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# Shifting Taxes from Labor to Consumption: Efficient, but Regressive?

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# ABSTRACT

## Shifting Taxes from Labor to Consumption: Efficient, but Regressive?*

Shifting taxes from labor income to consumption is regularly suggested as a measure to induce work incentives. We investigate the effect of increases in the Value Added Tax on labor supply and the income distribution in Germany, which is compensated by a revenue-neutral reduction in income-related taxes. Based on a dual data base and a microsimulation model of labor supply behavior, we confirm a general regressive impact of such a tax shift in the short run. When accounting for labor supply adjustments, the adverse distributional impact persists for personal income tax reductions, while the overall effects on inequality and progressivity become substantially lower when payroll taxes are reduced, which is due to increased work incentives, especially for low-income households.

JEL Classification: H21, H23, C63, D31

Keywords: income and payroll taxes, consumption taxes, microsimulation, labor supply, inequality, Germany

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# 1 Introduction

The appropriate choice between direct and indirect tax instruments has been subject to an extensive debate on their respective merits and disadvantages. Although the question of the optimal mix is still open, there are good reasons for a coexistence of both forms of taxation, as they address the economic policy objectives of efficiency and redistribution in different ways. Moreover, in the context of the need for fiscal consolidation in connection to the current debt crisis, consumption as a stable tax base constitutes an attractive and reliable source for government revenues. In addition, shifting the tax burden from labor to consumption, referred to as *fiscal devaluation*, is currently considered as an alternative to nominal devaluation in order to restore competitiveness in some euro area countries (de Mooij and Keen (2012), Koske (2013)).

The discussion of possible consequences of a tax shift from income towards consumption centers around two issues. First, standard economic theory provides intuition for why such a tax shift might be favorable with respect to employment as a consequence of higher incentives to participate in the labor market, due to lower marginal tax rates on labor income. Second, higher consumption taxes are often associated with a reduction in tax progressivity and thereby increased inequality. However, employment increases from a tax shift may outweigh adverse distributional impacts. The degree to which there exists a trade-off between equity and efficiency in this context is an empirical question. We provide an analysis for Germany to gauge the extent of this trade-off. More specifically, we investigate whether a shift from income to consumption taxation can be justified in light of positive labor supply effects. Germany represents a particular interesting case as the tax wedge on labor income is among the highest in industrialized countries (OECD, 2012).

Despite the theoretical virtues of indirect taxes, the direct to indirect tax ratio has been on the rise over the last decades, mostly due to increasing social security contributions (Martinez-Vazquez et al., 2010). Accordingly, recent years have witnessed a growing discussion on a heavier reliance on consumption taxes, such as sales taxes and the Value Added Tax (VAT) (OECD, 2007, 2010). A concrete policy implementation of such a *tax cut cum base broadening* was the 2007 VAT increase in Germany, which was compensated by cutting unemployment insurance contributions at the same time.[1] This policy was explicitly motivated by increasing

[1] The standard VAT rate was raised from 16% to 19%. Unemployment insurance contributions were lowered from 6.5% to 4.2%. This specific reform has been investigated by Bach et al. (2006).

work incentives and generating revenues at the same time. In the same spirit, Hungary financed a 5 percentage point reduction in the employer SSC rate through higher VAT. These policies followed the argumentation that the tax burden on labor in most OECD countries is too high and implies low incentives for labor market participation. Moreover, payroll taxes constitute a significant share of labor costs for employers. A shift away from income and payroll taxes towards consumption taxes could therefore release unused productive capacities by increasing labor supply *and* demand. Moreover, labor constitutes the major tax base for generating revenues in most countries, which might be questioned in light of a proper application of the ability to pay principle. Broadening the tax base addresses this issue by treating all sources of income equally. The distributional consequences of a tax shift are however unclear.

In this paper, we carry out microsimulations of a wide range of revenue-neutral policy scenarios. We simulate a step-wise increase of the standard VAT rate of currently 19% in Germany.[2] This is accompanied by a reduction in personal income taxes (PIT) or social security contributions (SSC). The novelty of our approach is to simulate a range of revenue-neutral tax reforms and to account for labor supply responses at the same time. As the distributional analysis is differentiated along several socio-demographic dimensions, the results can help to design specifically targeted policies to compensate the potential losers from an increase in VAT rates. For example, if pensioners are found to be worse off, it might be worth considering to split the additional revenue from the higher VAT on lowering payroll taxes *and* raising old-age pensions. The analysis is carried out with the behavioral microsimulation model IZAΨMOD (Peichl et al., 2010). Based on a representative sample of the German population from the Socio-Economic Panel Study (SOEP) and a detailed model of the German tax and transfer system, we are able to simulate not only changes in household budgets, but also adjustments in labor supply. As the SOEP database does not contain consumption expenditures, this information has to be imputed based on estimates from the "German Sample Survey of Income and Expenditures" (EVS). Our empirical approach is related to the studies of Decoster et al. (2009a) and Bach et al. (2006), but differs in several aspects. While the former study depicts only the static changes in household budgets ignoring behavioral responses, the latter does not consider a revenue-neutral reform.

[2] In Germany, there are two VAT rates. Apart from the standard rate of 19%, there is a reduced rate of 7%, applied on: most food commodities, public transport, books, newspapers, journals, entrance to cultural facilities and works of art. Moreover, medical, educational and financial services as well as rents are fully exempted from VAT.

We find that both scenarios of reducing the direct tax burden, either lowering PIT or SSC, imply distinct distributional impacts. Due to its strongly progressive design, a compensated reduction of personal income taxes leads to a higher level of inequality. Low-income earners, pensioners and unemployed are found to be the main losers from the policy. For payroll tax reductions, the adverse distributional effects are significantly less severe. Taking into account behavioral adjustments, we find that the distributional impacts of the tax shift are weakened throughout all reform scenarios. However, as for lowering the PIT level, a strongly regressive impact persists. Reducing payroll taxes seems particularly promising, given their potential to induce work incentives, and hence reduce unemployment. In these scenarios, many households are able to compensate their losses through increased labor earnings. Beyond, our results suggest no systematic difference between augmenting both VAT rates or only the standard rate, which underlines the limited redistributional power that is often attributed to a differentiation of VAT rates.

The paper is structured as follows: In Section 2, the theoretical arguments for a tax base broadening are reviewed. Then, we present related empirical findings on the macro and micro level. In Section 3, our microsimulation approach and the underlying data base is presented. Furthermore, our method to impute expenditures in an income data set is described in detail. In the results section 4, the simulated labor supply reactions are presented first. Second, a detailed distributional analysis identifies winners and losers from the reform. A comparison of several aggregated measures of inequality and progressivity completes the analysis. Section 5 concludes.

# 2 Background and Literature

## 2.1 Theory

Taxation affects economic incentives and may therefore induce behavioral adjustments for individuals, causing efficiency costs compared to a hypothetical situation without taxes. As any feasible tax causes distortions, the theoretical question is how to characterize the second-best setting that implies minimum efficiency losses, given a fixed government revenue. Economic theory provides intuition for why a shift from income to consumption taxation might be favorable in efficiency terms, i.e., promoting growth and employment. Within a static standard utility-maximization framework, it can be shown that both taxes distort the individual decision between consumption and leisure equivalently. An income tax reduces the net wage, while a

consumption tax reduces the real value of net earnings. Under non-negative wage and income elasticities of labor supply, both forms of taxation reduce work incentives (Bargain et al., 2013). The consumption tax base is however presumably broader, as it includes pensioners, beneficiaries and capital-income earners. While only a fraction of the population is subject to income taxation, virtually everyone pays consumption taxes. Hence, consumption taxes allow for obtaining the same revenue with a lower rate. If one recalls the classic insight that the excess burden of a tax rises approximately with the square of the tax rate (Auerbach, 1982), a shift towards a consumption tax induces lower aggregate efficiency costs. The intuition is that the positive effect on labor supply from the higher net wage exceeds the negative effect from a lower real income, resulting in higher aggregate labor supply.

A theoretical counter-argument is that throughout the life-cycle, income necessarily equals consumption and therefore implies an equal burden of both taxes (Caspersen and Metcalf (1993), Metcalf (1994)). This argument however only holds if both tax schedules are constant in the long run. Although the only difference between (labor) income and consumption arises from consumption smoothing, this intuition is hardly relevant in the policy debate on what defines a regressive tax. Another argument refers to the treatment of capital income. A tax levied on capital income distorts an individual's decision on how much to save, as it implicitly taxes future consumption. If this is a normal good, an income tax discourages savings. In contrast, the savings decision is neutral to the level of consumption taxation, as the consumption tax does not alter the returns to savings. Reducing the capital income tax in favor of the consumption tax is therefore expected to increase savings and hence economic growth (Feldstein, 1978).

The interdependencies between both forms of taxation have regularly been addressed by the optimal taxation literature. Atkinson and Stiglitz (1976) were the first to capture the equity-efficiency trade-off of both taxes within a formal framework. Under the assumption of separable preferences and individuals that are inequality-neutral, they neglect any role for indirect taxation. Since all commodities are equally substitutable for leisure, any attempt to offset the distortion between labor and leisure is bound to cause efficiency losses.[3] Later contributions refined this argument by imposing more realistic assumptions and found commodity taxation to be a necessary component of any optimal tax structure. Among these assumptions are uncertainty about individual wages (Cremer and Gahvari, 1995), heterogeneity among agents not only in ability (Cremer et al., 2001; Saez, 2002), different underly-

[3] See also the argumentation by Sørensen (2007).

ing production technologies (Naito, 2007) or different evasion characteristics of both taxes (Boadway et al., 1994; Richter and Boadway, 2005). According to Mankiw et al. (2009), the advance of indirect taxes and VAT in particular can be attributed to findings of optimal taxation theory. Despite Atkinson and Stiglitz' wide-known result not to levy any indirect taxes, it seems worth to consider whether a shift to consumption taxation might adjust the direct/indirect tax mix towards the optimum (European Commission, 2008). In addition, there is a broad consensus in favor of uniform commodity taxation for efficiency reasons.[4]

A proper application of the Ability to Pay Principle might provide further justification for a heavier reliance on consumption taxation. Such arguments favor consumption (the use of income) to income (the contribution to national production) as the better measure for individual ability. Dahlby (2003) argues that the term "Ability to Pay" should rather be substituted by "standard of living", for which consumption is the better indicator. Beyond, consumption is less volatile if individuals are assumed to choose their consumption level according to their expected long-term income. Therefore, *life-time* consumption might be the most adequate tax base for capturing individuals' Ability to Pay.

## 2.2 Empirical Evidence

Empirically, the efficiency impact of a shift from income to consumption taxation has been investigated by a number of studies, most of them based on a macrosimulation framework. They largely reveal positive, but moderate effects from a compensated SSC reduction on GDP growth rate and employment for the German case.[5] Their results show to the same direction; employment effects are estimated to be positive, but not higher than 1% of total employment. Similar figures are obtained for other countries.[6] Union's behavior in the aftermath of the reform is found crucial for the long-run effectiveness of the tax shift. Those studies that explicitly incorporate the

[4] See Diamond and Mirrlees (1971) and Atkinson and Stiglitz (1976). The studies of Corlett and Hague (1953) and Naito (1999) deliver arguments for differential taxation. However, their results rest on differentiating tax rates according to own and cross price demand elasticities, for which estimates are hard, if not impossible, to obtain. Another approach by Kleven (2004) derives optimal tax rates based on cost shares in household activities. However, estimation of these shares requires sophisticated micro data sets.

[5] See Buscher et al. (2001), Steiner (1996), Meinhardt and Zwiener (2005), Feil and Zika (2005), Feil et al. (2006), Böhringer et al. (2005).

[6] See European Commission (2006, 2008) for a cut in income taxes in the EU as a whole, Altig et al. (2001) for a shift of the US federal income tax, and Dahlby (2003) for income tax shifting in Canada.

mode of wage bargaining draw rather pessimistic conclusions. If union's bargaining power is assumed sufficiently high, wage increases as a consequence of increased living costs become likely in the medium term. Another channel that might work against the effectiveness, though not captured in these studies, are announcement effects of VAT increases that cause domestic demand to boost before and to decline in the aftermath of the policy change.

Macro approaches exhibit drawbacks when it comes to distributional questions. Any conclusions derived from macro simulations do not account for heterogeneity among individuals. As a consequence, these kind of questions have been addressed by a number of microsimulation studies. One comprehensive study for four European countries is delivered by Decoster et al. (2009a) with the EUROMOD model. They simulate a 25% reduction in social security contributions, compensated by a VAT increase. Their results indicate negative welfare effects for households in low income deciles, as well as for households with low-educated and unemployed heads. This in line with O'Donoghue et al. (2004), who find a general regressive impact in twelve OECD countries, Portugal being most regressive and Belgium being nearly proportional. Similar results are obtained by Bach et al. (2006), who simulate the effect of the three percentage points VAT increase implemented by the German government in 2007. This was complemented by a cut in unemployment insurance contributions by two percentage points. It should however be noted that this reform was not revenue-neutral. Picos-Sanchez (2012) simulate a revenue-neutral shift of 5% of the SSC burden to VAT and find increasing work incentives particularly for low-income earners across several European countries. Meinhardt and Zwiener (2005) simulate a cut in SSC by two percentage points, combined with an increase in VAT by the same amount. Although the authors do not report fiscal effects, this reform is presumably not revenue-neutral as well. They identify civil servants, self-employed and unemployed as the main losers from the reform, while gains for employed persons are rather moderate.

The empirical results partly strengthen the cause for a tax shift for efficiency reasons, though the positive impact on employment and growth should not be overestimated. As the results for Germany indicate, the magnitude crucially depends on the institutional setting of the economy. The microsimulation studies presented here confirm a regressive impact. Low-income groups are typically worse off from a tax shift as well as unemployed and pensioners. This result is not surprising, as these groups typically face a low burden of income taxes and social security contributions.

# 3 Empirical Approach

Microsimulation models have become a standard tool in the ex-ante assessment of reforms of the tax-benefit system and therefore allow to trace changes in highly complex tax regulations. In particular, the specific institutional setting and the socio-economic structure in a given country need to be taken into account, which can hardly be accomplished by an analysis on an aggregate level.

The basic idea of microsimulation in the context of labor supply is to model the individual (or household) decision between leisure and consumption. Based on observed behavior of a representative population sample in a given institutional setting, preference parameters can be estimated. If net income (and thus consumption possibilities) changes as a consequence of a tax-benefit reform, these estimates are used to predict individual labor supply *after* the reform. The reform effect is then defined as the difference in aggregate behavior between the two institutional regimes. For this, a detailed representation of the tax-benefit system is necessary. We use the IZA Policy SImulation MODel (IZAΨMOD) of the Institute for the Study of Labor (Peichl et al., 2010). Apart from replicating the German tax and transfer system, it comprises an econometrically estimated model of labor supply behavior. So far, IZAΨMOD has been applied to a range of reforms concerning the income tax tariff or the concrete design of the German unemployment benefits. For our purpose, the scope of the microsimulation model has to be extended to incorporate consumption patterns.

## 3.1 Dual Database

The main database for IZAΨMOD is the German Socio-Economic Panel Study (SOEP), which is an annual panel study of households and individuals that was launched in 1984 as a representative cross-section of the adult population living in private households in Germany (Wagner et al., 2007). Since then, the scope and size of the panel has been steadily extended. Special attention is given to the representativeness of the German population by explicitly oversampling foreigners and high-income households. As of now, it covers about 22,000 persons living in more than 12,000 households. Among others, IZAΨMOD exploits information on gross wages, household composition, working time, age and educational background of household members, as well as employment status and housing costs. These data serve as input for the tax and benefit module and for the labor supply estimation.

As the SOEP data do not report household expenditures, inference on the burden of consumption taxes is not possible from this database. For this reason, additional information from the German Sample Survey of Income and Expenditure (*Einkommens- und Verbrauchsstichprobe*, EVS) is used.[7] It is a cross-sectional survey conducted by the Federal Statistical Office that started in 1962/1963 and is repeated about every five years. The most recent available wave was conducted in 2008.[8] It covers about 55,000 households, of which a 80% subsample is provided for scientific analyses. The EVS data contain detailed information on every household member's employment, income from different sources and assets. Its main focus rests on expenditures for all types of commodities and services. All participants constantly keep record of their expenditures throughout a three-month period.

Although EVS and SOEP apply similar definitions the concepts of household and household income, both data sets are not fully comparable due to methodological differences.[9] Income is reported in more detail in the EVS. On the other hand, it shows weaknesses with respect to representing foreigners and high-income earners accurately. EVS does not sample households above an income threshold of € 18,000 per month. In addition, middle-income groups are slightly over-represented. The measurement error is probably larger in SOEP than in EVS, due to the retrospective methodology of SOEP.

## 3.2 Imputation of Consumption Expenditures

For our policy scenarios, the SOEP database has to be enhanced using expenditure data. The necessary information is extracted from EVS and imputed into SOEP by the help of variables contained in both data sets. For this statistical matching task, a range of techniques have been developed, which can be classified as *explicit* or *implicit*.[10] Implicit methods seek to infer expenditures based on observations that are as similar as possible to the target observation. Their virtue is that they do not rest on theoretical assumptions about the relationship between expenditures and income

[7] In 2010, the SOEP respondents were, for the first time, asked to report household expenditures. Its data quality however is arguably poorer than that of EVS. Apart from exhibiting large shares of missing values, this is due to the retrospective design of SOEP; it asks for expenditures from the year before the interview was conducted. The direct bookkeeping method of the EVS seems to be more appropriate, as individuals typically do not keep records on consumption expenditures. In light of this, the additional challenge of imputing expenditure data using EVS can be justified.

[8] See Destatis (2013) for a detailed description of the methodology.

[9] See Becker et al. (2003) for further information on the comparability of EVS and SOEP.

[10] For applications of statistical matching in the context of expenditure data, see Decoster et al. (2007) and Sutherland et al. (2002).

and other commonly observed variables. Explicit methods, in contrast, assume a functional relationship between expenditures and commonly observed variables. After carrying out some form of regression, the missing values in the recipient data set are imputed by predicted values based on the point estimates. A comprehensive comparison of four different matching techniques by Decoster et al. (2009b) found the parametric estimation of Engel Curves to be most adequate for the imputation of expenditure data. Therefore, we also follow this approach.[11]

The EVS contains few households with very low or even negative disposable income.[12] This applies mostly to households with a high negative income from capital or rents. It is reasonable to assume that these negative incomes constitute non-recurring tax deductions rather than expenses that occur regularly. This is underlined by the fact that EVS is based on quarterly, rather than annual, data. These households are not included in our sample. In addition, we exclude households with expenditures exceeding four times the gross income, as these expenditures are due to singular purchases (e.g. cars, holidays) and are not an appropriate measure for regular periodical consumption behavior. Keeping these observations would dramatically overestimate their annual VAT burden and would hence bias the imputation approach.

The household VAT burden is imputed in a two-step procedure, which builds on the approaches by Decoster et al. (2009b) and O'Donoghue et al. (2004). Using sample weights, the log of total consumption of household $i$, $C_i$, is regressed on log disposable income $Y_i$, its square and on various household characteristics $X_i$ in a first step:

$$\ln C_i = \alpha + \beta \ln Y_i + \gamma (\ln Y_i)^2 + \delta X_i + \varepsilon_i, \tag{1}$$

where $X_i$ encompasses household size as well as age, education, marital status, gender of the household head and the number of children in various age groups ($\leq 2, 3-6, 7-13$ years). In addition, dummy variables indicating employment status (full-time employed, part-time employed, self-employed, unemployed and inactive) and region (North, East, South, West) are added. As the variance of the predicted consumption is lower than in EVS, an error term $u^*$ is added to the predicted expenditure level. It is normally distributed with zero mean and standard

[11] We additionally applied an implicit distance function approach. Apart from being extremely computationally intensive, it proved to perform poorly especially for low-income households. This underlines the need for common support in all commonly observed variables when applying implicit matching techniques.

[12] Following usual conventions, disposable income is defined as *gross income − direct tax payments − SSC + private transfers + public transfers.*

deviation equal to the root mean square error from the regression in (1). In a second step, expenditure shares for each COICOP[13] category $\omega_k$, $(k = 1, \ldots, 12)$ are regressed on total consumption and the overlapping variables $X_i$. To account for zero expenditures, we apply a Tobit specification:

$$\omega_{ik} = \alpha_k + \beta_k \ln C_i + \gamma_k (\ln C_i)^2 + \delta_k X_i + \varepsilon_{ik} \tag{2}$$

For the SOEP sample, predicted consumption for each category $\widehat{c_{ik}}$ is then simply obtained by multiplying the predicted share $\widehat{\omega_{ik}}$ with estimated total consumption. The estimation results are reported in Table A.2 in the Appendix. On the first stage, we replicate a positive relation between period income and consumption, and the explanatory power of the model is considerably high ($R^2 > 0.5$). For the various expenditure shares (the second stage), we mostly obtain significant coefficients. Afterwards, VAT expenditures associated with a given consumption bundle have to be inferred. Our method relies on the weighting scheme that is used by the German Statistical Office for capturing price changes and is explained in the Appendix.

Table 1: Structure of VAT Burden in both data sets

| Brackets of Eq. Yearly Income | **EVS** | | **SOEP (imputed)** | |
|---|---|---|---|---|
| | VAT Share of Disp. Income | VAT Share of Total Consumption | VAT Share of Disp. Income | VAT Share of Total Consumption |
| € | % | % | % | % |
| $<= 10,800$ | 12.6 | 8.9 | 17.7 | 9.5 |
| $[10,801; 15,600]$ | 8.6 | 9.5 | 9.5 | 9.8 |
| $[15.601; 18,000]$ | 8.1 | 9.8 | 8.8 | 9.9 |
| $[18,001; 24,000]$ | 7.4 | 10.1 | 7.6 | 10.0 |
| $[24,001; 31,200]$ | 6.7 | 10.4 | 6.6 | 10.2 |
| $[31,201; 43,200]$ | 6.1 | 10.5 | 5.2 | 10.3 |
| $[43,201; 60,000]$ | 5.3 | 10.6 | 4.4 | 10.4 |
| $> 60,000$ | 4.5 | 10.6 | 3.3 | 10.5 |
| N | 44,000 | | 12,392 | |

Source: Own calculations based on EVS 2008 and SOEP 2009.

Note: All percentages represent the mean value in the respective cell. Disposable Income was equivalized using the modified OECD scale.

[13] COICOP - Classification of individual consumption by purpose. Commodities are classified as follows: *food and non-alcoholic beverages; alcohol and tobacco; clothing and footwear; housing, water, energy; household equipment; health; transport; communication; recreation and culture; education; restaurants and hotels; other goods and services* (UN, 2012).

Table 1 compares the VAT burden of the EVS households with the imputed VAT burden of the SOEP sample. The mean VAT burden, evaluated against equivalized disposable income, starts from about 13% for the lowest income bracket to below 5% for the highest bracket (second column of Table 1). This pattern is comparable to related findings[14] and confirms the general regressive pattern of the German VAT. It should however be noted that the extent to which the tax burden decreases with income is weak compared to the strongly progressive pattern of the German Income Tax.[15] The VAT payments as a share of total consumption are even slightly increasing across the income distribution from about 9% to above 10%, indicating that consumption taxes are usually not regressive when evaluated against their actual tax base.[16]

Since the replication of marginal densities is one of the basic objectives of statistical matching (Rässler, 2002, p. 31), the quality of the matching procedure can be evaluated by comparing these two patterns (VAT share of consumption and income) in the donor data set and in SOEP. As can be seen, the conditional distribution of imputed VAT payments generally closely follows the original distribution. Despite some discrepancies in the tails of the income distribution, the general pattern for income and consumption shares can be replicated in the SOEP data. The deviations are due to an income distribution that exhibits fatter tails in SOEP than in EVS.

## 3.3 Tax-Benefit and Labor Supply Modules

We calculate household disposable income from gross income and household characteristics from the SOEP data by means of a tax-benefit calculator. It reproduces the regulations of the system of direct taxes, social security contributions and benefits in Germany. As the latest available EVS wave is from 2008, we apply the legal status of that year.

In the last decades, VAT has become the main source of revenue for the German government. VAT and income tax together nowadays account for about two thirds of total tax revenues. The personal income tax is designed progressively, with a rate of 14% for incomes just above the basic allowance and with a top marginal rate of

[14] See e.g. Fritzsche et al. (2003, p. 119), RWI and FiFo (2007, pp. 52ff) and Bach et al. (2006, p. 5).

[15] See e.g. RWI and FiFo (2007, p. 34). While the two lowest income deciles hardly pay any income tax, the highest decile spends nearly a quarter of household income on income tax. Moreover, the top income decile pays about half of total income tax revenues.

[16] See also the results by Decoster et al. (2010) for other European countries.

42%.[17] Social security contributions, in contrast, are calculated as a constant share of labor income until an upper threshold is reached. SSC payments are, in general, equally split between employer and employee.[18]

At the core of our microsimulation approach, a behavioral labor supply module estimates preference parameters on the household level. Based on these estimates, the individual reactions following a change in households' net income can be simulated. The household decision is implemented following the discrete choice household labor supply model as proposed by van Soest (1995). It assumes a joint utility function for both spouses. The model is discrete in the sense that a household $i$ can choose between a finite number of combinations in consumption and leisure. We restrict the choice set to seven time categories of weekly working hours $(0, 10, 20, 30, 40, 50, 60$ hours). For households that are flexible in their labor supply decision, this results in seven alternatives for singles and couples with one flexible spouse.[19] For couples with two flexible spouses, the choice set expands to 49 alternatives. In addition we further expand the choice set in order to account for an endogenous decision on whether or not to apply for public benefits (Hoynes, 1996). This way, we address the potential presence of welfare stigma. Household utility $V_i$ is specified as a translog function, which allows for capturing the arguments' influence in linear and quadratic form. In addition, we control for age, number of children and handicap status. In order to account for unobserved heterogeneity, a stochastic error term $\varepsilon_i$ is added, dividing total Utility $U_i$ into a systematic an a stochastic part.

$$U_i(x_i) = V_i(x_i) + \varepsilon_i \tag{3}$$

Following the rationale of random utility maximization, a household $i$ chooses category $k$ if the utility of this category (depending on the net income and leisure of both partners $x$) exceeds the utility of any other category. The probability of $i$ to choose alternative $k$ against all other alternatives $l$ can therefore be expressed as:

$$P_{ik} = P(U_{ik} > U_{il}) = P\left[U_{ik}(x_{ik}) - U_{il}(x_{il}) > \varepsilon_{il} - \varepsilon_{ik}\right] \tag{4}$$

[17] In addition, a so-called *solidarity surcharge* is levied, amounting to 5.5% of the total income tax burden. For earners of income above € 250,000 per year, a so-called "tax for the rich" with a rate of 45% is applied. In 2008, capital income was taxed the same way as earnings before introducing a dual income tax regime in 2009.

[18] In 2008, the following rates apply for employees (overall): Old Age Pension Insurance: 9.95% (19.8%); Health Insurance: 7.9% (14.9%); Unemployment Insurance: 1.65% (3.3%); Care Insurance: 0.85% (1.7%).

[19] Self-employed persons and civil servants are assumed inflexible in their choice of labor supply.

Under appropriate assumptions on the error term, the utility difference between two categories follows a logistic distribution (McFadden, 1974). Hence, the probability of choosing alternative $k$ for any household $i$ can be described by a conditional logit model:

$$P(U_{ik} > U_{il}) = \exp(U_{ik}(x_{ik})) \Big/ \sum_{l=1}^{J} \exp(U_{il}(x_{il})) \tag{5}$$

In order to estimate this relationship, the arguments of the utility function $x_i$ have to be obtained first. Leisure time can be directly derived from observed working time by assuming a time endowment of 80 hours per week. Net income for every household is calculated in the tax and benefit module, which utilizes gross income from all relevant sources of income and accounts for tax deductions, household composition and benefit eligibility. It is further assumed that the hourly wage does not depend on the actual working time and is thus constant across all alternatives. For the unobserved choice categories, the hourly wage is simply multiplied with the number of hours. Using the observed choice as dependent variable, the parameters can be obtained by maximum likelihood estimation.[20] A welfare reform is characterized by a different set of rules that affect net income. After calculating the new net income, the point estimates are used to re-calculate the probabilities for each working time category. Labor supply for each household *after* the reform is obtained by multiplying the predicted choice probabilities for each category with the respective amount of hours. The estimates should thus be considered as an expected value of labor supply.

## 3.4 Reform Scenarios

**Revenue neutrality.** We carry out simulations of two benchmark scenarios, in which the standard VAT rate of 19% is increased in steps of one percentage point.[21] For a given increase in the consumption tax rate $d\tau > 0$, the individual burden of consumption taxes after the reform $T_{i1}^C$ is simply given by: $T_{i1}^C = T_{i0}^C \left(\frac{\tau + d\tau}{\tau}\right) = T_{i0}^C \left(1 + \frac{d\tau}{\tau}\right)$. Then the tax burden on the income side $T_{i0}^I$ is reduced for each household *proportionately* by a factor $\alpha \in [0, 1]$, such that the aggregated revenue loss equals the revenue gain from the VAT increase. Formally: $\Delta T^C - \Delta T^I = \underbrace{\sum T_{i1}^C - \sum T_{i0}^C}_{>0} - \underbrace{\sum T_{i0}^I - \sum \alpha T_{i0}^I}_{<0} \stackrel{!}{=} 0$.[22] This is done for personal

[20] See Train (2009, chap. 3.7) and McFadden (1974) for a detailed description.

[21] Pre-reform values are indicated with subscript 0, post-reform values are assigned subscript 1.

[22] There are numerous ways for governments to reduce the burden of income-related taxes. Here, we refrain from discussing the various interdependent impacts of instruments, such as reducing

income taxes and social security contributions separately. Each reform scenario is compared to the status quo outcome. This procedure is repeated 11 times until in the last step, an increase in the standard VAT rate from 19% to 30% is combined with a corresponding reduction on labor-related taxes.

Shifting taxes towards consumption not only extends the tax base for non-workers, but also for enterprises and the public sector, as investments and public consumption are also subject to VAT. Our micro-dataset is however only representative for private consumption from residents. Based on empirical findings by Boss (1997), RWI and FiFo (2007, pp. 140 ff.) and Bundesbank (2002, p. 28) we assume that 85% of total VAT is paid by private households. Hence, the simulated reforms are budget-neutral in the sense that the income tax reduction is computed in a way that the revenue loss equals the simulated VAT revenue increase $\Delta T_C$, divided by 0.85.[23]

Although SSC and income tax payments flow into separate budgets, their impacts on the overall budget are highly interlinked. For many years, the German statutory pension system has been subsidized from the tax budget, since SSC revenues are not sufficient to cover public pension payments. In fact, these subsidies have become the largest share of federal expenses. For this reason, reforms on either income taxes or SSC imply equivalent effects for the public budget as a whole.

**Income concept.** For each reform step, the combined tax change alters household budget constraints which, in turn, induces adjustments in household labor supply if the expected utility of an alternative choice category is higher than the status quo. In order to account for the budget effect of an increased consumption tax, the commonly used concept of disposable income is not sufficient here, as it ignores consumption taxes. For the subsequent analysis, the quantity of interest will be *Post-VAT Income (PVI)*, which is defined as disposable income minus VAT expenses. PVI can be understood as the amount of money that *would* be left for consumption after paying Value Added Tax. This income is of course virtual, as it is not disposable for consumption after VAT has been paid. PVI is not only the basis for the distributional analysis, but also enters the utility function and

marginal tax rates or raising the exemption level. Instead of providing a blueprint for a tax reform, we rather aim at gaining a rough insight on the interaction between both forms of taxation with respect to distributional questions. Therefore, we opt for the most straightforward way to reduce taxes, namely by proportional reduction.

[23] If, for example, VAT payments from households increase by € 5 bn due to the higher VAT rate, the income tax is reduced proportionally such that the revenue loss amounts to € 5.88 bn.

hence determines the labor supply decision.[24] Subtracting VAT expenses from disposable income is equivalent to full and instantaneous VAT shifting from firms to consumers.[25] We therefore abstract from the fact that it may take time until firms shift the higher VAT to consumers, which is in line with the logic of static models. Since we impute household expenditures by means of Engel curves, we account for the fact that savings may increase if the household is relieved on the income side. In such a case, the household is less affected by higher VAT. We also capture adjustments in the structure of commodity demand, i.e., the fact that consumption of some necessities grows smaller than income, in favor of either saving or luxury goods. As a caveat, our partial-equilibrium framework cannot account for inflationary effects on private consumption. However, we index the level of unemployment benefits with the mechanical price increase inherent to a VAT increase.[26]

**Incidence and VAT differentiation.** Subtracting the revenue-neutral deduction from household income implicitly assumes that workers bear the full burden of income taxes and social security contributions. Doubts are however justified, particularly for the case of payroll taxes, as their payment is split between employers and employees.[27] We address this issue by assuming alternative divisions of the tax incidence in a robustness check. If the incidence is low, employees benefit less from a tax reduction. We evaluate the extent to which this influences the overall distributional impact of the reform.

In a further robustness check, we alter the benchmark scenarios by increasing both VAT rates simultaneously, thereby addressing the issue of VAT rate differentiation. As in most OECD countries, expenditures for necessities are taxed with a reduced rate in Germany. The common justification for this policy are equity

[24] We thereby implicitly assume that households have an identical perception of their burden of direct and indirect taxes, which may be questioned in light of the experimental studies by Sausgruber and Tyran (2005) and Blumkin et al. (2012).

[25] Full incidence of the German VAT in the medium-run has been confirmed by the Bundesbank (2008).

[26] The level of the non means-tested unemployment benefit (*Arbeitslosengeld II*) is not directly linked to the inflation rate. A recent supreme court decision however asked for a loose connection between benefit level and inflation. As 54.3% of all expenditures are subject to the standard VAT rate, each percentage point of higher standard VAT rate raises the price level and hence the unemployment benefit by 0.46 percentage points. An increase of the standard rate to 30% leads to a rise in consumer prices of $\left(\frac{1.30}{1.19} - 1\right) 0.543 \approx 5\%$.

[27] The findings of Saez et al. (2012), exploiting a natural experiment in Greece, suggest that for a payroll tax increase, the long-term burden of workers is limited to the *employee* share. It is however unclear whether their findings are applicable for a different institutional setting and a payroll tax *reduction*.

concerns. If the reduced rate is fulfilling its redistributional aim, a simultaneous increase of both VAT rates should imply more regressive effects than the benchmark scenarios.

# 4 Microsimulation Results

## 4.1 Budget Effects

Each reform step is carried out such that the revenue loss in direct taxes equals the additional VAT revenues. The budgetary effects after the last reform step, i. e. for the standard VAT rate of 30%, are illustrated in Table 2. We report the static and the medium-term budget effect after labor supply adjustments. Both reforms are roughly revenue-neutral in the short run. A total revenue in the order of € 48 bn. is shifted. Due to labor supply increases, as will be shown below, direct tax revenues increase by about € 1 bn. compared to the static effect. Beyond, the indexation of the unemployment benefit implies only moderate effects for the government budget.

Table 2: Change in government budgets (VAT rate of 30%)

| *Reform Scenario* | **Base** | **PIT Reduction** | | **SSC Reduction** | |
|---|---|---|---|---|---|
| | | **MA**[a] | **LS**[b] | **MA** | **LS** |
| | | *Differences to base* | | | |
| Personal Income Taxes | 226.5 | -47.5 | -46.7 | 0 | 1.6 |
| Value Added Tax[c] | 93.5 | 47.3 | 46.4 | 48.5 | 47.4 |
| Social Security Contributions | 316.0 | 0 | 2.2 | -47.4 | -47.3 |
| Benefit Payments[d] | 32.7 | 1.7 | 2.6 | 1.1 | 1.4 |

Own calculations with IZAΨMOD v. 3.0.2. All numbers in billion Euros.
[a] Pure budget effect (Morning-After Effect)
[b] After labor supply adjustments
[c] Total revenues, including VAT from investments and public consumption.
[d] Unemployment benefits, housing allowances and child benefits.

## 4.2 Labor Supply Effects

Our microsimulation approach sheds light on whether positive expectations on work incentives can be confirmed. Similarly to the commodity market, the labor supply effects simulated here have to be interpreted as medium-term outcomes, i.e. after households have adjusted their labor supply behavior to the new institutional envi-

ronment. If one assumes a negative wage elasticity of labor demand, the final employment effect is expected to be lower (Peichl and Siegloch, 2012). As already noted before, positive employment effects may vanish in the long run if wages increase as a response to higher living costs. Again, the static setting of the microsimulation model imposes restrictions on dynamic analyses of this kind.

Table 3: Labor Supply Effects (VAT rate of 30%)

| *Reform Scenario* | **Base** | **PIT Reduction** | **SSC Reduction** |
|---|---|---|---|
| | | *in thousands* | |
| Full-Time Equivalents | 34,248 | 184.4 | 290.7 |
| Participation | 35,510 | -3.8 | 147.3 |

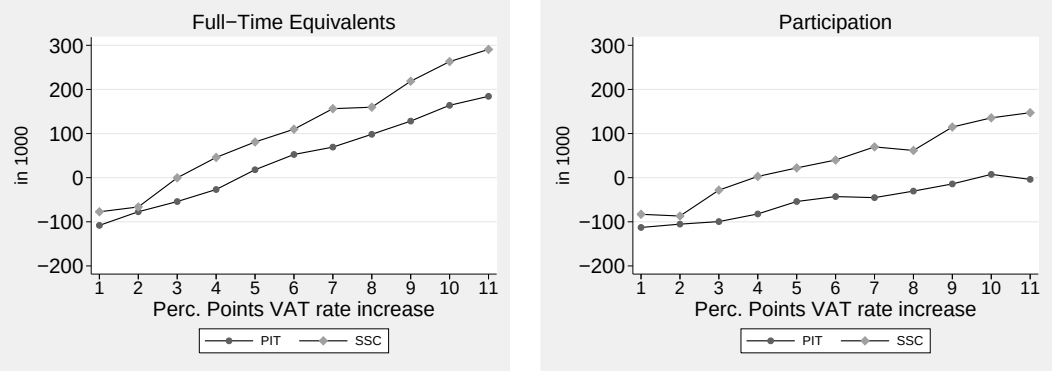
Own calculations with IZAΨMOD v. 3.0.2.
Notes: Full-Time Equivalent = 40 hours per week.

The final simulated labor supply responses, i.e., for an increase of the standard VAT rate from 19% to 30%, are displayed in Table 3. It shows the total difference in hours worked, measured in full-time equivalents (FTE) of 40 hours per week. The total effect is found to be positive in the order of 180,000 FTE for the PIT reduction. For reducing SSC, the effect in hours worked is substantially higher and amounts to about 290,000 FTE. This corresponds to an increase in labor supply of slightly less than 1% of total employment. This is in line with results obtained by CGE studies Böhringer et al. (2005); Buscher et al. (2001). Looking at the extensive margin of labor supply, i.e., the number of individuals entering the labor market from inactivity, we find a substantially higher activating potential of lowering social security contributions. This is not surprising, as many workers with comparably low earnings are subject to these contributions, while still exempted from the income tax. For the PIT reduction, the positive participation effect is totally absorbed by higher unemployment benefits because of indexation. If the moderate increase in labor supply can be mostly realized when facing constraints on the demand side, our simulation results seem to confirm the theoretical expectations concerning a moderate growth in total employment.

Aggregated labor supply effects for different reform scenarios are depicted in Figure 1. This sheds light on the interaction between both taxes if the shift is smaller. For marginal VAT rate increases, the total participation effect is negative, suggesting a dominant effect of higher unemployment benefits and raised livings costs over higher net wages. Moreover, the labor supply effect of the SSC reduction is stronger than the PIT reduction across the whole range of reforms both for the

intensive and extensive margin.

Figure 1: Labor Supply Effects for different VAT rate increases




(a) Full-Time Equivalents (b) Participation

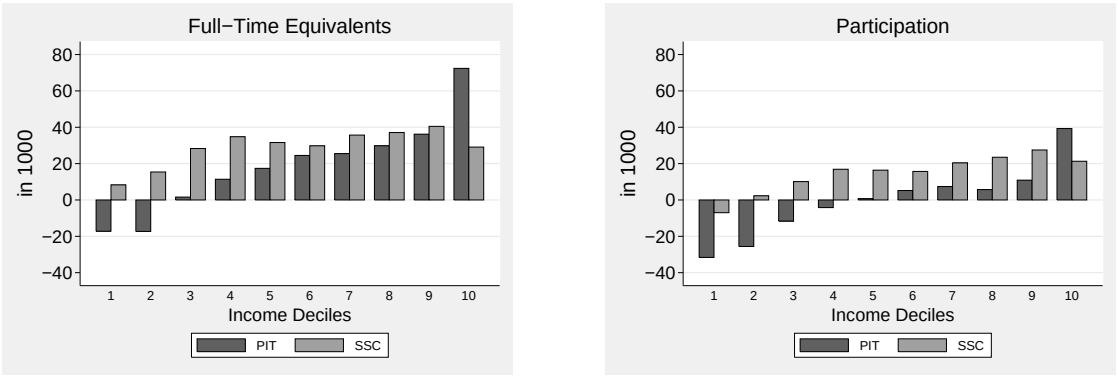
Own calculations with IZAΨMOD v. 3.0.2.

The total change in labor supply for a VAT rate increase to 30% is disentangled by income deciles in Figure 2. When shifting from personal income tax to VAT, the increase in hours worked is positive for the richest 80% of the population (dark gray bars), but particularly pronounced for the top deciles. Similarly, more workers entering the labor market from inactivity are found in higher income groups, while labor market participation is reduced for low-income groups. Shifting from SSC affects household budgets already at a lower income level and exceeds the effect from the first scenario up until the seventh decile, as indicated by the light gray bars. If policy-makers seek to reduce entry barriers into the labor market by reducing the tax wedge, the second policy scenario appears to be better targeted. However, the indexation of unemployment benefits leaves labor market participation for low-income workers largely unchanged.

## 4.3 Distributional Impact

**Employment Type.** The average budget effects with respect to the employment type are illustrated in Figure 3. Employees experience modest income gains vis-à-vis the status quo. Pensioners are losing most from the reform, as they are not able to extend their labor supply. For self-employed and civil servants, the picture is mixed. On the one hand, these groups significantly benefit from income tax reductions. However, they are not subject to social security payments. For this reason, civil servants turn out to be slightly worse off from the SSC reform while self-employed experience modest budget gains.

Figure 2: Labor Supply Effects by Income Deciles (VAT rate of 30%)




(a) Full-Time Equivalents (b) Participation

Own calculations with IZAΨMOD v. 3.0.2. Income is equivalized using the modified OECD scale.

With the exception of pensioners and civil servants, all employment groups are able to compensate a large share of their losses through increased realized labor supply. The main losers from the SSC reform are pensioners, who lose about 2% on average. In relative terms, employees and unemployed workers are the main beneficiaries. The average budget effect for unemployed (+2% for the PIT reduction; +4% for the SSC reduction) is due to substantial increases for *some* unemployed. For those remaining unemployed the total change in PVI will be about zero, as the increase in VAT expenses is expected to correspond roughly to the increase in unemployment benefits due to indexation. This result persists even though unemployment benefits are adjusted with the mechanical price increase. In general, these results are in line with expectations as well. Those who are not affected by the tax that is reduced are, in tendency, worse off from the reform.

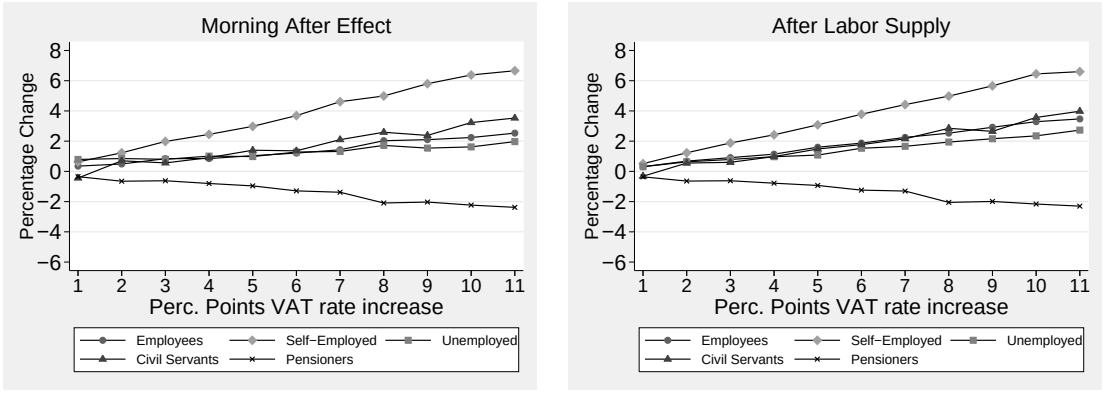
**Income deciles.** The distributional impact of the reform path, differentiated by (status quo) deciles of Post-VAT-Income, is illustrated in the upper part of Figure 4.[28] It displays the relative income change due to the reform by income deciles. For a clearer exposition, we restrict the presentation to five deciles.

The upper panel of Figure 4 demonstrates the increasingly regressive impact of a shift from personal income tax to VAT. Minor VAT increases hardly affect budgets of medium-income earners, but rather let the high-income earners better off. In addition, indexed unemployment benefits lead to budget gains for workers from the first decile. After the final reform step, the lowest decile suffers from an

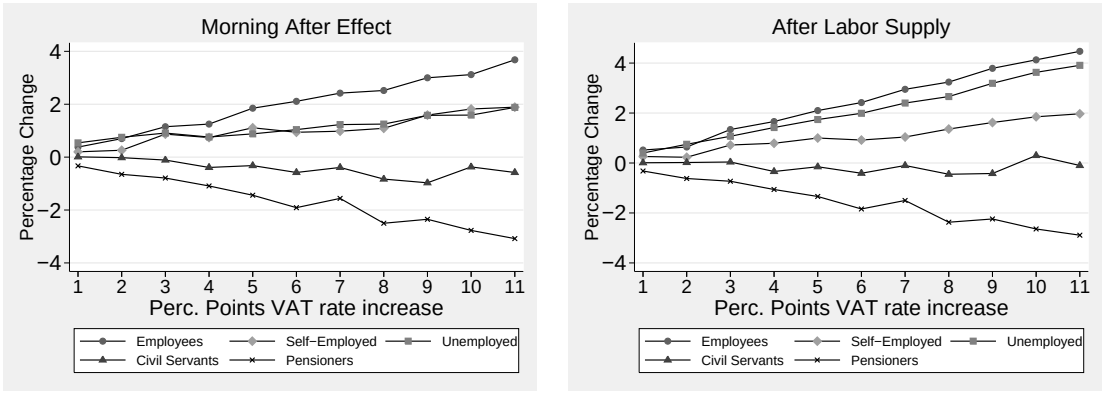
[28] Throughout the distributional analysis, incomes are adjusted by equivalence weights using the modified OECD scale.

Figure 3: Income change by employment type

PIT Reduction




SSC Reduction



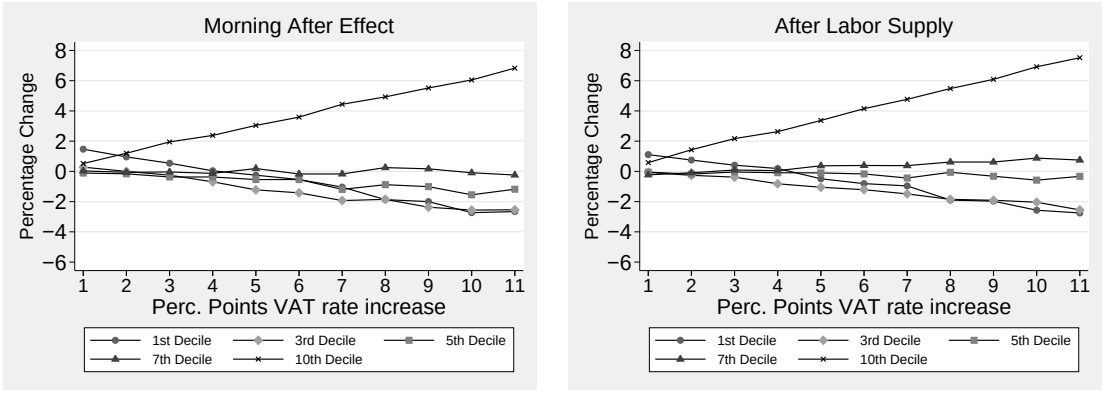

Own calculations with IZAΨMOD v. 3.0.2. Income changes refer to equivalized Post-VAT income.

income loss of about 3%, while the top decile gains about 6%. This is in principle not surprising as one would typically expect those households to lose from a shift towards consumption taxation who bear a low burden of PIT prior to the reform. The higher saving ratio of high-income earners exacerbates this effect. The core interest of our investigation is to analyze to what extent the regressive impact is weakened if behavioral responses are accounted for. As the right panel shows, the distributional picture however hardly changes for the PIT scenario, if we consider the budget changes after the labor supply response. The improvement to the morning-after effect is one percentage point at the highest across income deciles, leaving the poorest decile 3% worse off compared to the baseline.

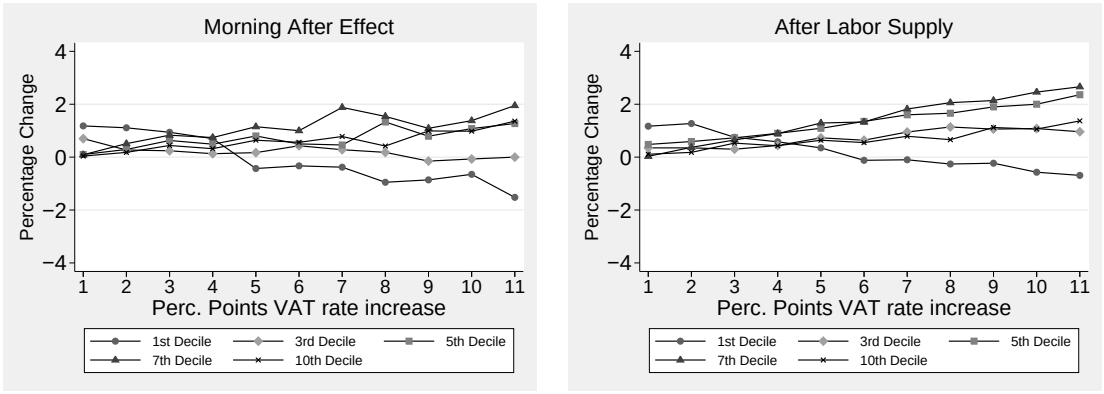
The equivalent analysis is presented in the bottom part of Figure 4 for the SSC reduction. While still implying a regressive impact in the short run, income gains are only 2% at the highest. The lowest decile loses about 2% on average. Besides, the $7^{th}$ decile experiences larger gains than the $10^{th}$ income decile, which can be explained by a low marginal payroll tax burden for top-earners due to the assessment threshold.

Figure 4: Income change by income deciles

PIT reduction




SSC reduction




Own calculations with IZAΨMOD v. 3.0.2. Income changes refer to equivalized Post-VAT income.

The labor supply response causes the picture to change to some extent. The income loss for the the lowest decile reduces to less than 1%. Moreover, middle income groups gain relatively more than the highest income decile, which can be explained by a higher working incentives particularly for these groups. The SSC reductions shift taxes from one regressive form of taxation to the other, which clearly has lower adverse distributional effects than the income tax reduction. As the burden of SSC is more dispersed over the income distribution, the budget changes from the reform are less pronounced for the second scenario.

Summing up, a shift from labor to consumption taxation indeed exhibits a regressive impact on household budgets. Lower income groups loose while receivers of high incomes benefit, in tendency, from the reform. This can be easily explained by the fact that the bottom 50% of the income distribution account only for 5% of total income tax revenues and thus hardly benefit from a reduction. The regressive impact is substantially less severe for a shift from social security contributions to VAT. This make SSC reductions more attractive for policy-makers than reliefs on

the income tax. It is doubtful whether an increase in PVI of more than 6% for the richest can be justified to the public.

**Inequality and progressivity indices.** To complete the picture on the distributional impact of the tax shift, we analyze the change of some aggregate measures of inequality and tax progression in Table 4. The numbers refer to the standard VAT rate of 30%.

Table 4: Changes in Distributional and Progressivity Measures (VAT rate of 30%)

| *Reform Scenario* | | **PIT Reduction** | | **SSC Reduction** | |
|---|---|---|---|---|---|
| | **Base** | **MA**[a] | **LS**[b] | **MA** | **LS** |
| | | *Change to status quo, in percent* | | | |
| Gini | 0.312 | 5.80 | 6.33 | 2.05 | 1.16 |
| $P90/P10$ | 3.866 | 6.11 | 7.93 | 4.97 | 4.95 |
| $P90/P50$ | 2.003 | 4.01 | 4.94 | 1.19 | -0.02 |
| Reynold-Smolensky | 0.068 | -25.72 | -25.98 | -7.99 | -6.69 |
| Musgrave-Thin | 1.110 | -2.96 | -2.56 | -0.90 | -0.68 |
| Suits | 0.211 | -23.86 | -24.26 | -5.56 | -4.56 |

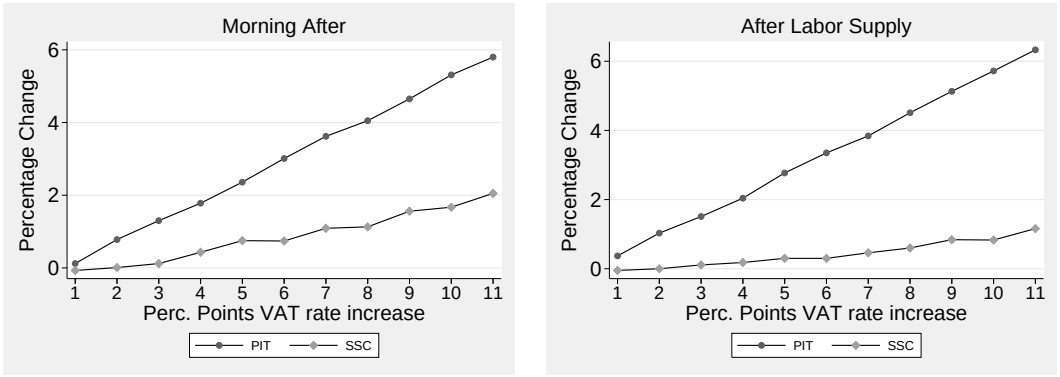
Own calculations with IZAΨMOD v. 3.0.2.
[a] Pure budget effect (Morning-After Effect)
[b] After labor supply adjustments

The changes in the Gini coefficient indicate a generally increased inequality in Post-VAT incomes from a shift towards indirect taxation. For the PIT reform, the Gini coefficient rises by about 6%. Income polarization, measured by the $P90/P10$ and the $P50/P10$ ratios, rises in a comparable manner. We additionally report changes in progression indices that capture the overall redistributional effect of the tax-benefit system. All three indices share the concept that higher values indicate more redistribution from top to bottom. Decreasing for the PIT reform hence indicate a rather regressive tax system than before. It can be seen that the negative effects on inequality and progression are significantly lower for the SSC reduction scenario. This confirms the results derived from the disaggregate analysis. Leaving behavioral reactions aside, inequality and polarization increases by a small share for the SSC reduction scenario. If the higher labor supply can be realized, the Gini coefficient increases only by about 1.1%, suggesting a distributional impact that is even close to being inequality-neutral. The rise in the $P90/P10$ ratio however suggests a slightly higher polarization of incomes. The analysis of aggregate measures confirms the image drawn before. SSC reliefs should be preferred to lowering PIT from an

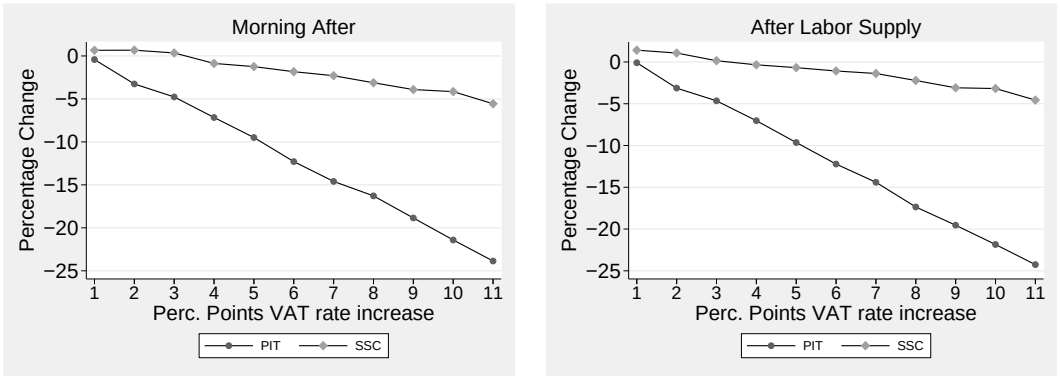
equity perspective. Moreover, it can be seen that the negative distributional impact is rather moderate when labor supply responses are accounted for.

Figure 5: Changes in Inequality and Tax Progression

Gini coefficient




Suits-Index



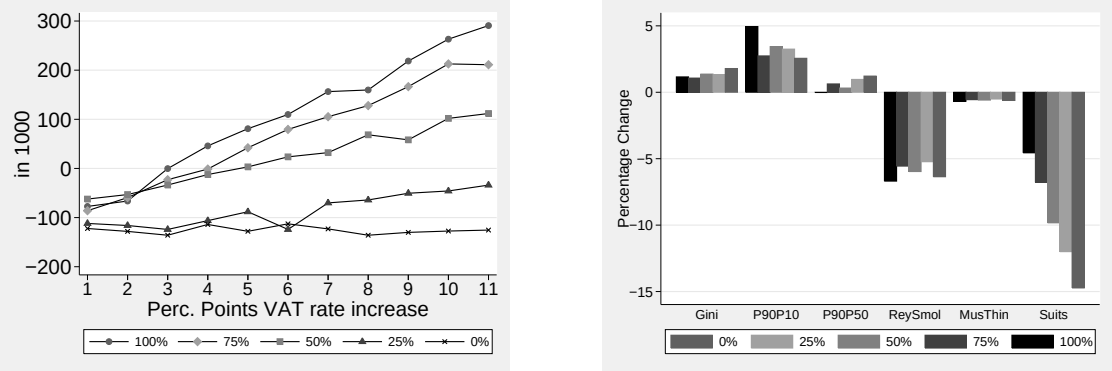

Own calculations with IZAΨMOD v. 3.0.2.

The changes in Gini and Suits-Index are depicted in Figure 5 for each intermediate reform step. For the PIT reform, inequality increases already for minor VAT increases, while minor shifts from SSC to VAT have a negligible impact on inequality and progression. If the standard VAT rate is increased by more than 3 percentage points, the slope of the grey lines becomes steeper. A further insight is that the SSC reform is superior in terms of inequality and overall tax progression to the PIT reform along the whole continuum of reform steps. The slightly flatter lines in the right panel of Figure 5 demonstrate the weakening adverse distributional impact from labor supply reactions.

## 4.4 Robustness Checks

**Alternative payroll tax incidence.** We deviate from the benchmark SSC reduction scenario by altering the assumption of full incidence of the payroll tax.[29] Instead, we present the changes in the aggregate distributional measures in Figure 6 for values of 100%, 75%, 50%, 25% and 0% respectively. As labor demand is typically estimated to be more elastic than labor supply, an incidence share of $\geq$ 50% for employees seems most realistic (Kotlikoff and Summers, 1987). Incidence below 100% causes employees to gain less from a payroll tax reduction and hence weakens the positive effect on work incentives. For the extreme case of no incidence, we simply increase only the Value Added Tax.

Figure 6: Alternative Incidence Assumptions




(a) Labor Supply Effects, FTE

(b) Aggregate Measures after LS

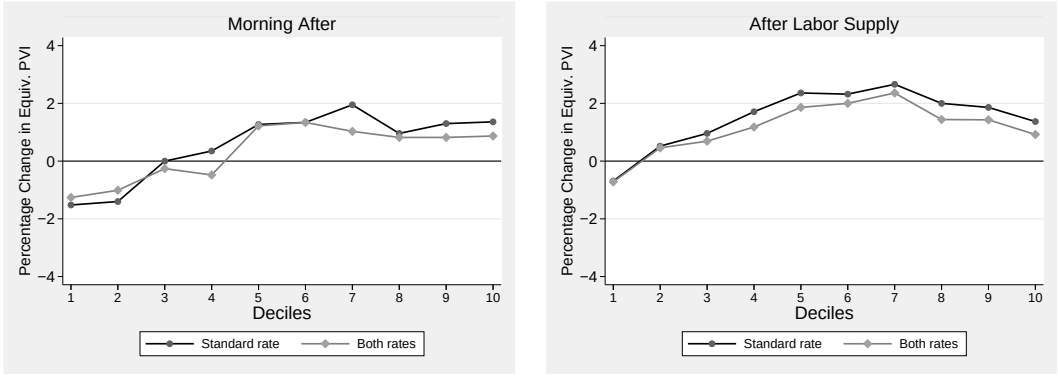
Own calculations with IZAΨMOD v. 3.0.2.

As expected, the labor supply response is weaker if the net wage is less affected by the payroll tax change (left panel of Figure 6). For an incidence of 25% or less, aggregate labor supply even decreases. The right panel depicts the corresponding changes of the measures from Table 4 for incidence assumptions, the left bar representing the benchmark scenario of 100%. The Suits Index indicates a steadily increasing overall regressivity, which is not supported by the other progressivity indices. Interestingly, the $P90/P10$ measure slightly decreases for lower tax incidence, suggesting slightly lower income polarization. The intuition is that earners of higher incomes are losing disproportionately if tax incidence is lower. For the most realistic range of 50% and above, our main conclusions with regard to the overall inequality impact however remain unaffected.

[29] In the following, we concentrate on variation on payroll tax reductions, as the strongly adverse distributional impact of the PIT scenario is likely to be confronted with strong political opposition and hence is not a realistic policy proposal.

**Increasing both VAT rates.** So far, our reform scenarios left the reduced VAT rate of 7% unchanged. Levying reduced VAT rates on necessities is justified, among others, by equity considerations (Copenhagen Economics, 2008). As a consequence, all EU countries with the exception of Denmark impose several VAT rates. Nonetheless, VAT differentiation is often criticized for not achieving its social purpose and to distort consumers' choices. In the following, we address the question whether shifting the tax burden also on commodities that are taxed with the lower rate is particularly to the detriment of low-income earners. We alter the SSC reduction scenario such that in each reform step, we increase both rates simultaneously in steps of one percentage point. The final reform step is a standard rate of 26% and a reduced rate of 14%. This VAT structure implies comparable revenue increases ( € 48 bn.) to the two standard scenarios presented above. In Figure 7, we compare

Figure 7: Income change across deciles




Own calculations with IZAΨMOD v. 3.0.2. Budget changes by equiv. Post-VAT income.

the distributional impact of the reform for the final VAT rate between both ways to raise VAT. As there is no systematic difference in the income changes both in the short and medium run, it is fair to conclude that raising both VAT rates instead of the standard rate does not imply a distinct distributional impact. This suggests that the reduced VAT rate in Germany hardly achieves its redistributional purpose, as high-income earners consume reduced-rate commodities in a similar manner.

# 5 Conclusions

This paper provides an analysis of a partial shift of taxation from labor income to consumption in Germany. Our empirical approach combines a detailed analysis of changes in household budgets with a microsimulation of behavioral reactions on the labor market. Based on a dual data base, we carry out a microsimulation of

several reform scenarios shifting a substantial share of personal income taxes or social security contributions onto the Value Added Tax. The policies are designed revenue-neutral. The expectations of positive effects on household work incentives are confirmed by the simulation. The total increase in labor supply is expected to be rather moderate below 1% of total employment for the benchmark scenarios. This suggests a limited capacity of this policy instrument for targeting workers at the margin to enter employment.

The distributional evidence suggests that a shift from personal income tax to VAT has a regressive impact on household budgets. Negative effects are expected for low-income households, unemployed and pensioners in particular. This budget loss amounts to up to 3% of equivalized income. The budget of high-income earners is not negatively affected. The change in aggregate distributional measures supports this view by indicating higher inequality and a lower degree of the overall tax progression. Typically, most losers have a low burden of direct taxes and thus hardly benefit from a reduction on the income side.

Taking into consideration labor supply effects, the overall picture is hardly affected, as labor supply increases are found to fall mainly on the intensive margin. From a distributional perspective, reducing social security contributions is superior to a shift from personal income taxes. For the SSC reduction, the increase in labor supply reduces the adverse distributional effect to a non-negligible extent. This is due to two reasons. First, SSC are a regressive form of taxation themselves. Replacing them with another regressive form of taxation hardly alters distributional effects. Second, their reduction affects household budgets at a rather low income level, which bears a high activating potential. Besides, we demonstrate the negligible redistributive impact of the reduced VAT rate. It is worth noting that our static approach does not allow conclusions beyond the medium run. It is possible that positive employment effects vanish in the long run if unions are able to assert higher wages.

Our empirical results may serve as a point of departure for further research in several areas. First, it is worth thinking about possible extensions of the policy proposal in order to increase both political feasibility and effectiveness with regard to increasing work incentives for low-income groups.[30] One could think of a reform that is both *revenue-* and *inequality*-neutral. As Decoster et al. (2010) suggest, increasing the progression of the remaining income tax schedule is one option. Another way would be to compensate the main losers by raising old-age pensions. In

[30] See also Thomas and Picos-Sanchez (2012) for further suggestions.

order to get a broader picture of the overall distribution of the consumption tax burden, incorporating excise taxes seems promising. A shift towards taxes on fuel or electricity is regularly discussed in the context of environmental tax reforms that aim at internalizing external effects.

# A Appendix

**Calculation of VAT payments.** In order to identify the consumption shares of goods with different VAT rates, we make use of the weighting scheme applied by the German Federal Statistical Office for capturing price level changes (the so-called "representative basket of products"). As an example, non-alcoholic drinks (taxed with the standard rate) are assigned a weight of 9.3% of total expenditures in COICOP category 1 (food and beverages). Therefore, 9.3% of this consumption component is allotted the standard VAT rate, while the rest is taxed with the reduced rate.

The treatment of VAT-exempted commodities for which no input tax deduction can be claimed deserves special attention. Despite their revenues being formally exempted, it is reasonable to assume that firms shift a certain share of their input tax burden to consumers through increased prices. The most notable case of exempted goods are rents. Landlords might be able to charge higher rents in order to compensate for taxes paid in connection to restorations or construction works. The extent to which this occurs is however hard to estimate, as the possibility to increase rents is restricted and depends on local market characteristics. Hence, there is no agreement in the literature on the extent to which rents are burdened with VAT.[31] Following RWI and FiFo (2007), we assume that 11% of expenditures on rents are subject to the standard VAT rate. This rather low assumption can be justified in light of the overall (rather short) time horizon of our model. Similar incidence assumptions are made for medical and financial services.

[31] See RWI and FiFo (2007),Fritzsche et al. (2003) and Bach (2005).

Table A.1: Resulting VAT Shares by COICOP categories

| | COICOP Consumption category | Average Consumption Share | Share of VAT 0% (%) | Share of VAT 7% (%) | Share of VAT 19% (%) |
|---|---|---|---|---|---|
| 1 | Food and beverages | 16.7 | — | 90.7 | 9.3 |
| 2 | Alcohol and tobacco | 2.3 | — | — | 100.0 |
| 3 | Clothing and footwear | 5.7 | — | — | 100.0 |
| 4 | Housing, water, energy | 21.1 | 58.7 | 5.2 | 36.0 |
| 5 | Household equipment | 5.4 | — | 5.0 | 95.0 |
| 6 | Health | 4.7 | 43.2 | 16.2 | 40.6 |
| 7 | Transport | 14.4 | 17.5 | 9.1 | 73.4 |
| 8 | Communication | 3.7 | — | 7.4 | 92.6 |
| 9 | Recreation and culture | 13.6 | 8.0 | 28.6 | 63.4 |
| 10 | Education | 1.0 | 92.4 | — | 7.6 |
| 11 | Restaurants and hotels | 6.1 | — | 70.2 | 29.8 |
| 12 | Other goods and services | 5.2 | 28.2 | — | 71.8 |

Source: Own calculations based on the weighting scheme by the German Federal Statistical Office.

Table A.2: Regression Results for Engel Curve Imputation

| | $1^{st}$ stage | $2^{nd}$ stage | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ln Cons | food_drinks | alc_tab | clothes | house | hhequip | health | transport | commun | culture | educexp | resthotel | other |
| $\ln Y$ | 0.530*** | | | | | | | | | | | | |
| | (0.068) | | | | | | | | | | | | |
| $(\ln Y)^2$ | -0.003 | | | | | | | | | | | | |
| | (0.003) | | | | | | | | | | | | |
| $\ln C$ | | -0.074*** | 0.056*** | 0.193*** | 0.415*** | 0.090*** | 0.015 | -1.116*** | -0.021*** | 0.316*** | 0.058** | 0.268*** | 0.092*** |
| | | (0.012) | (0.007) | (0.009) | (0.027) | (0.015) | (0.013) | (0.021) | (0.004) | (0.018) | (0.024) | (0.012) | (0.010) |
| $(\ln C)^2$ | | -0.001* | -0.003*** | -0.009*** | -0.023*** | -0.003*** | 0.001 | 0.059*** | 0.000 | -0.014*** | -0.002** | -0.013*** | -0.004*** |
| | | (0.001) | (0.000) | (0.000) | (0.001) | (0.001) | (0.001) | (0.001) | (0.000) | (0.001) | (0.001) | (0.001) | (0.000) |
| Age | -0.001*** | 0.001*** | -0.000*** | -0.000*** | -0.001*** | 0.000*** | 0.001*** | -0.001*** | -0.000*** | 0.000*** | -0.002*** | -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) | (0.000) |
| Female | 0.036*** | -0.000 | -0.011*** | 0.013*** | 0.015*** | 0.005*** | 0.006*** | -0.019*** | -0.000 | -0.001 | 0.005*** | -0.014*** | 0.009*** |
| | (0.005) | (0.001) | (0.000) | (0.001) | (0.002) | (0.001) | (0.001) | (0.001) | (0.000) | (0.001) | (0.001) | (0.001) | (0.001) |
| HH size | 0.101*** | 0.038*** | 0.001** | 0.005*** | -0.016*** | -0.005*** | -0.006*** | -0.005*** | 0.004*** | -0.009*** | 0.025*** | -0.010*** | -0.002*** |
| | (0.003) | (0.001) | (0.000) | (0.000) | (0.001) | (0.001) | (0.001) | (0.001) | (0.000) | (0.001) | (0.001) | (0.001) | (0.000) |
| # of Children $\leq$ 2 yrs | -0.074*** | -0.012*** | -0.009*** | -0.003*** | 0.021*** | 0.019*** | 0.008*** | -0.009*** | -0.005*** | -0.012*** | -0.021*** | -0.005*** | 0.015*** |
| | (0.010) | (0.002) | (0.001) | (0.001) | (0.003) | (0.002) | (0.002) | (0.003) | (0.001) | (0.002) | (0.002) | (0.001) | (0.001) |
| # of Children 3 to 6 yrs | -0.082*** | -0.015*** | -0.007*** | -0.003*** | 0.009*** | 0.011*** | 0.002 | -0.010*** | -0.006*** | -0.001 | 0.044*** | -0.003** | 0.002** |
| | (0.008) | (0.001) | (0.001) | (0.001) | (0.003) | (0.002) | (0.001) | (0.002) | (0.000) | (0.002) | (0.002) | (0.001) | (0.001) |
| # of Children 7 to 13 yrs | -0.064*** | -0.009*** | -0.005*** | 0.000 | 0.005** | 0.004*** | 0.001 | -0.009*** | -0.005*** | 0.018*** | -0.008*** | 0.002** | 0.001* |
| | (0.005) | (0.001) | (0.001) | (0.001) | (0.002) | (0.001) | (0.001) | (0.002) | (0.000) | (0.001) | (0.001) | (0.001) | (0.001) |
| Married | 0.076*** | 0.027*** | 0.002*** | 0.008*** | -0.059*** | 0.006*** | 0.008*** | 0.008*** | -0.003*** | 0.005*** | -0.021*** | 0.007*** | 0.002** |
| | (0.006) | (0.001) | (0.001) | (0.001) | (0.002) | (0.001) | (0.001) | (0.002) | (0.000) | (0.001) | (0.002) | (0.001) | (0.001) |
| *Education Dummies* | | | | | | | | | | | | | |
| Medium-Skilled | -0.094*** | 0.005*** | 0.005*** | -0.003*** | 0.016*** | 0.002*** | -0.012*** | 0.014*** | 0.000 | -0.011*** | -0.006*** | -0.015*** | 0.003*** |
| | (0.005) | (0.001) | (0.000) | (0.001) | (0.002) | (0.001) | (0.001) | (0.001) | (0.000) | (0.001) | (0.001) | (0.001) | (0.001) |
| Low-Skilled | -0.131*** | 0.001 | 0.007*** | -0.002*** | 0.049*** | -0.000 | -0.013*** | -0.009*** | -0.000 | -0.021*** | 0.010*** | -0.021*** | 0.005*** |
| | (0.008) | (0.001) | (0.001) | (0.001) | (0.003) | (0.001) | (0.001) | (0.002) | (0.000) | (0.002) | (0.002) | (0.001) | (0.001) |
| *Regional Dummies* | | | | | | | | | | | | | |
| East | 0.007 | -0.012*** | 0.002*** | -0.004*** | 0.015*** | -0.000 | -0.006*** | 0.007*** | 0.001** | 0.004*** | -0.020*** | -0.002 | -0.001* |
| | (0.006) | (0.001) | (0.001) | (0.001) | (0.002) | (0.001) | (0.001) | (0.002) | (0.000) | (0.002) | (0.002) | (0.001) | (0.001) |
| South | -0.006 | -0.004*** | -0.002*** | 0.001 | -0.016*** | -0.000 | 0.003*** | 0.013*** | 0.000 | -0.002 | 0.002 | 0.006*** | 0.002** |
| | (0.006) | (0.001) | (0.001) | (0.001) | (0.002) | (0.001) | (0.001) | (0.002) | (0.000) | (0.001) | (0.002) | (0.001) | (0.001) |
| West | 0.022*** | -0.001 | 0.001* | 0.002*** | -0.006*** | -0.000 | -0.001 | 0.006*** | 0.000 | -0.004*** | -0.002 | 0.004*** | 0.001* |
| | (0.006) | (0.001) | (0.001) | (0.001) | (0.002) | (0.001) | (0.001) | (0.002) | (0.000) | (0.001) | (0.002) | (0.001) | (0.001) |
| *Employment Dummies* | | | | | | | | | | | | | |
| PT employed | -0.006 | 0.004*** | 0.000 | -0.006*** | 0.012*** | -0.002 | 0.001 | -0.004* | 0.001 | -0.004** | 0.013*** | -0.002* | -0.005*** |
| | (0.008) | (0.001) | (0.001) | (0.001) | (0.003) | (0.001) | (0.001) | (0.002) | (0.000) | (0.002) | (0.002) | (0.001) | (0.001) |
| Self-Employed | -0.019** | 0.002* | 0.001* | 0.001 | 0.008*** | -0.006*** | -0.003** | -0.007*** | 0.003*** | -0.010*** | 0.021*** | 0.000 | 0.007*** |
| | (0.008) | (0.001) | (0.001) | (0.001) | (0.003) | (0.002) | (0.002) | (0.002) | (0.000) | (0.002) | (0.002) | (0.001) | (0.001) |
| Unemployed | -0.081*** | -0.004*** | 0.009*** | -0.018*** | 0.148*** | -0.006*** | 0.000 | -0.059*** | 0.001** | -0.038*** | 0.001 | -0.025*** | -0.013*** |
| | (0.009) | (0.001) | (0.001) | (0.001) | (0.003) | (0.002) | (0.001) | (0.002) | (0.000) | (0.002) | (0.003) | (0.001) | (0.001) |
| Inactive | -0.011* | -0.010*** | -0.006*** | -0.005*** | 0.041*** | -0.001 | 0.018*** | -0.035*** | -0.001*** | 0.001 | 0.018*** | -0.004*** | -0.005*** |
| | (0.007) | (0.001) | (0.001) | (0.001) | (0.002) | (0.001) | (0.001) | (0.002) | (0.000) | (0.002) | (0.002) | (0.001) | (0.001) |
| Constant | | 0.866*** | -0.227*** | -0.924*** | -1.513*** | -0.575*** | -0.195*** | 5.410*** | 0.244*** | -1.587*** | -0.355*** | -1.321*** | -0.454*** |
| | | (0.058) | (0.035) | (0.043) | (0.132) | (0.073) | (0.067) | (0.105) | (0.021) | (0.089) | (0.122) | (0.060) | (0.048) |
| Observations | 44000 | 44000 | 44000 | 44000 | 44000 | 44000 | 44000 | 44000 | 44000 | 44000 | 44000 | 44000 | 44000 |
| $R^2$ | 0.528 | | | | | | | | | | | | |

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: Own calculations based on EVS 2008. Base categories: High-Skilled, North, Full-Time Employed. Household characteristics refer to the household head.

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