term is denoted by ϵ_{it}. The main variables of interest are the dummies for country j; they are represented by the country fixed effects η_j (Denmark is chosen as the reference country).

We estimate equation (7.1) by OLS. Table 7.1 presents the regression results with clustered standard errors at the country level. The signs of the controls are largely in line with arguments found in political science (see Inglehart and Welzel, 2005): the

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[7]The third wave is excluded since it only provides a smaller set of countries and questions.

Tab. 7.1: OLS ESTIMATES OF POSTMATERIALISM: INDIVIDUAL LEVEL, WVS.

dependent variable	Inglehart index of postmaterialism	
	Coeff.	Std. error
male	0.052***	(0.007)
age	-0.002	(0.001)
age^2	0.000	(0.000)
education	0.034***	(0.003)
unemployed	0.027	(0.018)
medium income class	0.017*	(0.009)
high income class	0.061***	(0.016)
left	0.143***	(0.019)
right	-0.031*	(0.016)
no religious affiliation	0.074***	(0.021)
country fixed effects	Yes***	
constant	1.789***	(0.044)
N	57444	
R^2	0.123	

Note: Data is taken from the 1980, 1990 and 2000 waves of the WVS. Reference category is an individual from Denmark with low-class income and centered political orientation. Wave dummies are included. Standard errors are clustered at the country level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

highest income category is associated with higher postmaterialist scores (it is argued that postmaterialist attitudes primarily arise after basic material needs have been satisfied), as is the case with being left, having no religious affiliation, and being highly educated. Generally, the individual controls are strongly associated with postmaterialist life goals: most are significant at least at a five-percent level. The country-specific effects, which can be interpreted as a country's mean deviation from Denmark's position on the Inglehart scale after conditioning on individual heterogeneity, are highly significant as well. We report them separately in Figure 7.3.

7.3   Tax structure and postmaterialist culture

In this subsection, we correlate postmaterialist culture with policy outcomes. To measure a country's of tax burden on corporations, we use corporate tax revenues as a percentage of GDP. The individual tax burden is measured as the share in GDP of tax revenues from personal income.[8] Government total expenditures relative to GDP are used to capture public spending levels. The tax structure is measured by the ratio of

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[8]There is an extensive literature on what sort of tax rates are appropriate to measure tax burdens (see Sørensen, 2004). Ideally, we would like to use effective (forward-looking) marginal effective tax rates; as a second choice, we would opt for (ex post) macro average effective tax rates. Unfortunately, neither of these options is feasible since data is not available for a sufficiently large number of countries and/or periods.

Fig. 7.3: CROSS-COUNTRY DIFFERENCES IN POSTMATERIALIST CULTURE: MARGINAL COUNTRY-FIXED EFFECTS
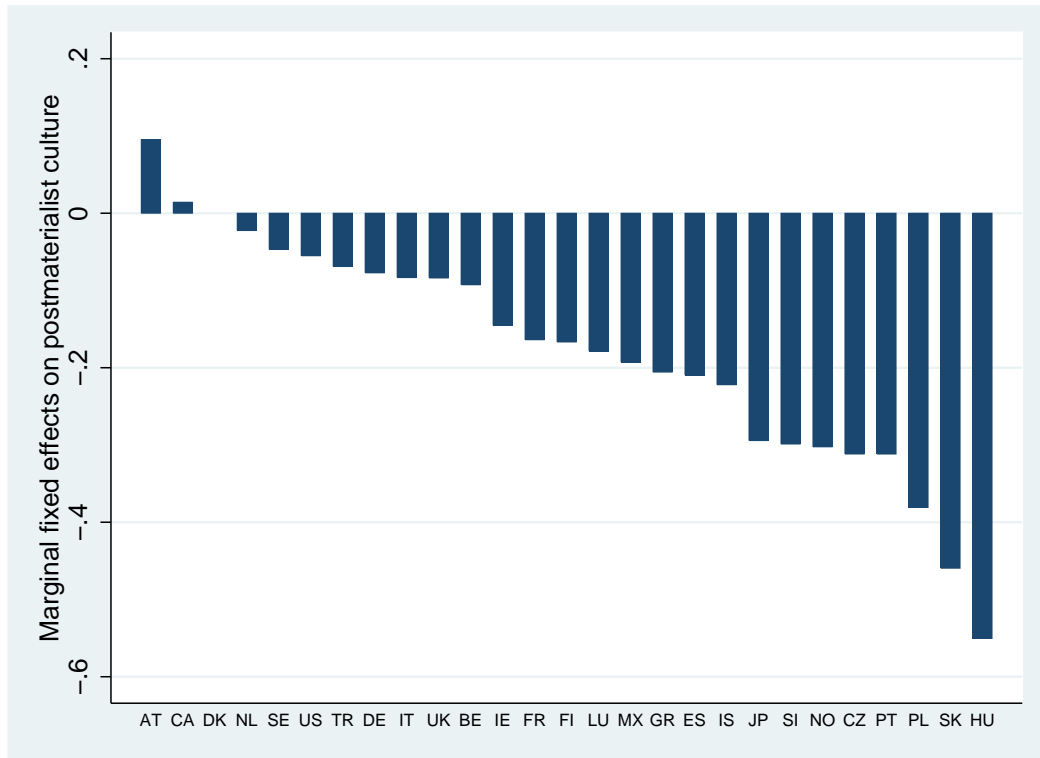
Note: Country's conditional score on the Inglehart's postmaterialism scale. Mean deviations from Denmark.
*Source:* WVS 1980, 1990, 2000.

corporate to individual taxes. All data are taken from OECD, Revenue Statistics, 2009.

We visualize the data and correlations by scatterplots in Figure 7.4. There, we map the corporate and the personal tax burden, the tax ratio and government expenditure (all averaged over the time span 1980-2003) against the marginal country-specific effects of postmaterialism, as derived in Section 7.2.

Panel (a) in Figure 7.4 shows that the connection between the tax ratio and and postmaterialist attitudes is clearly negative and, thus, well in line with our hypothesis. In fact, the predictive power of the postmaterialist trait is surprisingly strong: the bivariate linear regression exhibits $R^2 = 0.4130$, such that the proxy for postmaterialism explains more than 40 percent of the cross-country variation in relative tax burdens. The more materialist Eastern European countries rely, to a great deal, on taxes on corporate income. In contrast, the more postmaterialist Nordic countries tend more towards personal income taxation. Panel (b) relates cross-country heterogeneity in personal income taxes (as a percentage of GDP) to postmaterialist attitudes. The

Fig. 7.4: Postmaterialist culture and policy outcomes

(a)

(b)

(c)

(d)
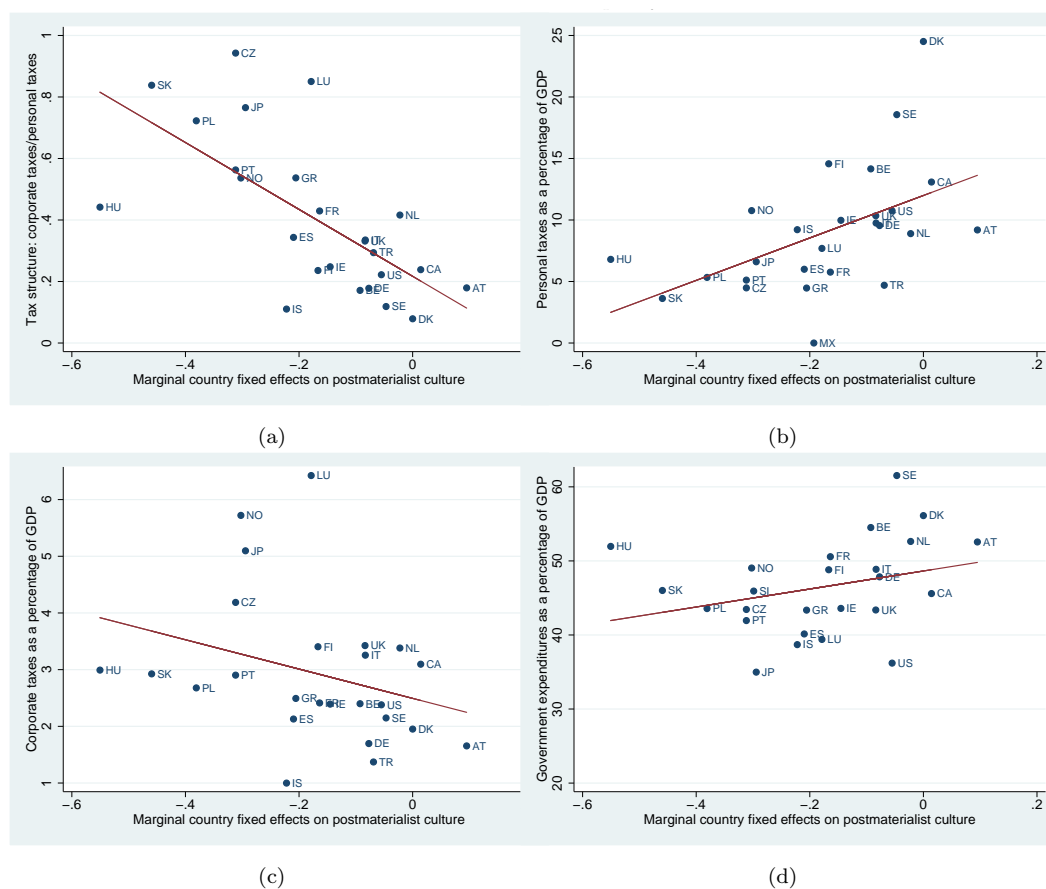
connection is strongly positive ($R^2 = 0.2360$). The association between corporate taxation and postmaterialism appears to be negative; see panel (c). One conjecture (which we have not verified) might be that the corporate sector itself is smaller in postmaterialist economies. Generally, however, the picture is less clear cut when compared to the other panels; it also is more vulnerable to outlier problems.[9] Panel (d) reveals a positive, but quite weak correlation between postmaterialist attitudes and government spending ($R^2 = 0.0561$). This might reflect the postmaterialist predilection for social equality, education or cultural activities or simply a generally lower marginal cost of public funds in less tax-sensitive economies; however, we do not pursue this direction any further.

To check whether the connections presented so far survive in a more rigorous regres-

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[9]Excluding the countries with the highest corporate taxes, the line of fitness would be almost horizontal.

Tab. 7.2: POSTMATERIALIST CULTURE AND TAX POLICY (OLS)

	tax structure (1)	personal taxes (2)	corporate taxes (3)
postmaterialist culture	-0.639**	12.545**	-2.630
	(0.267)	(5.148)	(1.831)
GDP per capita	0.000	0.000	0.000*
	(0.000)	(0.000)	(0.000)
openness	0.000	-0.003	-0.000
	(0.000)	(0.003)	(0.001)
constant	0.092	12.522***	1.046
	(0.139)	(2.970)	(0.707)
N	49	49	49
R^2	0.238	0.250	0.174

Note: Standard errors are clustered at the country level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

sion framework, we estimate the following model:

$$T_{jt} = b_0 + \beta_1 \eta_{j,t} + \beta_2 X_{jt} + \epsilon_{jt}. \tag{7.2}$$

where T_{jt} denotes the respective tax variable in country j at wave date t. Postmaterialist culture is represented by the country-fixed effects $\eta_{j,t}$. We extract them by estimating a model similar to equation (7.1). In contrast to Section 7.2, we run individual regressions separately for each wave. Thus, we get a cultural variable for each country at different dates, endowing us with a maximum number of observations. Model (7.2) includes controls at the national level, X_{jt}. To measure a country's degree of openness, we use the share of exports plus imports in GDP. We also control for per capita GDP. To get consistency with our cultural data, the dependent variable and the controls are averaged over the corresponding wave periods.

Table 7.2 reports the results where we cluster standard errors at the country level and include time dummies. These results are in line with the correlations presented in the scatterplots earlier: in particular, postmaterialism is negatively linked to the tax ratio. The coefficient in the first column indicates that the effects are economically sizeable. An increase in the degree of postmaterialism of 0.4 (which is, e.g., the difference between Poland and Denmark) goes along with a decline in the corporate-to-personal tax ratio of 25 percentage points.

Regression results for the raw data can be found in the Appendix (see Table 7.5); they exhibit significance at even higher confidence levels.

7.4   Epidemiological approach

So far we presented a stable link between postmaterialist culture and tax policy, suggesting that societies with a lower emphasis on material values shift tax burden from corporate to personal income. However, serious endogeneity issues arise in this context. A first concern is that our estimates are biased by reverse causation. E.g., higher taxes on personal incomes decreases private consumption which may go in hand with a value shift towards material goods and possessions. Economically, this reflects decreasing marginal utilities, in political science, this goes under the name of Inglehart's Scarcity Hypothesis (see Inglehart, 1997). Second, the regression analyses so far may suffer from an omitted variable bias since the vector of controls in equation (7.2) might not include all factors that are both correlated with policy outcomes and a country's position on the Inglehart scale (e.g., current economic and institutional conditions).

In this section, we tackle these problems by an epidemiological approach which has been proved a powerful tool to obtain exogenous variation in cultural variables in the recent literature on the role of culture in economics (for survey and critique, see Fernández, 2010).

Our empirical strategy is as follows. To separate culture from its specific national settings, we study individuals who share an identical political and economic environment but whose system of values and beliefs potentially differ, and this in a way that systematically reflects the cross-national differences in culture we are interested in. Specifically, we use information on the postmaterialist inclinations of second-generation immigrants in the US. These immigrants were born in the US and are living there; they were neither exposed to the current policy of their country of ancestry nor to potentially omitted variables in equation (7.2), such as the prevailing ideology, current macroeconomic situations or institutions.[10] At the same time, these individuals are likely to have inherited a significant part of their ancestor's country's degree of postmaterialism through their parents' cultural habits and practices. We exploit this source of variation to instrument for the country-specific effects gained from the WVS.

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[10]It cannot be ruled out that immigrants born in the US are still in touch with their home countries' conditions, e.g., via contacts with family members and friends who have not emigrated. We mitigate this problem by focusing on second- and higher-generation immigrants, excluding first-generation immigrants.

We use data from the US General Social Surveys (GSS) which include a question similar to that of the WVS quoted above. In the 1993, 1994 and 2000 waves, respondents were asked:

"Looking at the list below, please check a box next to the one thing you think should be America's highest priority, the most important thing it should do. America should . . .

1. Maintain order;

2. Give people more say;

3. Control prices;

4. Protect free speech."

Respondents could then name which two of these items they considered to be America's first and second priorities. We classify an individual as a postmaterialist if items (2) and (4) were both selected (score "3"). We assign scores for the mixed and materialist categories (scores "2" and "1", respectively). We restrict the GSS dataset to a sample comprising second (or higher) generation immigrants only.[11] On this subsample, we run OLS regressions of the form:

$$I_{ij} = \beta X_i + G_j + \epsilon_i. \tag{7.3}$$

Here, I_{ij} stands for the individual score on the Inglehart scale of an American-born respondent i whose ancestors come from country j. G_j represents the dummies associated with the country of origin j. The fixed effects capture the inherited part of postmaterialism transmitted from the country of origin through the customs of respondents' i ancestors (we again use Denmark as reference category). We combine data from 1993 and 1994 to one wave, representing the early 1990's. Thus, we can estimate the country of origin fixed effect, G_j, for two dates that are comparable with the 1990 and the 2000 wave periods from the WVS. In both regressions we control for the same individual characteristics, X_i, as in Section 7.2. The coefficients of the controls have in almost all

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[11]A respondent is classified as an (at least) second-generation immigrant based on the GSS question *"From what countries or part of the world did your ancestors come from?"*

cases the same signs as above and are statistically highly significant. In the Appendix, we show the regression results for the 1990 wave (see Table 7.6).

We then estimate the following two-stage model

$$\eta_{j,t} = c_0 + c_1 G_{j,t} + c_2 X_{jt} + v_{jt}, \tag{7.4}$$

$$T_{jt} = b_0 + \beta_1 \eta_{j,t} + \beta_2 X_{jt} + \epsilon_{jt}. \tag{7.5}$$

Equation (7.4) represents the first-stage regression of postmaterialist culture of home country j on average postmaterialism of second-generation Americans with ancestors from country j. Equation (7.5) represents the second stage, where the tax variable, T_{jt}, is regressed on the inherited part of culture, $\eta_{j,t}$, i.e., on those parts of culture which are separated from the current political and economic conditions of country j at wave date $t \in (1990, 2000)$. The control variables and the policy measures are the same as in Section 7.3 and averaged over the corresponding time period.

The first-stage estimates are reported in Table 7.3.[12] The coefficient of the marginal country of origin fixed effects is 0.43 and significant at the five percent level, indicating that strong cultural transmissions between generations take place.

Tab. 7.3: FIRST-STAGE ESTIMATES OF POSTMATERIALISM IN THE HOME COUNTRY

Dependent variable: Postmaterialism in the home country	Coeff.	Std. error
Inherited Postmaterialism of Americans from their country of origin	0.430**	(0.206)
GDP per capita	0.000	(0.000)
openness	0.000	(0.000)
constant	0.073	(0.136)
N	20	
R^2	0.288	

Note: WVS, 1990, 2000. GSS, 1990, 2000. Standard errors are clustered at the country level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The second-stage estimates for the different policy regressions are shown in Table 7.4. The IV results are qualitatively similar to the OLS estimates of section 7.3. In spite of a decrease in the number of observations[13] we gain significant parameter estimates for

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[12]Our analysis includes those OECD countries for which policy variables and cultural data from the GSS are available from at least one of the two waves 1990 and 2000. These countries are: Canada, Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Netherlands, Norway, Poland, Sweden, United Kingdom.

[13]Due to limited data availability, such drops are not uncommon in studies using the epidemiological approach; cf., e.g., Algan and Cahuc (2009) or Halla (2010).

the instrumented marginal effects of postmaterialist culture in the regressions for the tax structure (column 1) and personal taxes (column 2).

Tab. 7.4: SECOND-STAGE REGRESSION OF TAX POLICY

	tax structure (1)	personal taxes (2)	corporate taxes (3)
postmaterialist culture	-1.458**	42.843**	-3.427
	(0.564)	(20.518)	(2.584)
GDP per capita	0.000	0.001*	0.000*
	(0.000)	(0.000)	(0.000)
openness	0.000	-0.011	-0.001
	(0.000)	(0.008)	(0.001)
constant	0.388*	5.445	1.742**
	(0.217)	(6.076)	(0.746)
N	20	20	20

Note: WVS, 1990, 2000. GSS, 1990, 2000. Standard errors are clustered at the country level. $* \ p < 0.10$, $** \ p < 0.05$, $*** \ p < 0.01$.

These findings make us confident that the cross-country differences in tax structures observed in Figure 7.1 are indeed causally related to difference in materialist/postmaterialist attitudes, depicted in Figure 7.2.

7.5 Conclusion

Inglehart (1971) defines postmaterialism as the relative importance people ascribe to immaterial values relative to material goods. Put simpler, it is the degree of how little people are impressed by money. As taxation is foremost associated with a smaller purse, people's attitude towards money may have an effect on how strongly governments can tax them or how elastically they try to escape from the government's grabbing hands. Differences in value-induced perceptions of the burden imposed by taxes and in the responsiveness to taxation will then translate into different tax mixes in a society.

If people place lower relative emphasis on the material aspects of their work, they might also be less sensitive to their incomes being taxed away, implying that governments can increase the relative tax burden on individuals without generating too much political discomfort or too high an excess burden. In line with this idea, we demonstrate that in the OECD countries with higher priority on postmaterialist life goals tend to have low ratios of corporate to personal taxes.

Our paper adds another piece of evidence to the hypothesis that culture indeed impacts on economic policy. Yet, the interaction between culture and the economic and institutional environment could also go the other way round. Studies of how tax structures affect cultural values and their changes would, thus, be an important addition to the literature.

7.6 Appendix

Tab. 7.5: POSTMATERIALIST CULTURE AND TAX POLICY (OLS)

	tax structure (1)	personal taxes (2)	corporate taxes (3)
Inglehart index	-0.708***	14.312***	-2.463
	(0.255)	(4.999)	(1.603)
GDP per capita	0.000	0.000	0.000**
	(0.000)	(0.000)	(0.000)
openness	0.000	-0.003	0.000
	(0.000)	(0.003)	(0.001)
constant	1.553***	-17.058**	6.206**
	(0.445)	(7.939)	(2.985)
N	53	53	53
R^2	0.3	0.316	0.187

Note: Standard errors are clustered at the country level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Tab. 7.6: OLS ESTIMATION OF POSTMATERIALISM: INDIVIDUAL LEVEL, GSS DATA.

dependent variable	Inglehart index of postmaterialism	
	Coeff.	Std. error
male	0.168***	(0.042)
age	-0.001	(0.008)
age^2	0.000	(0.000)
education	0.019***	(0.004)
income	0.002	(0.006)
unemployed	0.032	(0.136)
left	0.13***	(0.023)
right	-0.026	(0.048)
no denomination	0.138**	(0.064)
country dummies	Yes***	
constant	1.877***	(0.168)
N	925	
R^2	0.068	

Note: Daten is taken from the 1993 and 1994 waves of the GSS. Reference category is an immigrant from Denmark with centered political orientation. Standard errors are clustered at the country of origin level.

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