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Happy Taxpayers? Income Taxation and Well-Being

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ABSTRACT

Happy Taxpayers? Income Taxation and Well-Being*

This paper offers a first empirical investigation of how labor taxation (income and payroll taxes) affects individuals' well-being. For identification, we exploit exogenous variation in tax rules over time and across demographic groups using 26 years of German panel data. We find that the tax effect on subjective well-being is significant and positive when controlling for income net of taxes. This interesting result is robust to numerous specification checks. It is consistent with several possible channels through which taxes affect welfare including public goods, insurance, redistributive taste and tax morale.

JEL Classification: H21, H41, I38

Keywords: subjective well-being, taxation, public goods

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1 Introduction

Taxation is the main economic instrument in the hand of governments influencing individual budget constraints and therefore well-being. Given that the effect of income on subjective well-being (SWB) is presently one of the most important questions (see Clark et al., 2008, for a survey) in the SWB literature, it is surprising that there is no direct evidence for the effect of taxes on SWB. Accepting that income increases SWB, at least in cross-sectional analyses, implies that taxation should reduce it. Clearly, this effect is implicitly accounted for in the existing literature, as income *net of taxes* is systematically used in SWB regressions. However, so far, the direct effect of taxation on well-being has not yet received attention (an exception is Lubian and Zarri, 2011, who look at the specific relationship between tax morale and SWB). Analyzing the relationship between taxation and SWB – in comparison to net income – not only contributes to the literature on the role of income for SWB but especially provides a new perspective on a core question in the traditional literature in public and welfare economics: how do taxes affect individual well-being? This is important for both the political economy of tax policy (support for tax reforms) and the sustainability and efficiency of public finance (for instance through the level of tax compliance).

In this study, we use SWB data to proxy individual (experienced) utility (e.g., Kahneman and Sudgen, 2005; Layard et al., 2008) and regress it on taxes, net income and many socio-demographic characteristics, which are known determinants of SWB (Clark and Oswald, 2002). Our empirical application relies on the German Socio-Economic Panel (SOEP) study, which has been used in important contributions to SWB research (e.g., Frijters et al., 2004b). Identification of the specific tax effect, i.e. in isolation from the income effect, is based on tax reforms occurring over the 26 years of the panel.

We find a significant and positive effect of tax payments on well-being, conditional on net income (i.e. holding individual living standards constant). This finding is robust to different approaches including the way we introduce individual heterogeneity in the model, the flexibility of the SWB equation with respect to income and tax levels, as well as the estimator and sample used. In addition, we show that the effect conditional on *net* income is not driven by status or relative concerns (higher tax implying higher *gross* income in this setting). The positive conditional tax effect may be explained through different channels: higher taxation might imply better provision (or quality) of public goods (Luechinger, 2009; Luechinger and Raschky,

2009; Levinson, 2012) or more redistribution and insurance through the social security system (Alesina et al., 2004). In addition, utility may arise from motives underlying tax morale (see Lubian and Zarri, 2011) or some 'citizenship' feeling of belonging to (or contributing to) the society in the spirit of the procedural utility concept of Frey and Stutzer (2001). In order to provide evidence for these different channels which could be all consistent with some warm glow motive of paying taxes, we interact the conditional tax effect with a large number of characteristics. Among other things, we show that this effect is significantly larger for the low income group; for Eastern Germans, who have been brought up in a system where the government played a bigger role; for individuals who live in regions with local underprovision of public goods; and for individuals with a higher tax morale.

The rest of the paper is set up as follows. Section 2 reviews the existing SWB literature with respect to government activity and taxation. Section 3 describes our empirical approach. We present our results in Section 4 together with extensive sensitivity checks. In Section 5, we discuss the potential channels that might explain the positive conditional tax effect. Section 6 concludes.

2 Related literature

Our study is related to the literature on the link between public policy and well-being (Layard, 1980, 2006; Frey and Stutzer, 2012). In particular, the study by Layard (2006) takes stylized facts recovered by SWB research, such as adaptation and social comparison, and discusses their implications for optimal taxation. To the best of our knowledge, there are only two studies that empirically touch upon the (implicit) effects of income taxation on measures of SWB. Firstly, Oishi et al. (2012) use the Global Gallup Poll to show that the progressivity of the tax system increases a nation's SWB. Secondly, Lubian and Zarri (2011) find that self-reported tax morale (the moral obligation to pay taxes) has a positive effect on SWB using a 2004 cross-section of Italian household data. While Lubian and Zarri (2011) have direct information on tax morale and can also investigate different dimensions of it (which we cannot because of data limitations), we provide a different identification strategy (based on tax reforms over time) in addition to a broader perspective allowing for more channels through which taxation can influence SWB (public goods, redistributive preferences and tax morale).[1]

[1] Besides income taxation, Kassenboehmer and Haisken-DeNew (2009) analyze the effect of social benefits on SWB, while Gruber and Mullainathan (2005) show that excise taxes on cigarettes

As (parts of) the tax revenues are used to finance public goods and the effect of paying taxes on SWB should capture this channel, our research is also related to the literature on the valuation and quality of public goods and their association with individuals' well-being. This link has been analyzed in a recent series of papers (Frey et al., 2009; Luechinger, 2009; Luechinger and Raschky, 2009; Levinson, 2012). The main finding is that the underprovision of public goods (and as a consequence the prevalence of terrorism, pollution or flood disasters) has a negative effect on SWB. Another channel through which income taxation might affect well-being is redistribution. In fact, Oishi et al. (2012) interpret their results by stating that a fair redistribution of wealth increases a nation's well-being.[2] Similarly, Di Tella et al. (2003) show that higher unemployment benefits are associated with higher national well-being. In addition, Alesina et al. (2004) find that inequality has a negative effect on SWB, especially in Europe. Interestingly, Harbaugh et al. (2007) show that mandatory tax-like transfers activate parts of the brain that are linked to rewards processing. They interpret their finding in line with the "pure altruism" hypothesis stating that even mandatory transfers to finance public good (such as taxes) increase individuals' well-being. The authors argue that the reason for this positive effect lies in the fact that the mandatory transfers are used to ensure the provision of the public good and that its availability is eventually more important to individual well-being than the way it is financed.

As implied by the study of Lubian and Zarri (2011), the relationship between tax and SWB could also be influenced by the subjective rewards of acting according to (the spirit of) the law. In other words, cheating, that is tax evasion (avoidance), generates lower levels of well-being than fiscal honesty. Finally, the literature on group identity is related to our research since the act of paying taxes can be interpreted as paying the membership fee to become part of the society. In fact, there is some evidence that more intensive participation in a democracy through political institutions is associated with a higher SWB (Frey and Stutzer, 2001).

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increase the well-being of individuals with a higher probability to smoke.

[2] On the other hand, and somewhat puzzling, they state that the positive effect of progressivity comes through the citizens' satisfaction with public goods such as education and public transportation, while they also show that government size and SWB are negatively associated. There are several other studies on the size of the government and SWB which bring forward mixed results, ranging from a zero effect (Veenhoven, 2000) over a negative effect (Bjørnskov et al., 2007) to an inverted U-shape relationship between government spending and SWB (Hessami, 2010).

3 Empirical approach and identification strategy

3.1 Model and estimation

In order to empirically test the question of how taxes affect SWB, we regress SWB_{it} on (log) tax payments T_{it} conditional on (log) net income N_{it}. In addition we add a set of standard socio-demographic and economic characteristics of individuals $\mathbf{X}_{it}$ as well as person and time fixed effects μ_i, μ_t.[3] The empirical model reads as follows:

$$SWB_{it} = \alpha N_{it} + \beta T_{it} + \boldsymbol{\gamma}\mathbf{X}_{it} + \mu_i + \mu_t + \epsilon_{it}. \quad (1)$$

As in Layard et al. (2008), we assume that the above specification is a proxy for the utility function of an individual. As the true functional form is unknown, we suggest alternative specifications in the sensitivity checks below that increase the flexibility of the relationship between well-being and tax/income, including polynomial forms of high degrees.

As common in the SWB literature, we assume that the net resources of a person matter for individual well-being, whether this person is aware of it or not. That is, we assume that individuals with a high living standard experience higher SWB levels. Hence, we expect the sign of α to be positive. Yet, we argue that previous models might have been under-specified as they ignore the specific role of taxation on well-being beyond the mere reduction of net income. In other words, the sign of β is unknown and the main object of our investigation.

In our baseline specification, we assume ϵ_{it} to be usual i.i.d. error terms and estimate the model linearly, taking SWB measured on a 11 point scale as a continuous variable. This gives us more flexibility to control for unobserved individual effects (fixed effects, quasi-fixed effects). In robustness checks, we also estimate ordinal (fixed effects) models, i.e. taking SWB_{it} as the latent utility. As in Ferrer-i-Carbonell and Frijters (2004), we confirm that the two estimation methods lead to very similar results (see Section 4.2).

[3] $\mathbf{X}_{it}$ includes age, age-squared, skill, nationality, gender, marital status, household composition, health status, labor market status, working hours, region fixed effects (16 states (*Länder*)).

3.2 Identification

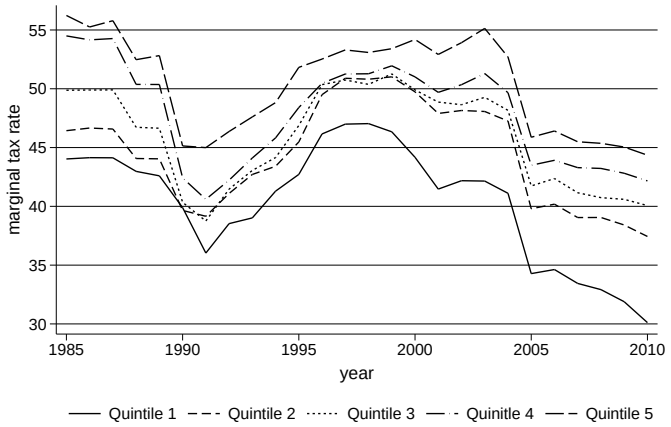
Tax $T_{it}(Y_{it}, Z_{it})$ is a function of market income Y_{it} and a subset Z_{it} of individual and household characteristics. Net income is calculated as $N_{it} = Y_{it} - T_{it}(Y_{it}, Z_{it})$. This means that tax payment and net income depend on the same gross income variable, implying a deterministic relationship. The tax function $T_{it}(Y_{it}, Z_{it})$ is highly non-linear in Germany. Hence, households with different characteristics Z_{it} (for instance having two versus three children, being married rather than cohabiting) will face a different tax schedule.[4] This provides the possibility for cross-sectional (parametric) identification given the non-linearity of $T_{it}(Y_{it}, Z_{it})$.

However, this variation might not be enough for identification given the fact that characteristics Z_{it} also directly affect well-being, and given potential behavioral responses to taxation. Therefore, we rely on tax reforms, i.e. changes in the tax base and schedule (brackets, rates, deductions, etc.) over time, as an exogenous source of variation which is necessary to identify the tax effect. Figure 1 presents the development of effective marginal tax rates (EMTR) over time in Germany by income quintiles. It illustrates that there were indeed substantial changes in tax parameters all over the period. Moreover, tax reforms have not been uniform but have affected different income and demographic groups differently. This exogenous tax variation enables identification of the conditional tax effect on SWB.

Two important remarks have to be made at this stage. Firstly, our identification strategy is related to the one applied in studies on the elasticity of taxable income (ETI, see Saez et al., 2012, for a recent overview). However, in this literature, changes in taxable income are the left hand side variable, therefore, only exogenous changes in the tax function (on the right hand side) are required for identification. In our case, we aim to identify two coefficients on the right hand side (income and tax), so that simultaneous variation in both gross incomes and the tax function is needed. Secondly, and as usual, our results could be affected by endogeneity issues such as reverse causality (happier individuals pay higher taxes). Our model speci-

[4]German tax legislation is household-specific: Married couples file their taxes jointly and face tax reductions due to the income splitting system. The presence of children also changes tax liabilities due to allowances and credits. More variation is generated through individual characteristics like religion, occupation type, age or disability. For instance, individuals of Christian denomination pay church taxes, which accrue to between 8% and 9% of the income tax (depending on the region) and which are collected with the general income tax. Civil servants and self-employed are partially exempt from paying payroll taxes (which themselves are deductable from the income tax base), and there is regional variation in payroll tax rates. Certain professions face different levels of tax free earnings. Moreover, Germany does not employ a piece-wise linear tax schedule with flat rates for different brackets, as in most countries, but a unique formula with continuously increasing marginal tax rates. So even slight variations in gross income will yield different tax rates.

Figure 1: Effective marginal tax rates by quintile over time



fication mitigates endogeneity concerns since tax is a function of income and SWB can affect income (and hence tax) only through behavior (i.e. happier individuals may work harder, be more creative and enterprizing and hence generate more income). However, recent research suggests that the causality runs from money to SWB implying endogeneity issues are limited (see, e.g., Luttmer, 2005, or Gardner and Oswald, 2007, as well as the evidence and references collected in Pischke, 2011). Nonetheless, we check if reverse causality goes through behavioral changes (income) by employing the same instrument (industry affiliation) as Pischke (2011) and by instrumenting taxes with the hypothetical tax payments in period t given the gross income in $t-1$ – again borrowing from the ETI literature (Saez et al., 2012). Results, presented in Section 4.1, are very similar to our baseline findings.

3.3 Data and selection

The German Socio-Economic Panel (SOEP) is a well-known survey of individuals in households living in Germany, which has been widely used for studying SWB (see, e.g., Frijters et al., 2004a,b; Ferrer-i-Carbonell, 2005; Luechinger et al., 2010). It is a representative survey of the entire German population with about $25,000$ individuals living in more than $10,000$ households per cross-section – East Germany was added in 1990 (Wagner et al., 2007). We select all waves, constructing a panel of about 270,000 individual-year observations for the years 1985 to 2010. The 26 waves of unbalanced panel data fulfil the above requirement of time variation in individual gross income and tax policies necessary for identification.

In each wave, the question "*How satisfied are you with your life, all things considered?*" is asked. The answer to this question is recoded on an 11-point scale, with

0 meaning totally unhappy and 10 meaning totally happy. The main explanatory variables are income and labor taxes which are taken from the data as well. Our measure of income N_{it} is net (after-tax) labor income of the month preceding the interview. The tax variable T_{it} comprises *both* income *and* payroll taxes (employee's social security contributions).

In the German context, the institutional setting that influences the perception of tax and income is as follows. Employees receive a monthly pay slip which informs them about their gross income as well as the income and payroll taxes (which are automatically withheld by the employer) to arrive at the net income which is directly transferred to their bank accounts.[5] Unlike the US, there are basically no additional deductions (such as retirement plans, insurances, garnishments, or charitable contributions) directly taken out of the gross income (there are some firm level pensions which receive a preferable tax treatment). Those payments are rather directly paid out of the net income in Germany.

Our baseline taxpayer sample is constructed as follows: We keep all individuals in households with strictly positive tax payments and the household head in working age (i.e. aged 16 to 65). The minimum tax payment usually corresponds to payroll taxes (social security contributions), which are phased-in as soon as a certain threshold (varying from 153 to 400 euros per individual per month over the observation period) is passed (*Mini-Job*). For a single household income taxes have to be paid when monthly taxable income exceeds 667 (180) euros in 2010 (1985). Our selection implies that non-working spouses in a taxpayer household (due to unemployment, voluntary non-employment or old-age) are also included in the sample.[6] We treat household incomes (tax payments) as a common good (bad) in the household, that is, we attribute the full household incomes and tax payments to both spouses. We implicitly equivalize household income by controlling for log household size and number of children in all regressions. The baseline sample covers almost 190,000 individual-year observations. Descriptive statistics of the dependent variable and the most important covariates are shown in Table A.1 in the Appendix.

[5] Taxes on capital gains are also withheld – in that case by financial institutions. Unfortunately, we neither have information on capital income nor on capital gains taxes in the month preceding the interview. In most cases individuals are informed at the end of the year about the capital income taxes that have been withheld. This makes capital income taxes less salient at the beginning and in the middle of the year, which is precisely the time when the SOEP survey is conducted.

[6] Note that this selection does not affect the estimates. We obtain very similar results when excluding non-working spouses of a taxpayer household in the sample.

4 Empirical results

4.1 Baseline

Our main objective is to test the (conditional) effect of tax on SWB. Table 1 presents the main set of results applying the FE estimator and focussing only on the main regressors of equation (1), i.e. reporting the coefficients on net income and tax as well as marginal effects.[7] Without surprise, the first column confirms that the effect of net income on SWB is positive. Most importantly, the second row shows that the coefficient on tax payments is significant and positive. This implies that – conditional on net income and all other individual/household characteristics – individuals have higher SWB when paying taxes.[8]

Table 1: Effects on subjective well-being - baseline results

Model	(1)	(2)	(3)	(4)
Specification	Baseline	Lagged tax	Instrumented	Income tax only
log net income	0.301***	0.320***	0.294***	0.327***
	(0.017)	(0.017)	(0.017)	(0.015)
log taxes	0.045***		0.024***	0.014***
	(0.009)		(0.004)	(0.003)
log $taxes_{t-1}$		0.009**		
		(0.004)		
adj. R^2	0.127	0.149	0.103	0.127
obs.	188412	150883	150316	188412
marg. eff. net inc.	0.00013	0.00014	0.00013	0.00014
marg. eff. taxes	0.00004	0.00001	0.00002	0.00003
MRS tax/net inc.	0.33	0.06	0.16	0.19

Note: Standard errors (in parentheses) clustered at person level. All regressions include standard controls variables (see Table A.2 in the Appendix for a complete set of coefficients) as well as person, state and year fixed effects. All money variables are in 2010 euros. Significance levels are 0.1 (*), 0.05 (**), and 0.01 (***). MRS stands for marginal rate of substitution between taxes and income.

[7] The complete set of baseline results including all covariates is shown in Table A.2 in the Appendix. In this and all of the following regressions, covariates show well-known patterns (Clark et al., 2008): SWB decreases with age and increases with the skill level; women are on average happier, while having children decreases SWB.

[8] When ignoring tax payments, we find a coefficient of net income of 0.345, which is in line with previous estimates based on SOEP data (Frijters et al., 2004a; Ferrer-i-Carbonell and Frijters, 2004; Akay and Martinsson, 2009). It is slightly lower in our baseline results, 0.301, when adding tax payments. A likelihood ratio test shows that adding taxes to the model significantly increases the fit of the model with a χ^2 of 17.72 and a corresponding p-value of 0.0001.

Given that we use a log specification, we also report marginal effects in Table 1. The marginal effect of tax payments may seem small (0.00004) in absolute terms. Compared to the marginal effect of net income, it is however sizeable as indicated by the marginal rate of substitution (MRS) of 0.33.[9] Next we use alternative specifications to estimate the conditional tax effect.

A first issue may be related to the timing of tax payment compared to the date of interview (and hence measure of SWB). If individuals become aware of their tax liabilities only at the end of the year but are interviewed early in the year (SOEP interviews occurring between January and September), then the tax payments of the previous year may be the relevant information for our purpose. We, thus, use lagged instead of current taxes in our model. The second column of Table 1 shows that the tax effect remains positive and highly significant, but decreases relatively to using contemporary tax payments.

A second check concerns potential endogeneity of taxes. A first issue discussed in the SWB literature is that happier people might earn more so that there is potentially reverse causality between gross income and subjective well-being (Luttmer, 2005; Pischke, 2011). Although the empirical findings suggest that the causality runs from gross income to SWB, we follow Pischke (2011) and instrument gross income using industry wage differentials which can at least be party attributed to rents and not productivity. Secondly, our tax coefficient could be biased if individuals respond to changes in the tax code. Assume for instance that a tax cut is perceived as a future decrease in welfare payments or public goods. In that case some individuals may compensate by increasing labor supply (to save more) so that total tax liability does not vary much. We therefore borrow from the ETI literature (Saez et al., 2012) and use a tax-benefit calculator to construct a synthetic tax measure by applying the inflation-adjusted gross income of period $t-1$ to the tax schedule of the year t and simulate the tax payments a household would face in the absence of behavioral responses. The third column of Table 1 shows that neither the effect of income nor the effect taxes is hugely affected by instrumenting both variables (the same is true when instrumenting only one of the two variables and estimating the model with

[9] As explained before, the most natural specification includes net income and tax payments. In this case, variations in both gross income and tax functions allow identifying the two effects. Starting from a utility function of net income and tax, $U(N,T)$, our results imply: $\frac{dU}{dT}|_{dN=0} = 0.00004$. Alternatively, a model specified with gross income and tax should lead to the same results. Indeed we can write $U(N,T) = U(Y-T,T) = f(Y,T) = f(Y-T+T,T)$ so that $\frac{df}{dT}|_{d(Y-T)=0} = \frac{\partial f}{\partial Y} + \frac{\partial f}{\partial T}$. Empirically, we find with this alternative specification that $\frac{df}{dT}|_{d(Y-T)=0} = 0.00011 - 0.00005 = 0.00006$, which is statistically not significantly different from $\frac{dU}{dT}|_{dN=0} = 0.00004$.

2SLS). The MRS decreases slightly from 0.33 to 0.16.[10]

In specification (4), we finally look at the effects of income taxation only, i.e. we exclude payroll taxes from the tax variable. While income taxes are mostly used for redistribution and to finance classic public goods such as roads or defense, payroll taxes serve basically as insurance contributions in case of illness, unemployment and retirement. Hence, individuals could prefer paying one but not the other tax for various reasons. In addition, the fact that payroll taxes are proportional to income, do not vary across demographic characteristics and show less (real) variation over time makes identification of a payroll tax effect difficult. When focusing on income taxes only, we find a positive marginal effect similar to the baseline estimate.

4.2 Sensitivity checks

We conduct several additional sensitivity checks to make sure that our results are robust to assumptions and choices made.

Functional form. In the baseline model we include net income and taxes in logs, a standard non-linear specification. Since logs may not capture the actual relationship between SWB and net income/tax, we experiment with different specifications in levels or logs including quadratic and higher order polynomials (up to order 8) as well as income splines. As shown in Table A.3 in the Appendix, the main result remains unchanged, with a significant, positive and fairly constant coefficient on tax; the MRS between net income and taxes is also very similar across specifications. This is true when both net income and tax enter with the same specification (e.g. quadratic income and quadratic tax) or in an asymmetrical way (e.g. quadratic net income and linear tax). The interaction term between net income and tax is significant and negative, indicating that the positive tax effect is smaller for richer individuals; we explore this point in more detail below. This result is reassuring and rules out concerns that taxes, being a non-linear function of income, would simply capture the non-linearity of the relationship between income and SWB. Results with Box Cox and Cobb Douglas specifications (not reported) also lead to the same conclusion.

Estimator. Next, we check the robustness with respect to the estimator. Table A.4 presents two linear models: the FE results (our baseline) and, following van Praag et al. (2003), a Mundlak-type (Quasi)-Fixed-Effects estimator (QFE).

[10]The first stage F-statistics are well above 10 in each estimation.

In the latter, we explicitly model the correlation between the time-invariant unobservables and all time-varying observables by including the within-person mean of those observables in the regression. Next, in column (3), we employ an Ordered Logit specification due to the ordinal scale of the SWB measure (results with Ordered Probit are very similar and not reported). Finally, we set up the "Blow-up and Cluster" Fixed Effects Ordered Logit Estimator suggested by Baetschmann et al. (2011) to additionally account for individual fixed effects. Once accounting for individual fixed effects, using linear or ordered logit models does not make much difference, as indicated by Ferrer-i-Carbonell and Frijters (2004). Our results are generally confirmed and the tax effect is significant with very similar MRS between income and tax of around 0.3. The exception is column (3) where we do not control for individual fixed effects. This indicates that the cross-sectional variation alone is not sufficient to identify the tax effect but changes in gross income and tax reforms over time are necessary.

Sample. In our baseline specification, we do not use population weights provided by the SOEP. As Table A.5 in the Appendix shows (column (1)), this choice does not affect the results. Moreover, we do not find big differences when estimating the model separately for singles and individuals in couples (regressions (2) and (3) in Table A.5). Next, we extend the analysis to all individuals in the population, including non-workers and welfare recipients, and re-estimate our baseline model. Instead of net income, we use disposable income (i.e. net income plus government transfers) as some households do not have any taxable labor income. As Table A.5 suggests, estimates do hardly change when including log tax payments (specification (4)). They are neither affected when using a different, composite measure of taxes paid minus benefits received, which we call net taxation. The sign of net taxation decreases slightly, but remains positive and significant (specification (5)). Last, we check whether results are driven by the German reunification (not reported). Results do not change when restricting the sample to the post reunification period. Moreover, we find very similar results when looking at Western Germans only – both after 1990 or when focussing on the years around the reunification.

Status. As the SWB literature has extensively stressed the importance of relative concerns (e.g., Luttmer, 2005, among others), one potential explanation for the positive coefficient on tax is that higher taxes reflect higher gross income (when conditioning on net income). To check for possible status effects, we firstly control for

relative income and relative taxes, defining the reference group according to region, gender, age and occupation. Our main result remains unaffected by the inclusion of relative income (relative income and taxes), i.e. the coefficient on tax becomes 0.045 (0.042) and is still significant at the 1%-level. Results do not change either when using a broader definition of the reference group or the median income instead of the mean. Secondly, we replicate our estimation using several measures of occupational prestige (we use the Standard Index of Occupational Prestige Scala (SIOPS) by Treiman, the International Socio-Economic Index of Occupational Status by Ganzeboom and the classification by Erikson-Goldthorpe-Portocarero). While we find that occupational prestige has a positive effect on SWB, it does not affect the coefficients on income and taxes. In particular, the fact that controlling for the Ganzeboom index, which explicitly defines income as one source of prestige, does not affect the results, makes it unlikely that status is driving our results. Moreover, our baseline coefficients do not change when including state-year and state-year-quintile fixed effects, which make other potential omitted variable biases unlikely as one would expect an omitted variable to be correlated with these fixed effects.

5 Discussion of results

Our empirical analysis shows that, conditional on net income, taxation has a positive, significant and robust effect on SWB. This result is in line with evidence from neuroscience: Harbaugh et al. (2007) show that mandatory transfers to charity, similar to taxes, activate those parts of the brain that are linked to rewards processing. This could give rise to a warm glow motive associated with paying taxes which could increase happiness (Owen and Videras, 2006).

But how can this positive tax effect be explained? In this section, we test three hypotheses which can theoretically explain the positive coefficient of taxes conditional on net income. Firstly, it might be explained by the fact that taxes are used to finance public goods. Hence, individuals who are consuming public goods more often or those living in regions with a relative underprovision of public goods might be happier to pay taxes. Secondly, the positive coefficient on taxes could be explained by redistributive preferences. There are several ways to test this hypothesis. Following Corneo and Grüner (2002), there are two relevant types of redistributive preferences in our setting. First, they could be driven by a high solidarity and/or a strong belief in the role of the state. Second, redistributive preferences could, however, also be shaped by more self-centered behavior, such as

risk aversion and the preference for a tight social safety net in case of a shock such as unemployment (a 'veil of ignorance' motive). Finally, the positive coefficient on taxes could also be due to the righteousness to pay taxes of some individuals in the population. Individuals with a high tax morale might feel morally obliged to pay taxes because it is the law. In that case, the positive coefficient on taxes would be explained by the negative utility of doing something unlawful. We test whether such kind of high tax morale could drive our results.

Table 2: Hypotheses for the positive tax effect

Hypothesis	H1 Public goods	H2 Redistributive preferences	H3 Tax morale	Empirical findings	
				Low inc.	high inc.
Relatively poor	+	+	+	++	
PG underprovision	+			++	+
Culturally active	+			o	++
Children in school	+			–	++
Small community	+	+		++	o
Return migrants	–	–		o	o
Born in the East	+	+		++	++
Leftist		+		+	++
Helpfulness		+		++	o
Risk averse		+		++	–
Frequent volunteer		+		o	o
High trust in others		+		–	o
Higher tax morale			+	+	+
Religiosity		+	+	++	–
Women			+	+	o
High-skilled			?	o	+
Self-employed			–	o	o

Note: + indicates a positive, – a negative and o no relationship. Double symbols indicate statistically significant differences at the 5%-level, single symbols show suggestive patterns that are not statistically significant at this level.

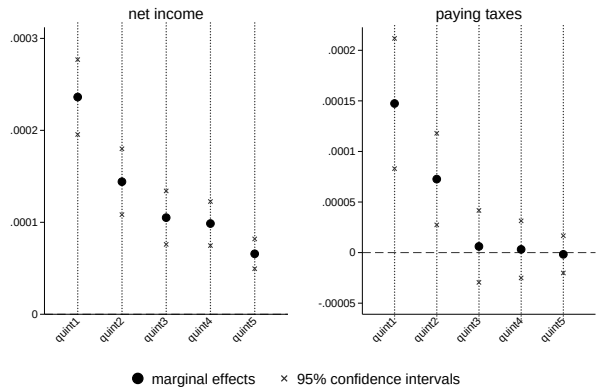
For each hypothesis, we use a variety of (individual or household) characteristics which we interact with the tax and net income variables in order to obtain heterogeneity in the tax and income effects.[11] It is important to note that the three

[11] For instance, let the dummy variable E be equal to unity if an individual is from Eastern Germany and 0 otherwise. Instead of using an omitted category, we can rewrite the standard model with interaction terms $SWB = \alpha_0 + \beta_Y Y + \beta_{YE} Y \cdot E$ as $SWB = \alpha_0 + \gamma_{YE} Y \cdot E + \gamma_{YW} Y \cdot (E-1)$. The two models are equivalent if $\gamma_{YE} = \beta_Y + \beta_{YE}$ and $\gamma_{YW} = \beta_Y$.

hypotheses are complementary rather than rivaling. For this reason, each of the characteristics is allocated to at least one of the three hypotheses. Table 2 summarizes the predicted signs of the coefficients for the interaction of each variable with the tax variable together with the empirical findings which will be discussed below (detailed regression results are reported in Table A.6 in the Appendix).[12]

Income. Before going through each hypothesis, we start our analysis with income which is possibly related to all three hypotheses: Ceteris paribus, middle income individuals (who pay taxes but have a relatively low income) may have a higher willingness to pay for public goods (Epple and Romano, 1996), a higher preference for redistribution (Fehr and Schmidt, 1999) as well as a higher tax morale (Torgler, 2006) than high income individuals. We divide our taxpayer sample into income quintiles and calculate quintile specific marginal effects of net income and taxes. It is important to note that the bottom quintiles of the taxpayers distribution are actually part of the middle-class of the income distribution of the full population as only slightly more than 50% of the individuals pay income taxes. Figure 2 shows that marginal effects are declining in income (left panel). When looking at the marginal effect of paying taxes (right panel) only the bottom of the taxpayer distribution (the poorest 40 percent) have higher SWB when paying taxes. The marginal effects in quintiles 3 to 5 do not seem to be affected by taxes.

Figure 2: Marginal effects - by income quintile



Given the strong heterogenous effects we find for different income quintiles, we additionally interact all subgroup dummies with a variable indicating whether the

[12]In addition to the interacted regressions, we re-estimate the baseline model including only the base dummy variables (without interactions) to make sure that the effects of income and taxes are not driven by compositional effects. Table A.7 in the Appendix shows that results do not change when including one or all dummy variables used for the subsequent interactions.

individual is in the lower (quintiles 1 and 2) or the upper part (3-5) of the income distribution to take out the income effect in the following analyses. We are thus particularly interested in whether individuals within the lower part of the income distribution have significantly different tax effects and whether there are certain subgroups within the upper part of the income distribution that derive a positive marginal effect from paying taxes.

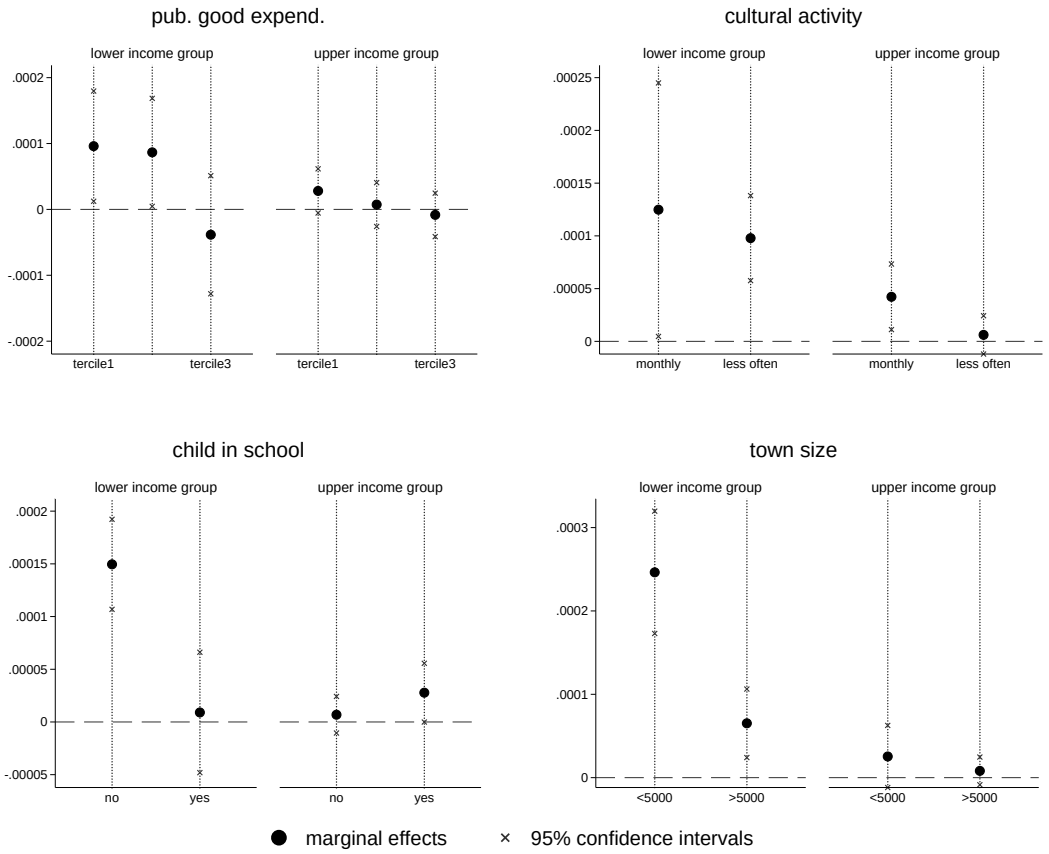
Public goods. The first hypothesis we test is whether the positive coefficient on taxes conditional on net income is related to public goods. Unfortunately, we do not directly observe individual public good consumption and have to proxy it using various indicators. First, we exploit information on regional public good availability. We merge metropolitan area *(Raumordnungsregion)* data on public good expenditures per capita for the years 1997 to 2007 to the SOEP. The regional data on public good expenditures have been obtained from the Statistical Offices of the German federal states *(Statistische Landesämter)*. We check whether individuals living in regions with higher regional per capita expenditures and thus a higher average public good consumption have different marginal effects from paying taxes.[13] We group individuals into terciles of per capita public good expenditures. The top left panel of Figure 3 shows that individuals in the two lowest terciles, i.e. those living in regions where there is a (relative) underprovision of public goods, have a higher marginal effect from paying taxes in the lower part of the income distribution. In the upper part of the distribution – though not statistically significant at the 5% level –, the panel implies that individuals in regions with a low per capita public good expenditure derive a positive marginal effect from paying taxes, while the top tercile even has a negative marginal effect.

Next, we proxy public good consumption by using a SOEP question on cultural activity. This question asks how frequently individuals attend plays, concerts, and exhibitions which are at least partly publicly funded in Germany. As the top right panel of Figure 3 indicates, individuals in the upper part of the distribution who are culturally active are statistically significantly happy to pay taxes, whereas the marginal effect from paying taxes for inactive individuals is zero.

Third, we look at individuals in households with school-age children. Given that tax money is partly used to finance school, the public goods hypothesis suggests that individuals with children in school derive a higher marginal effect from paying

[13] Note that we assess the effect of paying federal taxes although public good expenditure is rather local. Yet, communities are assigned a certain share of their collected federal taxes so that there is a direct link between the two. In Germany, there are no local income or sales taxes.

Figure 3: Marginal effects of taxes - public goods



taxes. While our empirical findings support this rationale for the upper income group where individuals with children do even have significantly positive marginal effect from paying taxes, we find the opposite in the lower half of the income distribution (see bottom left panel of Figure 3).

A last test – on the border between public goods and preferences for redistribution – is to look at the size of the municipality the individuals live in. On the one hand, bigger cities provide more public goods and services, hence the willingness to pay should be higher in smaller cities due to the relative underprovision. On the other hand, social cohesion is higher in smaller communities, which again would point to a higher willingness to pay taxes. In line with our prediction, we find in the bottom right panel of Figure 3 that individuals in the lower part of the income distribution who live in small communities (with less than 5,000 inhabitants) have a very high marginal effect from paying taxes, while the coefficient for individuals in larger communities is significantly smaller, though still positive.

Preferences for redistribution. An obvious attempt to explain differences in the effect of paying taxes on SWB is differentiating by the redistributive taste of individuals. Preferences for redistribution can be egoistic and driven by pecuniary motives; they can also be shaped by societal values (Corneo and Grüner, 2000, refer to the first channel as "homo oeconomicus effect" to the second as "public values effect"). Alesina and Fuchs-Schündeln (2007) show that preferences for redistribution have been shaped by the political socialization in East and West Germany prior to the reunification. We can use the same hypothesis and look at whether there is an East-West divide in terms of preferences for taxation as well. We thus differentiate between individuals who lived in Eastern Germany and taxpayers who lived in Western Germany prior to the reunification in 1990. As it turns out from looking at the top left panel of Figure 4, Eastern Germans in the lower part of the income distribution have a significantly higher marginal effect of paying taxes than individuals who have lived in the West prior to 1990. The same is true for the upper part, where individuals from the East have a positive coefficient on the tax variable conditional on net income, whereas individuals from the West do not.

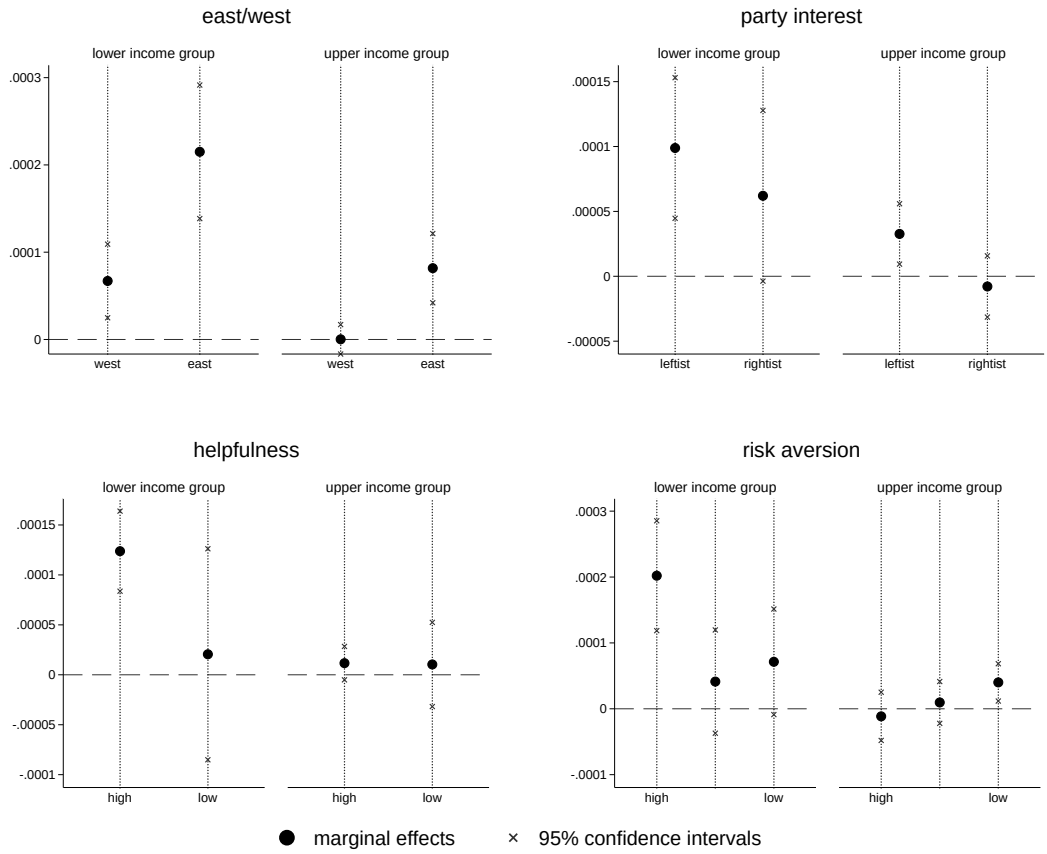
A second, related test is to check for partisan differences in the redistributive taste. Following Alesina and Angeletos (2005) we would expect individuals in favor of leftist parties (SPD, Die Grünen, PDS/Die Linke) to have a higher taste for redistribution and thus a higher marginal effect of paying taxes. Indeed, the top right panel of Figure 4 shows that leftists voters do have a more positive marginal tax effect. In fact, even in the upper part of the income distribution we find a positive and significant effect for individuals supporting leftist parties.

Theoretically, a high redistributive taste could be due to altruistic motives. We proxy altruism by a SOEP question on the "importance of being there for others" coded on a four point scale ranging from very important to unimportant. We dichotomize the variable which is included in the waves of 1990, 1992, 1995, 2004 and 2008. The bottom left panel of Figure 4 suggests that in both parts of the income distribution the individuals with a high preference towards altruism show a positive and significant marginal effect of paying taxes.

Another factor that could lead to a high redistributive taste is risk aversion. Risk averse individuals might like to pay taxes if they regard them as premia to an insurance against income shocks. In order to test this hypothesis, we use a direct measure on individual risk aversion provided in the SOEP.[14] We group our

[14] In the waves of 2004, 2006, 2008, 2009 and 2010, a question on self-rated risk aversion (ranging from 0 ('risk averse') to 10 ('fully prepared to take risks') is asked. We pool the answers to the

Figure 4: Marginal effects of taxes - redistributive preferences



population in terciles of high, medium and low risk aversion. The bottom right panel of Figure 4 reveals that individuals in the lower part of the income distribution only like to pay taxes if they have a high level of risk aversion (the pattern seems to be reversed for the high income group). For the other subgroups the marginal effect is not statistically significantly different from zero.

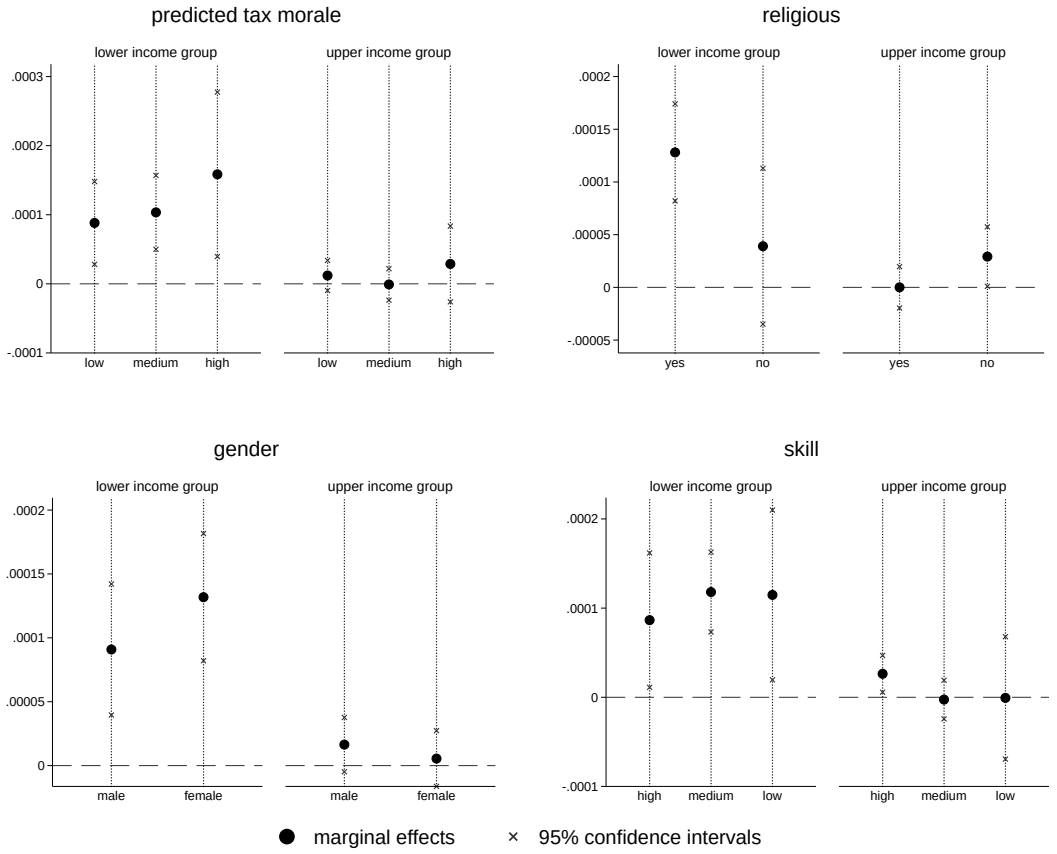
To sum up, the findings presented in Figure 2 (marginal effect decreasing with income) confirm the "homo oeconomicus effect", whereas the results presented in Figure 4 provide additional evidence in favor of the "public values effect".

Tax morale. According to Lubian and Zarri (2011) individuals with a higher tax morale have a higher level of SWB – suggesting another channel which could explain our positive coefficient of tax payments conditional on net income. As we do not have a question on tax morale in the SOEP, we run a regression of tax morale on

questions of all waves and assign an individual its mean risk aversion level.

a set of characteristics which has been identified to affect tax morale (such as age, skill, gender, religiosity, income and labor market status) using data from the World Value Survey.[15] Having determined the variables affecting tax morale, we make an out-of-sample prediction in the SOEP and determine the probability of having a low or a high tax morale. The upper left panel of Figure 5 shows that – though not statistically significant – the higher the tax morale the higher the marginal effect of paying taxes in both parts of the income distribution.

Figure 5: Marginal effects of taxes - tax morale



Secondly, we differentiate by religiosity. Religion does not only work as an internal moral enforcement device (Anderson, 1988), but also shows a strong and positive association with higher tax morale (Torgler, 2006). Looking at religion in Germany with its predominantly Christian population is especially interesting since members of the Christian churches (both Catholics and Protestants) have to pay

[15] Regression results are available on request. In line with the literature, tax morale increases (decreases) with age and education (income) and is higher (lower) for females and married (self-employed) individuals (see, e.g., Doerrenberg and Peichl, 2012).

church taxes. The church tax is directly linked to the income tax in two ways. First, the tax liability is a fixed share of the income tax (at the moment between 8% and 9% – depending on the state). Second, the church tax is collected with the income tax by the official tax authorities. While religiosity has been found to have a positive impact on SWB (Lelkes, 2006), in the context of our study the additional tax burden for members of the Christian church is of particular interest. In a way, Christians pay 'voluntarily' more taxes in exchange for certain services they receive from the church. The upper right panel of Figure 5 suggests that religiosity does not matter in the upper part of the distribution, but in the lower part only religious individuals have a significantly positive effect of paying taxes.

Third, it is a stylized fact in the tax morale literature that women have a higher tax morale (Alm and Torgler, 2006). While we do find that the marginal tax effect of women is slightly higher than for men in the lower income group, there does not seem to be a difference in the upper half of the distribution (see bottom left panel of Figure 5).

As far as qualification is concerned, the empirical findings in the tax morale literature are ambiguous, hinting at different signs in the relationship between skill level and tax morale in different parts of the income distribution (Doerrenberg and Peichl, 2012). As the bottom right panel of Figure 5 indicates, we find some suggestive evidence backing this hypothesis. In the lower part of the income distribution the marginal effect of taxes seems to be decreasing in skill, whereas in the upper half, better qualified individuals have a higher marginal effect of paying taxes.

Summary. In addition to the results discussed in detail above, we also investigated further variables where we did not find statistically unambiguous results. The last two columns of Table 2 summarize the empirical findings for all variables analyzed. For instance, we would have expected to find a negative coefficient for return migrants since they will not benefit from public goods in the future. In terms of redistributive taste, we would have expected individuals who volunteer regularly as well as individuals with a higher trust level to have positive marginal effects. Last, the literature on tax morale suggests that self-employed have a lower intrinsic motivation to pay taxes, results that we cannot confirm with our SWB regressions.[16]

Based on the results reported in Table 2, we now discuss the relative merit of

[16] The main reason for the ambiguous findings for all these variables is probably the low statistical power of our regressions due to too small sample size, for e.g. return migrants, or due to questions which are not frequently asked in the SOEP (such as trust).

our three hypothesis. Public goods are confirmed in about half of the checks both for the lower and the upper part. The relative low 'success rate' might be due to the quality of the proxies for public good consumption. The fact that there are no big differences between the lower and upper part could be due to the fact that public good consumption is rather equal across the income distribution. The redistributive taste hypothesis is confirmed more often for the lower than for the upper part of the distribution which might indicate self-interested redistributive tastes. Finally, for tax morale we confirm all checks for the lower part but none for the upper part. This is not surprising since tax morale is declining with income in our sample.

6 Conclusion

In this paper, we examine the effect of paying taxes on individual SWB. Using 26 waves of the German Socio-Economic Panel, we find that, conditional on net income, taxation has a positive, significant and robust effect on SWB. Several non-rivaling explanations for this finding are possible: public good consumption, redistributive tastes and an intrinsic motivation to pay taxes. Our analysis does not invalidate any of these hypotheses and all three are important to a certain degree for the whole population as different individuals can have different motives for paying taxes. Heterogeneous effects suggest evidence, however, that tend to support primarily the redistributive/insurance motive and, for the lower income group among tax payers, factors attributed to tax morale. All these channels could give rise to a warm glow motive associated with paying taxes (Owen and Videras, 2006).

Admittedly, other channels could explain our results, which could not be tested in the present work due to data limitation. For instance, some 'citizenship' feeling of belonging to (or contributing to) the society might be important. Future research could investigate such channels or employ better data for the ones analyzed here. In addition, trying to isolate the channels of the positive tax effect and their relative importance (e.g. in controlled experiments) would be worthwhile. It would also be interesting to replicate our findings with data from other countries with a welfare state different from the German one (e.g. the US). In that way one could investigate if the conditional tax effect differs in different institutional and cultural settings.

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A Appendix

Table A.1: Descriptive statistics, taxpayer sample (N=188412)

	mean	sd	min	max
subjetive well-being	7.09	1.7	0	10
gross income	3939.17	2514.2	667	116210
net income	2614.84	1572.7	350	114856
taxes	1324.32	1075.7	11	56412
age	41.06	11.0	17	99
gender	0.50	0.5	0	1
east	0.21	0.4	0	1
foreigner	0.13	0.3	0	1
high skilled	0.27	0.4	0	1
medium skilled	0.60	0.5	0	1
low skilled	0.12	0.3	0	1
household type	0.87	0.3	0	1
married	0.71	0.5	0	1
separated	0.02	0.1	0	1
divorced	0.07	0.3	0	1
widowed	0.02	0.1	0	1
household size	2.44	1.0	1	13
one child	0.11	0.3	0	1
two children	0.10	0.3	0	1
three children	0.02	0.2	0	1
more than three children	0.01	0.1	0	1
self-employed	0.07	0.2	0	1
civil servant	0.07	0.2	0	1
unemployed	0.03	0.2	0	1
pensioner	0.03	0.2	0	1
non-employed	0.11	0.3	0	1
very good health	0.21	0.4	0	1
good health	0.44	0.5	0	1
satisfactory health	0.22	0.4	0	1
poor health	0.09	0.3	0	1
bad health	0.03	0.2	0	1

Table A.2: Effects on subjective well-being - baseline results, all covariates

Model	(1)	(2)	(3)	(4)
Specification	Baseline	Lagged tax	Instrumented	Income tax only
log net income	0.301***	0.320***	0.294***	0.327***
	(0.017)	(0.017)	(0.017)	(0.015)
log taxes	0.045***		0.024***	0.014***
	(0.009)		(0.004)	(0.003)
log taxes$_{t-1}$		0.009**		
		(0.004)		
log working hours	0.054***	0.048***	0.052***	0.054***
	(0.012)	(0.014)	(0.014)	(0.012)
age squared	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
east	-0.180	-0.263**	-0.182	-0.180
	(0.117)	(0.132)	(0.137)	(0.117)
foreigner	-0.019	-0.006	-0.006	-0.018
	(0.056)	(0.062)	(0.062)	(0.056)
log hhsize	-0.042	-0.018	-0.042	-0.042
	(0.029)	(0.034)	(0.034)	(0.029)
household type	0.083***	0.065*	-0.031	0.084***
	(0.030)	(0.034)	(0.037)	(0.030)
high skilled	-0.137***	-0.167***	-0.157**	-0.136**
	(0.053)	(0.062)	(0.062)	(0.053)
medium skilled	-0.057	-0.077*	-0.075*	-0.056
	(0.040)	(0.046)	(0.045)	(0.040)
pensioner	0.264***	0.251***	0.256***	0.263***
	(0.054)	(0.061)	(0.059)	(0.054)
self-employed	-0.029	-0.057*	-0.075**	-0.041
	(0.029)	(0.033)	(0.032)	(0.029)
unemployed	-0.276***	-0.288***	-0.302***	-0.278***
	(0.049)	(0.055)	(0.054)	(0.049)
non-employed	0.195***	0.184***	0.191***	0.193***
	(0.041)	(0.047)	(0.046)	(0.041)
handicapped	-0.175***	-0.179***	-0.190***	-0.176***
	(0.040)	(0.044)	(0.044)	(0.040)
gender	0.036	0.002	-0.060	0.036
	(0.067)	(0.070)	(0.087)	(0.067)
married	0.093***	0.094***	0.132***	0.092***
	(0.022)	(0.025)	(0.026)	(0.022)
separated	-0.169***	-0.180***	-0.046	-0.169***
	(0.042)	(0.048)	(0.052)	(0.042)
divorced	0.150***	0.148***	0.153***	0.151***
	(0.036)	(0.041)	(0.042)	(0.036)
widowed	-0.066	-0.054	0.078	-0.067
	(0.092)	(0.103)	(0.111)	(0.092)
one child	0.033	0.020	0.021	0.032
	(0.020)	(0.023)	(0.024)	(0.020)
two children	0.018	-0.008	-0.005	0.017
	(0.027)	(0.031)	(0.031)	(0.027)
three children	0.070*	0.049	0.076*	0.069*
	(0.040)	(0.046)	(0.046)	(0.040)
more than three children	0.180**	0.102	0.132	0.178**
	(0.083)	(0.092)	(0.090)	(0.082)
good health	-0.377***	-0.372***	-0.369***	-0.377***
	(0.010)	(0.011)	(0.011)	(0.010)
satisfactory health	-0.852***	-0.838***	-0.835***	-0.852***
	(0.013)	(0.015)	(0.015)	(0.013)
poor health	-1.298***	-1.285***	-1.277***	-1.298***
	(0.019)	(0.020)	(0.020)	(0.019)
bad health	-1.954***	-1.944***	-1.929***	-1.954***
	(0.034)	(0.038)	(0.038)	(0.034)
adj. R^2	0.127	0.149	0.103	0.127
obs.	188412	150883	150316	188412

Note: Standard errors (in parentheses) clustered at person level. All regressions include person, state and year fixed. All money variables are in 2010 euros. Significance levels are 0.1 (*), 0.05 (**), and 0.01 (***).

Table A.3: Effects on subjective well-being - different functional forms

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(net income)^1 [$\beta \cdot 1000$]	0.059***	0.107***	0.104***	0.107***	0.134***	0.665***	0.447***		0.000***		0.000***				
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)		(0.000)				
(net income)^2 [$\beta \cdot 1000$]		-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***				-0.000***				
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				(0.000)				
(net income)^3 [$\beta \cdot 1000$]					0.000***	0.000***	0.000***								
					(0.000)	(0.000)	(0.000)								
(taxes)^1 [$\beta \cdot 1000$]	0.028***	0.004***	0.036***	0.034***	0.055***	0.016***	0.359***	0.000		0.000**					
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)					
(taxes)^2 [$\beta \cdot 1000$]			-0.000***	-0.000***	-0.000***		-0.000***			-0.000***					
			(0.000)	(0.000)	(0.000)		(0.000)			(0.000)					
(taxes)^3 [$\beta \cdot 1000$]					0.000***		0.000***								
					(0.000)		(0.000)								
net income $\cdot$ taxes [$\beta \cdot 1000$]				-0.000***											
				(0.000)											
(log net income)^1								0.342***		0.332***		0.301***	0.906***	0.794***	0.486**
								(0.017)		(0.017)		(0.017)	(0.203)	(0.213)	(0.232)
(log net income)^2													-0.040***	-0.032**	0.017
													(0.013)	(0.014)	(0.020)
(log taxes)^1									0.107***		0.085***	0.045***	0.045***	0.141**	0.435***
									(0.011)		(0.009)	(0.009)	(0.009)	(0.068)	(0.115)
(log taxes)^2														-0.007	0.009
														(0.005)	(0.007)
log net income $\cdot$ log taxes															-0.066***
															(0.019)
8th order poly. net inc.	No	No	No	No	No	Yes	Yes	No	No	No	No	No	No	No	No
8th order poly. taxes	No	No	No	No	No	No	Yes	No	No	No	No	No	No	No	No
adj. R^2	0.152	0.144	0.142	0.142	0.137	0.002	0.000	0.129	0.142	0.128	0.138	0.127	0.127	0.127	0.126
obs.	188412	188412	188412	188412	188412	188406	188406	188412	188412	188412	188412	188412	188412	188412	188412
marg. eff. net inc.	0.00006	0.00010	0.00010	0.00010	0.00011	0.00015	0.00015	0.00015	0.00005	0.00014	0.00008	0.00013	0.00012	0.00013	0.00012
marg. eff. taxes	0.00003	0.00000	0.00003	0.00003	0.00004	0.00002	0.00004	0.00000	0.00010	0.00002	0.00008	0.00004	0.00004	0.00003	0.00004
MRS tax/net inc.	0.48	0.04	0.29	0.26	0.34	0.11	0.26	0.02	2.09	0.11	1.03	0.33	0.34	0.28	0.37

Note: Standard errors (in parentheses) clustered at person level. All regressions include standard controls variables as well as person and year fixed effects. All money variables are in 2010 euros. Significance levels are 0.1 (*), 0.05 (**), and 0.01 (***). MRS stands for marginal rate of substitution between taxes and income.

Table A.4: Effects on subjective well-being - by estimator

Estimator	Fixed Effects	Quasi FE	Ordered Logit	FE O-Logit
Model	(1)	(2)	(3)	(4)
log net income	0.301***	0.316***	0.562***	0.499***
	(0.017)	(0.013)	(0.015)	(0.028)
log taxes	0.045***	0.041***	0.000	0.069***
	(0.009)	(0.008)	(0.009)	(0.015)
adj. R^2	0.127	0.299	0.086	0.084
obs.	188412	188412	188412	607600
marg. eff. net inc.	0.00013	0.00014	-0.00001	0.00021
marg. eff. taxes	0.00004	0.00004	-0.00000	0.00006
MRS tax/net inc.	0.33	0.29	0.00	0.30

Note: Standard errors (in parentheses) clustered at person level. All regressions include standard controls variables as well as person and year fixed effects. All money variables are in 2010 euros. Significance levels are 0.1 (*), 0.05 (**), and 0.01 (***). MRS stands for marginal rate of substitution between taxes and income.

Table A.5: Effects on subjective well-being - different samples

Model	(1)	(2)	(3)	(4)	(5)
	Population weights	Singles only	Individuals in couples	All individuals	
log net income	0.299***	0.376***	0.308***		
	(0.017)	(0.064)	(0.018)		
log taxes	0.045***	0.060**	0.046***	0.031***	
	(0.009)	(0.027)	(0.010)	(0.007)	
log disp. income				0.236***	0.246***
				(0.014)	(0.013)
log net taxation					0.012***
					(0.002)
adj. R^2	0.125	0.044	0.142	0.261	0.260
obs.	186603	24037	164375	260480	260480
marg. eff. income	0.00013	0.00025	0.00012	0.00010	0.00010
marg. eff. taxes	0.00004	0.00008	0.00004	0.00004	0.00002
MRS tax/inc.	0.33	0.30	0.33	0.42	0.17

Note: Standard errors (in parentheses) clustered at person level. All regressions include standard controls variables as well as person and year fixed effects. All money variables are in 2010 euros. Significance levels are 0.1 (*), 0.05 (**), and 0.01 (***). MRS stands for marginal rate of substitution between taxes and income.

Table A.6: Effects on subjective well-being - interaction effects

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Log tax interacted with	income quintiles	pub. good expend.	cultural activity	child in school	town size	east/west	party interest	helpfuln.	risk aversion	predicted tax	religious	gender	skill
income quintile 1	0.068***												
income quintile 2	0.057***												
income quintile 3	0.006												
income quintile 4	0.005												
income quintile 5	-0.004												
lower income group, tercile 1		0.063**											
lower income group, tercile 2		0.056**											
lower income group, tercile 3		-0.026											
upper income group, tercile 1		0.046											
upper income group, tercile 2		0.012											
upper income group, tercile 3		-0.014											
lower income group, monthly			0.074**										
lower income group, less often			0.060***										
upper income group, monthly			0.071***										
upper income group, less often			0.009										
lower income group, no				0.087***							0.022		
lower income group, yes				0.007							0.083***		
upper income group, no				0.010							0.046**		
upper income group, yes				0.054*							0.000		
lower income group, smaller than 5000					0.141***								
lower income group, greater than 5000					0.041***								
upper income group, smaller than 5000					0.036								
upper income group, greater than 5000					0.012								
lower income group, west						0.043***							
lower income group, east						0.115***							
upper income group, west						0.000							
upper income group, east						0.115***							
lower income group, leftist							0.062***						
lower income group, rightist							0.039*						
upper income group, leftist							0.048***						
upper income group, rightist							-0.013						
lower income group, high								0.075***	0.128***	0.095***			0.054**
lower income group, low								0.012	0.044*	0.051***			0.070**
upper income group, high								0.018	-0.018	0.038			0.047**
upper income group, low								0.015	0.066***	0.019			-0.001
lower income group, medium									0.026	0.069***			0.072***
upper income group, medium									0.015	-0.001			-0.004
lower income group, male												0.057***	
lower income group, female												0.080***	
upper income group, male												0.025	
upper income group, female												0.008	
adj. R^2	0.126	0.090	0.141	0.127	0.128	0.056	0.131	0.110	0.123	0.124	0.101	0.126	0.126
obs.	188412	80801	164793	188412	188407	178121	134860	165241	97556	141772	141772	188412	188412

Note: Standard errors (in parentheses) clustered at person level. All regressions include standard controls variables , person and year fixed effects as well as base effects of the interactions. All money variables are in 2010 euros. Significance levels are 0.1 (*), 0.05 (**), and 0.01 (***).

Table A.7: Effects on subjective well-being - interaction groups

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)
log net income	0.223***	0.290***	0.295***	0.295***	0.278***	0.293***	0.211***
	(0.032)	(0.023)	(0.021)	(0.021)	(0.024)	(0.024)	(0.043)
log taxes	0.021	0.035***	0.040***	0.040***	0.043***	0.035***	0.040*
	(0.018)	(0.013)	(0.012)	(0.012)	(0.014)	(0.013)	(0.023)
relative log net income	-0.032	-0.010	-0.002	-0.002	0.023	-0.008	-0.023
	(0.042)	(0.030)	(0.028)	(0.028)	(0.032)	(0.031)	(0.055)
relative log taxes	-0.004	0.006	0.007	0.006	0.003	-0.001	0.015
	(0.028)	(0.020)	(0.019)	(0.019)	(0.021)	(0.021)	(0.037)
occ. prestige (Ganzeb.)	0.001	0.002***	0.002***	0.002***	0.002**	0.002***	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
pub. good expend.: tercile2	0.015						0.033
	(0.019)						(0.024)
pub. good expend.: tercile3	0.034						0.052
	(0.029)						(0.037)
cultural activity: less often		-0.063***					-0.069***
		(0.014)					(0.026)
child in school: yes			-0.043**				-0.062*
			(0.022)				(0.035)
town size: greater than 5000				-0.005			0.020
				(0.030)			(0.064)
party interest: rightist					-0.001		-0.143**
					(0.034)		(0.068)
predicted tax morale: medium						0.006	0.022
						(0.016)	(0.027)
predicted tax morale: high						-0.013	-0.023
						(0.030)	(0.058)
adj. R^2	0.104	0.130	0.120	0.118	0.116	0.119	0.125
obs.	65546	132534	151693	151690	110034	116099	36600
marg. eff. net inc.	0.00009	0.00012	0.00012	0.00012	0.00011	0.00012	0.00008
marg. eff. taxes	0.00002	0.00003	0.00003	0.00003	0.00004	0.00003	0.00003
MRS tax/net inc.	0.19	0.25	0.29	0.29	0.33	0.25	0.38

Note: Standard errors (in parentheses) clustered at person level. All regressions include standard controls variables as well as person and year fixed effects. All money variables are in 2010 euros. Significance levels are 0.1 (*), 0.05 (**), and 0.01 (***). MRS stands for marginal rate of substitution between taxes and income.