

Ochmann, Richard; Bach, Stefan; Beznoska, Martin

**Research Report**

## The Retrospective Evaluation of Elements of the VAT System: The Case of Germany. Research Project on Behalf of the European Commission, TAXUD

DIW Berlin: Politikberatung kompakt, No. 63

**Provided in Cooperation with:**

German Institute for Economic Research (DIW Berlin)

*Suggested Citation:* Ochmann, Richard; Bach, Stefan; Beznoska, Martin (2012) : The Retrospective Evaluation of Elements of the VAT System: The Case of Germany. Research Project on Behalf of the European Commission, TAXUD, DIW Berlin: Politikberatung kompakt, No. 63, ISBN 978-3-938762-54-7, Deutsches Institut für Wirtschaftsforschung (DIW), Berlin, [https://nbn-resolving.de/urn:nbn:de:0084-diwkompakt\\_2012-0630](https://nbn-resolving.de/urn:nbn:de:0084-diwkompakt_2012-0630)

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## Politikberatung kompakt

Deutsches Institut für Wirtschaftsforschung

2012

# The Retrospective Evaluation of Elements of the VAT System The Case of Germany

Richard Ochmann, Stefan Bach and Martin Beznoska

## IMPRESSUM

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DIW Berlin  
Deutsches Institut für Wirtschaftsforschung  
Mohrenstraße 58  
10117 Berlin  
Tel. +49 (30) 897 89-0  
Fax +49 (30) 897 89-200  
[www.diw.de](http://www.diw.de)

ISBN-10 3-938762-5 -  
ISBN-13 978-3-938762-5 -  
ISSN 1614-6921

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## **DIW Berlin: Politikberatung kompakt 63**

Richard Ochmann\* (Corresponding author)

Stefan Bach\*

Martin Beznoska\*

### **The Retrospective Evaluation of Elements of the VAT System<sup>+</sup>**

The Case of Germany

TAXUD/2010/DE/328

FWC No. TAXUD/2010/CC/104

Research project on behalf of the European Commission, TAXUD

Institute for Fiscal Studies (Project leader)

In consortium with:

CPB Netherlands Bureau for Economic Policy Analysis (Consortium leader)

CAPP, CASE, CEPII, ETLA, IFO, IHS

Berlin, July 2012

\* DIW Berlin, Department Public Economics. rochmann@diw.de, sbach@diw.de, mbeznoska@diw.de

<sup>+</sup> This report was commissioned by the European Commission (DG TAXUD) and prepared by a consortium under the project leader IFS. The views and opinions expressed in this report are not necessarily shared by the European Commission, nor does the report anticipate decisions taken by the European Commission.



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## Preface

Reforms to the systems of the Value Added Tax have been on the political agenda in most European countries in recent years. Most of them had the aim to foster public finances. In economic analyses, very often impacts of such reforms on inequality in the distribution of income as well as on agents' consumption behaviour are disregarded. However, reforms to the systems of Value Added Tax typically have non-negligible effects on consumption decisions and income inequality if consumers are affected heterogeneously by tax reforms. Such effects shall be of subject to analysis in this study. Various reforms to the Value Added Tax are simulated with survey data on household consumption, and changes in the distribution of tax burden across the income distribution as well as across demographic characteristics, accounting for the fact that consumers may adjust consumption to tax differentials, are analysed.

## 1 Introduction

The system of the Value Added Tax (VAT) has been subject to various reforms in Germany in recent decades, most of which aiming at an increase of the regular rate. Mostly, the aim of these reforms was to reduce budget deficits, or to lower contribution rates to social security in order to foster employment. In the course of such reforms, usually effects on inequality of the income distribution as well as on household consumption behaviour are disregarded in economic analyses. However, VAT reforms typically have non-negligible effects on the structure of consumption bundles as well as the distribution of tax burdens across the income distribution if these reforms affect tax rates of the goods differently, and if consumption is structured heterogeneously across the income distribution so that consumers are affected differently by tax reforms.

This study features effects of various reforms to the system of VAT in Germany on the distribution of tax burdens across the income distribution and across demographic characteristics, as well as on household consumption behaviour. The reforms analysed aim at several changes in the levels of the regular tax rate, as well as the reduced tax rate, and are simulated in two scenarios. In the first scenario, behavioural response in consumption is neglected, whereas in the second scenario, households are allowed to adjust consumption bundles in response to the reforms. The reforms are analysed by techniques of microsimulation of the VAT system in Germany. The data applied stems from consumption survey data for Germany (LWR data).

Results of the distributional analysis indicate that the entire German VAT system is regressive if tax burdens are related to income – at least in the short term if consumption is not considered over the entire life cycle. As the regular rate alone is regressive, an increase has a regressive effect. A regressive effect is also found if reduced rates are substituted by the regular rate. This effect is lowered if additional revenue is used to lower the regular rate. But, the regressive effect is persistent even if households are allowed to adjust their consumption behaviour. Welfare effects indicate that, while almost all households gain from a revenue-neutral abolition of reduced rates, combined with a reduction of the regular rate, this gain is spread unevenly across the income distribution, with households in upper income deciles gaining relatively more than households in lower deciles.

In the next section, the VAT system in Germany is briefly introduced. In Section 3 the single reforms that are analysed are described. In Section 4, methodological issues are featured. The data set is introduced, the tax module for the microsimulation of the VAT reforms is explained, and a demand model for behavioural response in household consumption is presented. Section 5 contains results from the distributional analysis, structured by the static analysis, omitting response, and the behavioural analysis, where response is accounted for. Finally, Section 6 concludes.

## **2 The VAT System in Germany**

In general, the German VAT system is a multi-stage general consumption tax system, according to the harmonized European VAT system, with tax credit on intermediate inputs (input tax deduction). Most goods and services are taxed at the regular rate of 19%. The German VAT system applies no zero-rating and only a single reduced rate of 7% on some goods and services that are considered to satisfy some basic needs or deemed as merit goods.<sup>1</sup>

More than 70% of the aggregate final sales that are taxed at the reduced VAT rate are falling on foodstuffs. Furthermore, the reduced rate is applied to books, newspapers, plants, flowers, living animals, water supplies, art, antiques and collectors pieces, dental prostheses, devices for the disabled, entrance for certain cultural events, museums, zoos, and circuses, charitable work (if not exempt), hotel accommodation, and local public passenger transport. Unlike in other EU countries, no reduced rate to locally supplied labour intensive services is applied in Germany. The revenue loss of the reduced tax rate against the regular rate is estimated at Euro 23 billion in 2010, which equals to 0.9 per cent of GDP, or 13 per cent of VAT revenue (more on this to be found below when revenue effects for the simulated reforms are presented).

Moreover, there are some goods and services that are exempt from VAT at the final stage of consumption. In Germany, these are the standard exemptions, which are exempt in most EU countries. Among them are postal services, transport of sick/injured persons, hospital and medical care, human blood, tissues and organs, dental care, charitable work, education, non-commercial activities of non-profit making organisations, sporting services, cultural services (except radio and television broadcasting), insurance and reinsurance, letting of immovable

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<sup>1</sup> See OECD (2011).

property, financial services, betting, lotteries and gambling, supply of land and buildings, and certain fund-raising events. However, since suppliers are not allowed to deduct any input tax for VAT-exempt goods, these goods are effectively charged with VAT at the previous input stage, and thus the tax burden is usually borne by the consumer.<sup>2</sup> Small firms are not required to charge and collect VAT up to a threshold of Euro 17,500 sales per year. Correspondingly, these small firms are not allowed to deduct any input tax. With respect to such VAT-exempt sales used as intermediate expenditures by VAT taxpayers, these exemptions break the VAT chain and create a cascading effect, as the non-deductible tax on inputs is embedded in the subsequent selling price and is not recoverable by taxpayers further down the supply chain.

### **3 Reforms to VAT in Germany**

When general consumption taxation was transformed into the current VAT system in Germany at the end of the 60ies, it started with a regular rate of 11% and a reduced rate of 5.5%. The tax rates were increased step by step over the next decades. In the 70ies and 80ies, the extra tax revenue was mainly used to reduce direct taxation. Since 1983, the reduced rate remains at 7%. In 1993, the regular rate was increased by 1 percentage point in order to meet the financial demands of German reunification. In the course of increasing unemployment rates since the mid-90ies, the idea of consumption tax hikes to reduce the high contribution rates to social security has been increasingly supported by both policymakers and economists in Germany. So it was the case in 1998 when the VAT regular rate was increased by 1 percentage point in order to plug rising budget gaps of the public pension system. The same strategy stood behind the ecological tax reform of 1999-2003, which step-by-step increased energy tax rates. As a further big leap in this respect, in 2007 the “great coalition” government increased the regular VAT rate by 3 percentage points, from 16% to 19%. Amounting to Euro 25 billion, or 1.1 per cent of GDP, this reform was labelled as the largest tax hike in German post-war history ever. The revenue was mainly used to reduce the contribution rates to the public unemployment insurance, and partly for budget consolidation.

In these days, the current conservative-liberal government plans no further rise in regular rates, but to revise the catalogue of goods and services taxed at the reduce rate. The idea is to cut back the various specific items that do not have a clear-cut rationale anymore, and are

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<sup>2</sup> See OECD (2011).

often costly to administer. However, the tax reduction for foodstuffs is said to be kept up due to the significant distribution impact on the poor households. Moreover, there is strong lobbying against the repeal of the tax reduction for many other items. Presumably, the announced reform of the reduced VAT rate will come to nothing over the next years.

Against this background of the VAT development in Germany, a couple of policy reforms to this system shall be evaluated. Our first reform simulation quantifies the distributional impact of VAT as a whole. The results show how the entire burden of VAT is distributed across the income distribution. In the second reform scenario, we raise the regular VAT rate by 1 percentage point, but leave reduced rates unchanged. Finally, the third reform aims at abolishing reduced rates in two scenarios. In the first scenario, reduced rates will be substituted by the current regular rate (19%). In this scenario, VAT revenue increases by Euro 17.5bn per year (respectively 7.5bn in the behavioural scenario, where it is assumed that savings are adjusted accordingly, also see Section 4.3). In the second scenario, this additional revenue from abolishing reduced rates is used to substitute reduced rates by a revenue-neutral regular rate, which results from iterative simulation.

All reforms are simulated either omitting behavioural response (static scenario), or explicitly allowing for households to adjust their consumption bundles and substitute away from goods taxed at relatively higher rates (behavioural scenario). In all reforms simulated, any VAT-exempt goods are ignored, as are any effects of cascaded VAT and exemptions. Furthermore, housing is ignored, i.e., no reforms to VAT-exempt goods or housing are simulated.

## **4 Methodology**

### **4.1 Data**

Our simulations rely on official cross-sectional survey data on household consumption in Germany. The consumption micro data applied in this analysis stem from the Continuous Household Budget Survey for Germany (*Laufende Wirtschaftsrechnungen*, LWR). The LWR data are collected by the German Federal Statistical Office (*Statistisches Bundesamt*). Micro data sets were provided by the Research Data Centre of the Statistical Offices of the Länder (*Forschungsdatenzentrum der Statistischen Landesämter*, FDZ). In each cross section, there are about 8,000 households observed. The advantage of the LWR data is that they include very

detailed information on all the single consumption items at the household level, together with the common socio-demographic characteristics and the single components of household income.

Collecting the LWR consumption data, households are recruited voluntarily for reports every year, according to stratified quota samples from Germany's current population survey (*Mikrozensus*), and report for a time of four months (one month out of each quarter of the year). Since 2005, recruited households stem from a subsample of the Income and Consumption Survey for Germany (*Einkommens- und Verbrauchsstichprobe*, EVS). The survey weights are adjusted to the aggregates of the covered population, according to the distribution of pertinent demographic variables. The entire population covered by the LWR is restricted, as there are groups that are not surveyed: these are households of self-employed, institutionalized people (i.e. military people in caserns, students in dormitories, elderly and disabled people in nursery homes or hospitals, nurses or migrant workers in residences, people in jails), homeless people, and households with monthly net household income greater than Euro 18,000. The six repeated cross sections for the years 2002 to 2007 used here contain 92,091 observations when pooled.<sup>3</sup> When descriptive statistics on the LWR data are presented data are weighted by population weights. Population weights for the LWR are constructed with respect to the distribution of households in the *Mikrozensus*-population by strata of household composition, social status, and net household income.<sup>4</sup>

## 4.2 Microsimulation of the German VAT System

The reform scenarios analysed are simulated in a taxation module for the VAT system in Germany, by means of microsimulation techniques. As all reforms are hypothetical, they are evaluated in an ex-ante analysis. This means that household responses to the reforms are not observed, but they are simulated. The latest cross-section available for the German LWR data is for 2007. This data is uprated to 2010 and tax laws as of 1<sup>st</sup> January 2011 are applied for the current VAT benchmark law.

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<sup>3</sup> Due to a change in the survey design in the year 2005, an observation means either a household observed for a month or for a quarter.

<sup>4</sup> For further details on the LWR data, see Statistisches Bundesamt (2007).

As household consumption is observed very detailed by commodities in the LWR data, tax rates can be applied differentiated by regular rates and reduced rates at the lowest commodity level. For the demand model of behavioural response (see next subsection), changes in after-tax prices, resulting from the reforms to the tax rates, are aggregated up to higher commodity levels.

Following the basic set up of a static microsimulation model, the analysis is conducted in a partial equilibrium framework of comparative statics. It is assumed that pre-tax commodity prices are in equilibrium and thus not affected by demand changes. This implies that commodity supply is perfectly elastic, so that the only effects that are considered in this analysis result from demand shifts that are related to changes in VAT rates. Furthermore, it is assumed that changes in tax rates and resulting tax burdens are perfectly shifted to consumers. This implies that demand is assumed perfectly elastic for any good under analysis.<sup>5</sup>

For the static analysis, i.e. omitting demand adjustment, distributional effects are evaluated by analysing the distribution of additional tax burdens across the income distribution. For the behavioural analysis, in addition household utility may be affected due to substitution away from relatively more expensive commodities. Welfare effects are evaluated by the compensating variation (CV), which permits a valuation of effects in money metric welfare terms comparable to direct budget effects.

### 4.3 Modelling Behavioural Response

The demand model for consumption commodity groups is based on a complete integrable almost ideal demand system (AIDS),<sup>6</sup> which is flexible concerning the factors of influence. The AIDS is based on price-independent generalized logarithmic (PIGLOG) preferences and Engel curves in the Working-Leser form, which are linear in the log-budget. It is applied here in an extended version, which allows for more flexible Engel curves, i.e. the quadratic almost ideal demand system (QUAIDS), where demand is modelled in a quadratic function of the log-budget.<sup>7</sup>

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<sup>5</sup> This is probably a strong assumption, which might be violated at least for some goods under analysis here. Analysing the impact of alternative concepts of VAT incidence is, however, beyond the scope of this study.

<sup>6</sup> See Deaton, Muellbauer (1980).

<sup>7</sup> See Banks, Blundell, Lewbel (1997).

Seven groups of commodity bundles are modelled explicitly in the demand system:

- Food (i.e. food and non-alcoholic drinks at home)
- Services (communication services, dry-cleaner, coiffeur, et al.)
- Medical care
- Transportation (public or private, for everyday trips, not holidays)
- Energy
- Leisure goods (non-durable), hotel accommodation (not paid for by employers) and tobacco
- Restaurants (i.e. food and drinks in restaurants and alcoholic drinks at home or in restaurants)

The relevant budget is defined by the sum of expenditures for these seven commodities. All other goods are excluded from the demand system by keeping their quantities constant. Three non-demand-system categories are built. The first contains expenditures for housing, i.e. for both those renting and the owner occupiers. It also includes any overhead housing costs, e.g. operating and maintenance costs, but it excludes heating and electricity (which are both in the energy group). Furthermore, residual expenditures for consumer items, financial services, and any kind of repairs etc. are put in another group. Expenditures for durable consumption goods, which mainly consist of purchases of cars, furniture, and electronic equipment, form the last commodity group.

Individual prices at the household level are constructed as arithmetic averages of aggregate prices (Consumer Price Index) and individual commodity weights. This weighted average price is applied in logarithmic form in the demand equations (Stone-Lewbel cross-section prices).<sup>8</sup> We estimated the nonlinear equation system with control variables for household composition, age of household head, a dummy for pensioners, as well as yearly, quarterly, and regional dummies in each equation.

In the static scenario, where consumption adjustment is omitted, nominal household income is kept constant. Moreover, it is assumed that households do not change consumption bundles, i.e. the commodity quantities demanded. Changes in tax burden from a reform – as presented in the results section -- are consequently calculated on the basis of pre-tax spending.

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<sup>8</sup> See Lewbel (1989) or a recent application in Hoderlein, Mihaleva (2008).



Thereby, pre-tax spending for each commodity group is the same before and after a change in tax rates, i.e. quantities are held fixed, and in turn after-tax spending changes according to the tax differentials. Thus, overall spending, including VAT, must change, and it is assumed, by constant income, that savings are adjusted residually.

When behavioural response is simulated it is again assumed that nominal income is constant. Moreover, intertemporal consumption behaviour is not modelled explicitly. Thus, households adjust their current spending behaviour due to the income effects as well as the relative price effects of the reforms. Thereby, overall spending is not affected by the reforms; just the spending structure is reallocated. As a result, savings are kept unchanged.

## 5 Results

In this chapter, we describe and interpret the main results from the simulations of the policy reforms and highlight the most important features. The chapter is structured into two sections, the static analysis, where consumption response is omitted, and the behavioural analysis, where adjustment of consumption bundles is accounted for. Respective tables on distributional effects of the various VAT reforms will be presented in the appendix.

### 5.1 Static Analysis

In this section, results from the static analysis are presented for simulations of four policy reforms. Firstly, VAT is abolished altogether, secondly the regular rate is increased by one percentage point, then reduced rates are abolished and substituted by the regular rate, and finally the latter reform is implemented with a revenue-neutral regular rate.

#### ***Abolishing VAT Altogether (S)***

Under the current VAT system, the distribution of the tax burden across the distribution of (equivalent) household net income<sup>9</sup> exhibits the well-known effect of regressive taxation if the burden is related to household net income and any life-cycle effects are neglected (Table 5). While the absolute tax burden increases continuously over the income deciles, the relative

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<sup>9</sup> Household net income has been equalized by the modified OECD equivalence scale.

burden is greater for households in the lower deciles than for households in the higher deciles (see first and second column of Table 5). The relative tax burden amounts to almost 10.0% in the lowest decile. It decreases continuously in the following deciles, and amounts to only some 5.5% in the highest decile. For the median household, the relative burden amounts to 7.1% (mean 6.6%).

This regressive effect is present across all deciles of the income distribution and it is related to the fact that the savings rate is typically observed to increase across the income distribution.<sup>10</sup> Thus, the regressive effect vanishes when savings are excluded and the tax burden is related to total spending, instead of income. When VAT payments are related to total spending there even appears a slight progressive effect, as the relative burden increases from 7.5% in the lowest income decile up to 8.9% in the highest decile, however the increase is not continuous. For the median household the relative burden amounts to 8.5% of total spending (mean 8.5%). This progressive effect is also visible when tax burden is broken down across the (equivalent) expenditure distribution (Table 6).<sup>11</sup>

When taking a look at the distribution of tax payments across household composition (Table 7) there is not much variation apparent across the groups. The tax burden related to income (second column) is generally slightly greater than on average for single-adult households (6.7-7.6%) and slightly lower than on average for households with more than one adult and one kid (6.4-6.7%). The groups of households that bear the greatest tax burdens are households with “more than one adult, no kids and none working” (8.4%) as well as with “more than one adult, more than one kid, none working” (7.7%). This picture, however, is again reverted when tax payments are related to total spending, as savings rates vary over household composition.<sup>12</sup> While the average burden is generally greater according to this measure because savings are neglected, households with “more than one adult, more than one kids, and more than one working” bear the greatest burden (9.1%), while households with “a single adult, aged 60+” (7.6%) bear the smallest burden.

When households are sorted according to their relative tax burden (related to total spending), starting with those that bear the smallest burden (i.e. those with the smallest relief if VAT is

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<sup>10</sup> See e.g. Beznoska, Ochmann (2010).

<sup>11</sup> Household expenditure has been equivalized by the modified OECD equivalence scale.

<sup>12</sup> See e.g. Beznoska, Ochmann (2010).

abolished), there appears to be a lot of variation in demographic characteristics between those who bear the smallest and those who bear the greatest burden (Table 8). Households in the first quintile (i.e. those with the smallest burden, or the smallest reform relief) consist of adults with a higher average age (58.7) compared to households in the fifth quintile (49.0). Furthermore, they consist with a greater share (54.9%) of single adult households (compared to 30.2% in the fifth quintile), and to a smaller share of households with children (11.2% compared to 23.6%). They consist of youngest children with a lower average age (8.8 compared to 9.7), have a greater share of low-educated household heads (10.2% vs. 5.1%), a greater share of unemployed heads (61.5% vs. 26.2%), and a smaller share of households where one adult is working (27.5% vs. 39.9%), or where more than one adult is working (9.4% vs. 30.6%). Furthermore, among those with smallest burdens, there are slightly more households with persons owning their house (51.3%) than among those with highest burdens (41.7%).

**Revenue Effects:** Total revenue of VAT in Germany, as reported in national accounts, amounts to Euro 180.0bn in 2010, of which some Euro 121.3bn are related to consumption of private households. Overall VAT revenue thereby amounts to 7.2% of GDP and 31.4% of total tax revenue.<sup>13</sup> If it is further accounted for the fact that any VAT payments related to housing, rents, and imputed rents are not considered in this analysis the relevant aggregate VAT revenue amounts to only Euro 93.8bn.<sup>14</sup> On the contrary, the respective VAT revenue from the consumption micro data, as simulated in this analysis for the static scenario, amounts to Euro 78.8bn, which translates into 84.0% of the relevant revenue from national accounts.

This difference between the VAT revenue that is simulated with micro data in this analysis and the relevant revenue from national accounts mainly results from conceptual differences as well as from the survey design of the micro data. The latter is related to the fact that the population of the LWR data is restricted to about 36.1mn households, which relates to about 90.8% of the actual population, as e.g. the group of households with a self-employed head are excluded; also see Section 4.1.<sup>15</sup>

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<sup>13</sup> GDP in Germany for 2010 amounts to Euro 2,498.8bn. Total tax revenues from national accounts amount to Euro 572.7bn for 2010. See Statistisches Bundesamt (2011).

<sup>14</sup> Own calculations based on figures from national accounts, see Statistisches Bundesamt (2011).

<sup>15</sup> The figure of 39.8mn households in the actual population is taken from the German census, which is the official statistic for the construction of the LWR survey. See Statistisches Bundesamt (2008).

As a consequence, aggregate consumption is not fully captured in the simulation analysis. In the LWR data for 2007, aggregate consumption, which for the sake of comparison includes housing expenditures here, amounts to some Euro 925.obn per year. This relates to 70.6% of aggregate consumption of private households from national accounts.<sup>16</sup> The under coverage of aggregate consumption is greater than the under coverage of VAT revenue, as there are a couple of commodities that are taxed at reduced rates, or that are VAT exempt, and that have a relatively poor coverage in the LWR data (e.g. hospital services, financial services, and education).

### ***Increasing Regular Rate by 1 Percentage Point (S)***

When the regular VAT rate is increased by one percentage point (from 19.0% to 20.0%) households' VAT payments increase on average by Euro 1.9 per week, assuming that households do not change their consumption bundles in turn (Table 9). When this increase in tax payments is related to income it amounts to 0.30% of household net income and respectively to 0.39% of spending when it is related to total spending. There is only slight variation in this increase in tax burden across the income distribution found for this marginal reform. The increase in VAT burden related to income is slightly greater, than on average, in the lowest income decile (0.43%) and slightly smaller in the highest decile (0.26%), implying a slight regressive effect of this reform. This picture is however reverted when VAT differentials are related to spending: the increase in the relative burden now is slightly lower for households in the first income decile (0.33%) and slightly greater for households in the highest decile (0.42%). This effect is also apparent when tax burden is broken down across the expenditure distribution (Table 10).

When changes in tax burden are broken down by household composition, there is not much variation apparent (Table 11). The increase in tax burden related to income is only slightly greater than on average for households with "one adult, no kids, none working" (0.34%), with "one adult, kids, and one working" (0.35%), and with "more than one adult, more than one kid, none working" (0.34%).

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<sup>16</sup> Aggregate consumption of private households from national accounts amounts to Euro 1,309.8bn per year. See Statistisches Bundesamt (2011).

Sorting households according to the increase in their relative tax burden resulting from this reform, starting with those households for whom tax burdens increase the most and putting them in the first quintile, some variation with respect to demographic characteristics between the quintiles becomes apparent (Table 12). The picture is similar compared to the distribution of overall tax burden described above. Households with the smallest increase in relative tax burden consist of older adults, of more single households, of fewer children, of more low-educated household heads, of more unemployed, of fewer households in which one or more adults are working, and of slightly more households owning their house.

**Revenue Effects:** If the increases in VAT burden are aggregated up over the population, an increase in the regular VAT rate by one percentage point would increase aggregate VAT revenues by Euro 3.6bn per year in the static scenario, from Euro 78.8bn to Euro 82.4bn. This increase in VAT revenue translates into 4.36% of total aggregate VAT revenue as simulated in this analysis. It amounts to 0.63% of total tax revenue and to 0.14% of GDP.

#### ***Abolishing Reduced Rates – Substituted by Regular Rate (S)***

If the reduced rate of 7% is replaced by the regular rate of 19%, again, VAT payments increase for all households. However, the increase varies over the households according to consumption bundles, with respect to goods taxed at the reduced rate and goods taxed at the regular rate.

When reduced rates are abolished, households' VAT payments increase on average by Euro 9.3 per week (Table 13). When this increase is related to household net income, it translates into 1.48% on average. Such a reform would foster the regressive effect of the VAT system, as the increase in tax burden is relatively greater for households with lower incomes than for households with higher incomes. For households in the lowest income decile, the tax burden increases on decile average by 2.84% of their income. This additional tax burden decreases continuously up to the highest income decile, in which households have to bear an additional tax burden of 0.92% only. Interestingly, this regressive effect of the reform remains when the change in tax burden is related to total spending. While the regressive effect is generally lower in this picture, there is still a difference of 0.67 percentage points between the additional tax burden in the lowest income decile (2.17%) and the highest (1.50%), which is similar in size when tax burden is broken down across the expenditure distribution (Table 14).

There is also some variation in the distribution of the additional tax burden across household composition (Table 15). It becomes apparent that especially households in which no adult is working face a relatively greater increase in tax burden than an average household (between 1.86% and 2.26%). Increases are below average for households of “one adult, no kids, one working” (1.21%) and “more than one adult, no kids, more than one working” (1.26%). Interestingly, this picture remains the same when additional tax burdens are related to total spending, instead.

Again, sorting households by the relative increase in tax burden, and putting those with the greatest relative increases in the first quintile (Table 16), some variation in demographic characteristics of these groups is revealed. For this reform, the picture looks a bit different, though, compared to the incidence of current VAT and of the first reform. Again, in the first quintile, i.e. those losing most by the reform, there are less single-adult households, and more households with children than in the fifth quintile. However, there is not much variation in the age distribution across the quintiles, and there are more households with a low-educated head in the lowest quintile (8.9%) than in the highest (6.3%). The lowest quintile moreover consists of more workless households (49.7%) than the highest quintile (41.5%).

**Revenue Effects:** If the reduced rate of 7% is substituted by the regular rate of 19% aggregate VAT revenues in the static analysis would increase by Euro 17.5bn per year, from Euro 78.8bn to Euro 96.3bn. This increase in VAT revenue translates into 21.19% of total aggregate VAT revenue as simulated in this analysis. It amounts to 3.06% of total tax revenue and to 0.70% of GDP.<sup>17</sup>

### ***Abolishing Reduced Rates – Revenue Neutral (S)***

Now we turn to the results of a simulation of a revenue-neutral reform. This reform substitutes the reduced rate by a revenue-neutral regular rate. If additional revenues from abolishing reduced rates are used to lower the regular rate by 3.46 percentage points, the reform would be revenue neutral, overall for the sector of private households. Thus, the revenue-neutral

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<sup>17</sup> This increase in VAT revenue, from abolishing reduced rates, amounts to 76.1% of the respective revenue effect estimated by the ministry of finance for the entire VAT accounts, not just for private households, which amounts to Euro 23.0bn per year. See Sachverständigenrat (2010), p.214.

uniform rate turns out to be 15.54%. This means if reduced rates are abolished for all goods, the regular rate, now common for all goods, can be reduced from 19.00% to 15.54%, by a reform that leaves public funds unchanged. By definition of revenue neutrality, aggregate VAT revenues remain unchanged in this reform scenario.<sup>18</sup>

As a result of this reform households are, on average, not affected by the reform due to revenue-neutrality, i.e. their VAT burden does not change. This result, however, only holds on average. When taking a look at the distribution of the change in tax burdens (Table 17), assuming again that households do not alter their consumption bundles, it becomes apparent that there turn out to be winners as well as losers of the reform. For winners, the effect of the reduction of the regular rate compensates the increase in the reduced rate, whereas for losers, the effect of the increase in the reduced rate is greater than the effect of the reduction in the regular rate.

Interestingly, winners and losers of the reform are spread across the income distribution such that losers are mostly found below the median income, while winners are found above the sixth decile. As a consequence, there is a regressive effect of the reform. Households in the lowest income decile lose the most by the reform (loss of 0.54% of income). This loss shrinks in relative terms in the following deciles and it turns into a gain in the seventh decile (0.04%). Households in the eighth decile face a slight loss again, but in the ninth and tenth deciles, households gain on average, more than in the seventh decile (0.11% and 0.24% respectively). This picture is very similar when changes in tax burden are related to total spending (third column of Table 17) or when tax burden is broken down the expenditure distribution (Table 18), i.e. the regressive effect, again, does not vanish.<sup>19</sup>

This regressive effect of the revenue-neutral reform is a consequence of two single effects, which go in opposite directions. On the one hand, households in the lower income deciles benefit relatively more from a reduction of the regular rate than households in higher deciles, making them better off, as a result of the regressive effect of the regular rate itself. On the other hand, these households at the lower end of the distribution suffer relatively more from

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<sup>18</sup> There remains a slight decrease in VAT revenue of Euro 0.021bn per year due to computational limitations in the process of iterating the simulation for revenue neutrality.

<sup>19</sup> A similar regressive effect of a revenue-neutral abolition of reduced VAT rates is found when VAT on housing and cascaded VAT from payments on inputs into tax-exempt goods are accounted for. See Bach (2011).

the increasing reduced rates than the richer households. As the latter effect is stronger than the first one, there remains a regressive effect of the reform overall. All in all, the regressive effect of this reform turns out to be smaller than in case of the reform that substitutes the reduced rate by a regular rate that is not revenue neutral.

When the gains and losses are analysed across household composition (Table 19) it becomes apparent that, again, especially households in which no adult is working are losers of the reform. For them the tax burden increases by between 0.14% and 0.45% of income. Winners are, again, found in the groups of “one adult, no kids, one working” (gain of 0.24% of income) and “more than one adult, no kids, more than one working” (0.13%).

Taking a look at the demographic characteristics of the winners and the losers of the reform reveals significant differences only at some characteristics (Table 20). On the one hand, losers are only slightly older on average than winners and slightly less live in single households. There are some more heads with low education among the losers. On the other hand, children appear to be spread more or less evenly across winners and losers and no clear pattern with respect to their age occurs. However, there appears a clear pattern with respect to employment. There are significantly more households of unemployed among the lower quintiles of reform losers (between 41.8% and 57.0%) than in the higher quintiles of reform winners (between 30.8% and 35.4%). In turn, there are fewer households with one or more adults working in the lower quintiles. Furthermore, among the losers only between 37.5% and 52.1% of the households own their house, while between 50.9% and 54.1% of the winning households own their home.

## 5.2 Behavioural Analysis

In this section, we present results from the behavioural analysis. This section is structured into two parts. Firstly, estimated demand elasticities from the demand system estimation are presented. Then, the main results from the simulations of the policy reforms are described and interpreted in terms of welfare effects, and the most important effects are highlighted. Respective tables on welfare effects of the various VAT reforms will be presented in the appendix.



#### ***a) Estimates for Demand Elasticities and Tests***

In this subsection, we show estimates for demand elasticities from the demand system estimations. Compensated and uncompensated own- and cross-price elasticities, as well as income elasticities, all evaluated at means, are presented and interpreted. Results are interpreted for the constrained estimation, for which results are also applied in the following welfare analysis. Estimated demand elasticities are compiled in four tables, all relegated to the appendix, 1) for compensated price elasticities from the constrained estimation (Table 1), for 2) for uncompensated price elasticities from the constrained estimation (Table 2), 3) for compensated price elasticities from the unconstrained estimation (Table 3), and 4) for uncompensated price elasticities from the unconstrained estimation (Table 4).

In the constrained estimation, i.e. constrained for homogeneity and symmetry, compensated own price elasticities are estimated consistently, i.e. negativity holds, for all seven goods (Table 1). Demand is estimated relatively own-price inelastic for food (compensated own-price elasticity of -0.43), medical services (-0.61), and transportation (-0.41), whereas it is estimated relatively own-price elastic for services (-1.42), energy (-1.10), leisure goods (-1.68), and food and drinks in restaurants (-2.28).

Estimates for income elasticities are stable across constrained and unconstrained estimations. Food (income elasticity estimated at 0.56), services (0.80), and energy (0.61) turn out to be necessary goods, whereas medical services (2.25), transportation (1.13), leisure goods (1.34), and restaurants (1.29) are estimated to be luxury goods.

The estimated income elasticities, as well as the compensated price elasticities from the constrained estimation, are further applied in the behavioural reform analysis in order to simulate household consumption responses as a result of the VAT reforms. Corresponding uncompensated own-price elasticities are estimated, consistently with positive income elasticities, slightly greater (i.e. more negative) than respective compensated elasticities (Table 2).

**Tests:** For the unconstrained estimation, the system has been tested for constraints from demand theory. Homogeneity must be rejected at the 5% level for five out of the six estimated demand equations. It must be rejected for food (Chi<sup>2</sup> test statistic with 1 degree of freedom:

92.84), medical care (35.61), transportation (22.98), energy (4.69), and leisure goods (35.92). It cannot be rejected for services (2.85) only. Homogeneity is strongly rejected for the entire system (198.86). Also symmetry must be rejected at the 5% significance level for the entire system ( $\chi^2$  test statistic with 15 degrees of freedom: 219.17).

The demand system has furthermore been tested for separability of the consumption decision from the labour supply decision, by means of a test suggested by Browning and Meghir (1991). For this test, the demand equations have been augmented by a dummy variable indicating whether there is at least one person working in the household, and this dummy variable tested for significance in each demand equation. This dummy is estimated significantly in most of the demand equations. As a result, separability from the labour supply decision must be rejected for five out of the six estimated equations. Only for services, separability cannot be rejected at the 5% significance level. This results holds for both the estimation constrained for homogeneity and symmetry as well as the unconstrained estimation.

#### ***b) Welfare Effects and Revenue Effects***

In this subsection results from the behavioural analysis are presented for simulations of the four policy reforms. For this analysis, welfare effects evaluated in money metric terms of the compensating variation are presented. The results account for the fact that households are now allowed to adjust consumption bundles to changes in VAT rates. Results are described and interpreted in the main text, while similar tables as for the distributional analysis are again relegated to the appendix.

#### ***Abolishing VAT Altogether (B)***

If the current VAT system is abolished altogether and households are allowed to adjust consumption bundles to the abolition (Table 21), the average reduction in tax burden, as well as its distribution across the income distribution, look very similar to the static scenario, where behavioural response is ignored (Table 5). Again, the regressive effect of VAT becomes apparent. While the absolute tax burden increases continuously over the income deciles, the relative burden is greater for households in the lower deciles than for households in the higher deciles. Here, the average tax burden that is relieved if VAT is abolished altogether is marginally greater, but only by Euro 0.4 per week (Euro 42.4 per week, measured in money-

metric welfare terms of the compensating variation), compared to the static scenario (Euro 42.0). Households substitute away from relatively more expensive commodities, i.e. those that were VAT exempt already before the reform, and thereby increase the VAT relief resulting from abolition only marginally.

This effect is slightly more pronounced across the income, as well as expenditure distribution (Table 22). Welfare effects are greater than revenue effects for households in higher deciles of the income, as well as the expenditure distribution, while they are slightly smaller for households in lower deciles. There is only little variation in this effect across household composition (Table 23). It has no considerable impact on the demographic breakdown across the distribution of tax payments (Table 24). Similar patterns as for the static scenario, where behavioural response is omitted, are observed.

**Revenue Effects:** The aggregate VAT burden that would be saved for the households if VAT is abolished altogether, and households are allowed to adjust consumption in turn, amounts to Euro 79.6bn per year. This is Euro 0.8bn more than the total VAT revenue that was simulated for the static scenario. And it equals the population aggregate of the Euro 0.4 per week that households save from tax burden in the behavioural analysis. It results from the fact that households substitute those goods for which prices fall only in terms of the reduced rate by goods for which the decrease in prices is stronger because they were taxed at the regular rate before the reform. This shift in consumption bundles reduces the tax burden that is saved for the households if VAT is abolished altogether only marginally. The saved VAT burden translates into 84.9% of the relevant VAT revenue from national accounts, 13.9% of total tax revenue, and 3.2% of GDP.

#### ***Increasing Regular Rate by 1 Percentage Point (B)***

When the regular VAT rate is increased by one percentage point (from 19.0% to 20.0%) tax payments increase on average by Euro 2.2 per week, measured in money metric terms of the compensating variation (Table 25). This additional tax burden is of the same size as in the static scenario (Euro 1.9 per week), it is only marginally greater. This is because households slightly change their consumption bundles in turn of the increase in the regular rate, but in such a way that in general they shift consumption to the relatively more *expensive* goods, i.e. goods taxed at the regular rate. This reaction is unexpected, as households would rather be

expected to shift consumption *away* from more expensive goods, as the estimates for negative own-price elasticities indicate.<sup>20</sup> However, the effect is of only marginal size, i.e. consumption patterns do not change much as a result of this reform.

Despite the demand effect, the reform of increasing the regular rate by 1 percentage point has a slight regressive effect across the income distribution, as it also has in the static scenario. Related to income, the relative additional tax burden slightly decreases across the income distribution, from 0.47% in the lowest decile to 0.30% in the highest decile. This means that utility, in relative terms, is reduced slightly more for the poor than for the rich households due to this reform. This picture is inverted, though, when the increase in tax burden is related to total spending, instead of income, or when tax burden is broken down across the expenditure distribution (Table 26). Now, the rich suffer relatively more than the poor, as a consequence of disregarding their relatively greater savings.

The slight increase in tax burden through the reform is spread all across household composition. There is again not much variation in this effect over the groups (Table 27). When households are sorted according to the relative increase in tax burden, there are some changes in the demographic breakdown of this distribution, which result from behavioural response, apparent (Table 28). On the one hand, now, there are significantly more single adult households in the fifth quintile of households that are relative gainers from the reform (65.2%) than in the static scenario (53.3%), and in turn less in the quintile of losers (21.1% compared to 33.4% in the static scenario). On the other hand, among the group of losers there are now significantly more households with children (29.4%) than before behavioural response (22.6%), and respectively less in the higher quintiles of relative winners.

**Revenue Effects:** An increase in the regular VAT by one percentage point in the behavioural scenario would increase aggregate VAT revenues by Euro 4.2bn per year. If the revenue from the entire VAT system, as aggregated for the static scenario, is taken as a benchmark this would mean an increase from Euro 78.8bn to Euro 83.0bn. This increase in VAT revenue is Euro 0.6bn greater than for the same reform in the scenario omitting response. It translates into 5.33% of total aggregate VAT revenue from the static scenario. It amounts to 0.73% of total tax revenue and to 0.17% of GDP.

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<sup>20</sup> This behaviour may, however, result from additional relevant cross-price effects.

### ***Abolishing Reduced Rates – Substituted by Regular Rate (B)***

If reduced rates are abolished and substituted by the regular rate (19%), a greater behavioural response results compared to the preceding reforms. Here, households in general substitute away from the more expensive goods, i.e. those previously taxed at reduced rates, and thereby the additional average tax burden decreases significantly from, on average, Euro 9.3 per week before consumption response to Euro 4.0 per week thereafter (Table 29). However, behavioural adjustment is more pronounced among households in the upper deciles. For those households, additional tax burdens decrease significantly, e.g. from Euro 13.4 per week to Euro 4.3 per week in the highest decile, while for households in the lowest decile, they only decrease from Euro 4.9 per week to Euro 3.0 per week.

As a result, this reform still has a regressive effect on the income distribution, even after behavioural response, and this regressive effect now is rather stronger. The additional tax burden decreases continuously from 1.73% of net income in the lowest decile to 0.30% in the highest decile. The effect also remains if additional tax burdens are related to total spending, instead of income, and when tax burden is broken down across the expenditure distribution (Table 30). The regressive effect is increased by consumption response for this reform because of the commodity group of “food and non-alcoholic drinks at home”. This commodity group determines about 70% of the VAT revenue from reduced rates.<sup>21</sup> And it has a significantly greater share in the consumption bundle of low-income households than in those of high-income households. Furthermore, low-income households adjust food consumption only marginally in response to food price changes, and food prices increase as a result of this reform as they are taxed at reduced rates. As a result, overall consumption is found to be adjusted to a lesser degree among low-income households than among high-income households if reduced VAT rates are abolished.

The burden-reducing effect of behavioural response is also apparent in the distribution across household composition (Table 31). Now, no significant difference in the additional tax burden remains over the groups. Additional burdens in relation to income are slightly greater for households with no adult working, and relatively lower for households of more than one adult with kids, where adults are working.

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<sup>21</sup> See Bach (2011).

Sorting households by additional tax burden reveals further effects of behavioural consumption response, related to demographic characteristics (Table 32). On the one hand, while the groups of winners from this reform, before behavioural response, consist of households with children to a relatively low extent (18.9% in the fourth quintile and 11.3% in the fifth), now, after accounting for consumption adjustment, there are 27.2% and respectively 33.2% households with children in the upper quintiles, and in turn relatively less in the lower quintiles of losers. On the other hand, and related to this shift, single adult households move from the upper quintiles of winners to the lower quintiles of losers. Before response, there were 32.5% single adult households in the lowest quintile and now there are 65.8%. In this group of reform losers, there are now also significantly more households with no adult working (63.8%) as in the static scenario (49.7%) and in turn less households with more than one adult working (5.6%) than before response (17.5%). Furthermore, homeowners tend to move up slightly to the winning groups.

**Revenue Effects:** If the reduced rate of 7% is substituted by the regular rate of 19% and household consumption response is accounted for, aggregate VAT revenues increase by only Euro 7.5bn per year, from Euro 78.8bn to Euro 86.3bn. This increase in VAT revenue is by Euro 10.0bn lower than for the static scenario. It translates into 9.08% of total aggregate VAT revenue as simulated in this analysis. It amounts to 1.31% of total tax revenue and to 0.30% of GDP.

#### ***Abolishing Reduced Rates – Revenue Neutral (B)***

Now we turn to the results of the simulation of the revenue-neutral reform. This reform substitutes the reduced rate by a revenue-neutral regular rate. The revenue-neutral rate, now common for all goods, turns out to be 16.21%. It is slightly greater than for the static model, omitting behavioural response (15.54%), as households now substitute away from VAT increases. This means if reduced rates are abolished for all goods, the regular rate can be reduced from 19.00% by 2.79 percentage points to guarantee revenue neutrality. By definition of revenue neutrality, aggregate VAT revenues, after behavioural response, remain unchanged in this reform scenario.

Due to revenue neutrality from adjusting the regular VAT rate, the budget effect for an average household is again 0.0. Now, allowing households to adjust consumption behaviour to the new

common VAT rate, there results a little additional utility gain of Euro 3.1 per week, for an average household, in money metric welfare terms of the compensating variation (Table 33). This is because, on average, households gain utility from substituting relatively more expensive goods, i.e. those previously taxed at reduced rates, for relatively cheaper goods, i.e. those taxed at the, now lower, regular rate.

However, this utility gain is not spread evenly across the income distribution. Again, as in the static model, there remains a regressive effect of the reform after behavioural response. While the utility gain for households in the lowest income decile is virtually zero (0.00% of income), this gain increases continuously along the income distribution up to 0.59%, while the average household gains 0.49%. This regressive effect remains if burdens are related to spending, or broken down across the distribution of expenditures (Table 34). On the one hand, there is a progressive effect that results from the reduction of the regular rate, exclusively. This progressive effect, on the other hand, is however compensated by a stronger regressive effect due to the abolition of reduced rates.<sup>22</sup>

Nevertheless, while before response, more than 50% of all households turn out to lose from the reform, now there are significantly less losers (also see Table 36). And, losers are spread across the entire income distribution, as even in the lowest decile, on decile average, households gain slightly from the reform. Thus, even most of the poor households, which cannot substitute away much from the tax rate increase on basic goods like food, are compensated sufficiently by the reduction of the main rate (from 19.00% to 16.21%) in the course of this reform, such that they are almost indifferent between implementing the reform, or not implementing it.

Groups that gain more than others from this reform can also be identified when conditioning on household composition (Table 35). Households that have almost no utility gain (0.1) from the revenue-neutral reform after behavioural response can be found among the non-working, and especially among the non-working single adults (0.06% of income) and the non-working single parents (0.04%). Also single adults aged 60+ gain less than average (0.12%). For most other groups, utility gains are around average (0.49%), remarkable exceptions being

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<sup>22</sup> As about 70% of the revenue from reduced rates falls on food and low-income households have a greater share of food in consumption bundles, reduced rates are more regressive than regular rates. See Bach (2011). Now, if reduced rates are increased this alone has a relatively strong regressive effect, which in this reform compensates the progressive effect of the reduced regular rate.

households in which there are “more than one adult, more than one kid, one working” (0.67%) and “more than one adult, more than one kid, more than one working” (0.66%), who gain most by this reform.

When considering the demographic breakdown of relative winners and losers of the reform (Table 36), first of all it becomes apparent that there remain some losers from this reform, as in the first quintile households slightly lose utility, on average. This becomes also apparent in the breakdown across expenditures (Table 34). Moreover, similar effects from behavioural response, as at the corresponding non-revenue-neutral reform, are found. Again, households with children move from the lower quintiles into the upper ones, while single adult households move in the opposite direction from winners to losers. This effect is even slightly pronounced now that the reform is revenue-neutral. In the lowest quintile, there are now 69.2% single adult households (51.5% in the second quintile). Also non-working households tend to move into the losing quintiles, more than for the previous reform. Now, there are 70.0% non-working households in the first quintile and 54.0% in the second. In turn, households, in which more than one adult is working, move in the opposite direction. However, this effect is less pronounced than in the previous reform for households owning their home, of which there are now 61.7% in the winning quintile.

## 6 Conclusion

All in all, it seems that the reduction of the main VAT rate in the course of this revenue-neutral reform seems to compensate most of the households for additional tax burdens due to the abolition of reduced rates. Nevertheless, some losers remain, spread across the entire income distribution, and there are groups of households that gain relatively more than others. And those households that lose from this reform are more often found among the single households as well as the non-working, while households with children rather gain. Moreover, the compensating effect of this reform does not compensate low-income households sufficiently to eliminate the regressive effect of the abolition of reduced rates. There remains a slight regressive effect of this reform, as for all other reforms, which is persistent even when savings are discarded.



The regressive effect on the income distribution, which is a characteristic of VAT systems in general, can also be found for VAT reforms aiming at abolishing reduced tax rates, either with, or without a combined reduction in the regular rate, or at solely increasing the regular rate. Moreover, household response in consumption does not eliminate the regressive effect entirely. While most households manage to substitute away from goods that are taxed at increasing reduced rates, if they are compensated in turn by a reduction in the regular rate, gains are distributed unevenly across the income distribution, such that richer households tend to gain more from a revenue-neutral reform than poorer households, and households with children more than non-working households and single households.

## Appendix

### *Elasticities Tables*

**Table 1** Estimates for Income and *Compensated* Price Elasticities – *Constrained* Estimation

	Food	Services	Medical	Transport	Energy	Leisure	Restaurants
Food	<b>-0.43</b>	0.01	-0.01	-0.01	-0.18	0.40	0.21
Services	0.06	<b>-1.42</b>	-0.02	0.13	0.18	0.13	0.94
Medical	0.11	0.02	<b>-0.61</b>	-0.07	0.26	0.29	0.01
Transport	-0.06	0.07	0.02	<b>-0.41</b>	0.34	0.43	-0.39
Energy	-0.33	0.14	0.07	0.52	<b>-1.10</b>	-0.24	0.93
Leisure	0.75	0.10	0.19	0.58	-0.21	<b>-1.68</b>	0.27
Restaurants	0.49	0.92	0.07	-0.72	1.15	0.38	<b>-2.28</b>
Income El.	0.56	0.80	2.25	1.13	0.61	1.34	1.29

Notes: Price and income elasticities evaluated at sample means.

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 2 Estimates for Income and *Uncompensated* Price Elasticities – *Constrained* Estimation**

	Food	Services	Medical	Transport	Energy	Leisure	Restaurants
Food	<b>-0.58</b>	-0.04	-0.05	-0.11	-0.25	0.32	0.15
Services	-0.16	<b>-1.50</b>	-0.07	-0.02	0.08	0.02	0.85
Medical	-0.49	-0.21	<b>-0.77</b>	-0.50	-0.03	-0.02	-0.22
Transport	-0.36	-0.05	-0.06	<b>-0.63</b>	0.19	0.28	-0.50
Energy	-0.49	0.08	0.03	0.41	<b>-1.18</b>	-0.32	0.87
Leisure	0.40	-0.04	0.10	0.32	-0.39	<b>-1.87</b>	0.14
Restaurants	0.14	0.79	-0.02	-0.97	0.98	0.20	<b>-2.42</b>
Income El.	0.56	0.80	2.25	1.13	0.61	1.34	1.29

Notes: Price and income elasticities evaluated at sample means.

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 3 Estimates for Income and *Compensated* Price Elasticities – *Unconstrained* Estimation**

	Food	Services	Medical	Transport	Energy	Leisure	Restaurants
Food	<b>0.61</b>	-0.03	0.20	-0.20	-0.24	0.64	1.17
Services	-0.28	<b>-1.73</b>	0.04	-0.05	-0.18	0.17	1.19
Medical	-0.73	1.06	<b>-1.05</b>	1.56	-0.87	-0.09	2.69
Transport	-0.74	0.38	-0.01	<b>-0.13</b>	0.38	0.58	-2.11
Energy	0.63	0.07	0.29	0.38	<b>-1.36</b>	-0.13	-0.58
Leisure	0.15	-0.07	-0.08	-0.21	1.14	<b>-2.01</b>	3.05
Restaurants	-0.42	0.37	-0.07	-0.45	0.86	0.02	<b>-5.50</b>
Income El.	0.56	0.80	2.25	1.13	0.61	1.34	1.29

Notes: Price and income elasticities evaluated at sample means.

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 4 Estimates for Income and *Uncompensated* Price Elasticities – *Unconstrained* Estimation**

	Food	Services	Medical	Transport	Energy	Leisure	Restaurants
Food	<b>0.46</b>	-0.09	0.16	-0.31	-0.31	0.56	1.11
Services	-0.49	<b>-1.81</b>	-0.02	-0.21	-0.28	0.06	1.11
Medical	-1.33	0.83	<b>-1.21</b>	1.14	-1.16	-0.40	2.46
Transport	-1.04	0.26	-0.09	<b>-0.35</b>	0.23	0.42	-2.23
Energy	0.47	0.00	0.25	0.27	<b>-1.44</b>	-0.22	-0.64
Leisure	-0.21	-0.20	-0.18	-0.47	0.97	<b>-2.19</b>	2.91
Restaurants	-0.76	0.24	-0.16	-0.69	0.69	-0.16	<b>-5.64</b>
Income El.	0.56	0.80	2.25	1.13	0.61	1.34	1.29

Notes: Price and income elasticities evaluated at sample means.

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

## Results Tables – Static Analysis

**Table 5 Abolishing VAT altogether – Changes in VAT payments across the income distribution (S)**

Income Decile Group	Average VAT Payment per household			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
Poorest	16.7	9.78	7.45	171	224	3,618,899	378
2	23.7	8.30	8.20	286	289	3,606,492	466
3	27.4	7.40	8.13	370	336	3,607,429	529
4	33.3	7.43	8.37	448	398	3,612,900	590
5	37.7	7.13	8.49	529	444	3,609,379	663
6	42.1	6.96	8.42	604	499	3,610,875	748
7	49.3	7.07	8.81	698	559	3,611,505	831
8	49.9	6.25	8.48	799	589	3,612,256	973
9	60.5	6.25	8.70	967	695	3,608,334	1,187
Richest	79.3	5.46	8.88	1454	894	3,607,101	1,332
All	42.0	6.64	8.52	632	493	36,105,171	7,697

Notes:

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 6 Abolishing VAT altogether – Changes in VAT payments across the expenditure distribution (S)**

Spending Decile Group	Average VAT Payment per household			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
Poorest	13.2	5.18	7.14	255	185	3,612,140	415
2	19.8	5.31	7.59	372	261	3,616,286	515
3	25.6	5.56	7.91	460	323	3,604,526	567
4	29.5	5.87	8.18	503	361	3,611,506	644
5	35.1	6.01	8.38	584	419	3,610,156	670
6	37.9	5.93	8.30	638	456	3,611,172	781
7	44.5	6.32	8.61	704	516	3,611,170	826
8	51.2	6.38	8.63	803	594	3,610,010	974
9	60.8	6.91	8.79	880	692	3,610,700	1,093
Richest	102.3	9.09	9.13	1125	1121	3,607,504	1,212
All	42.0	6.64	8.52	632	493	36,105,171	7,697

Notes:

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 7 Abolishing VAT altogether -- Changes in VAT payments across household composition (S)**

Household Composition	Average VAT Payment per household			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
1 adult, no kids, 1 working	32.7	6.74	8.70	486	376	5,307,186	838
1 adult, no kids, 0 working	17.6	7.62	7.87	231	224	2,288,492	216
1 adult, kids, 1 working	37.7	7.46	8.70	506	434	715,002	148
1 adult, kids, 0 working	23.5	7.05	7.98	333	294	415,299	50
>1 adult, no kids, 0 working	36.3	8.40	8.65	433	420	904,784	191
>1 adult, no kids, 1 working	48.5	6.58	8.73	737	556	3,028,051	738
>1 adult, no kids, >1 working	62.4	6.36	9.04	980	690	4,404,750	1,369
>1 adult, 1 kid, 0 working	27.2	6.72	8.16	405	334	194,882	38
>1 adult, 1 kid, 1 working	49.9	6.66	8.51	749	586	1,076,255	209
>1 adult, 1 kid, >1 working	61.6	6.43	8.82	957	698	1,555,568	383
>1 adult, >1 kid, 0 working	37.0	7.69	8.28	482	447	143,230	32
>1 adult, >1 kid, 1 working	63.3	6.59	8.70	959	727	1,682,437	343
>1 adult, >1 kid, >1 working	69.2	6.54	9.09	1058	761	1,552,968	374
1 adult, aged 60+	23.5	6.55	7.57	359	311	6,551,864	950
>1 adult, all aged 60+	45.0	6.67	8.16	674	551	6,284,404	1,818
All	42.0	6.64	8.52	632	493	36,105,171	7,697

Notes:

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.



**Table 8 Abolishing VAT altogether -- Changes in Demographic breakdown across the distribution of tax payments (S)**

Demographic Breakdown	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Average
Average tax payment as % of total spending <sup>1)</sup>	5.2	7.2	8.2	9.2	11.1	8.5
Average age of adults in household	58.7	55.7	52.4	50.5	49.0	53.3
% of single adult households	54.9	44.6	35.2	31.1	30.2	39.2
% of households with children	11.2	16.7	24.3	26.4	23.6	20.4
Average number of children (if children)	1.6	1.6	1.7	1.6	1.6	1.6
Age of youngest child (if children)	8.8	9.2	9.0	9.5	9.7	9.3
% of households with low education of head	10.2	8.2	7.8	5.6	5.1	7.4
% of workless households	61.5	51.8	41.1	31.4	26.2	42.4
% of households with 1 adult working	27.5	32.4	39.4	41.4	39.9	36.1
% of households with >1 adult working	9.4	14.1	17.9	23.9	30.6	19.2
% of households owning their home	51.3	50.3	49.0	48.2	41.7	48.1

Notes: <sup>1)</sup> Quintile sums.

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 9 Increasing the regular rate by 1 ppt -- Changes in VAT payments across the income distribution (S)**

Income Decile Group	Average VAT Payment per household			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
Poorest	-0.7	-0.43	-0.33	171	224	3,618,899	378
2	-1.1	-0.37	-0.37	286	289	3,606,492	466
3	-1.2	-0.33	-0.36	370	336	3,607,429	529
4	-1.5	-0.33	-0.38	448	398	3,612,900	590
5	-1.7	-0.32	-0.38	529	444	3,609,379	663
6	-1.9	-0.32	-0.38	604	499	3,610,875	748
7	-2.3	-0.33	-0.41	698	559	3,611,505	831
8	-2.3	-0.29	-0.39	799	589	3,612,256	973
9	-2.8	-0.29	-0.40	967	695	3,608,334	1,187
Richest	-3.8	-0.26	-0.42	1454	894	3,607,101	1,332
All	-1.9	-0.30	-0.39	632	493	36,105,171	7,697

Notes:

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 10 Increasing the regular rate by 1 ppt -- Changes in VAT payments across the expenditure distribution (S)**

Spending Decile Group	Average VAT Payment per household			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
Poorest	-0.6	-0.22	-0.30	255	185	3,612,140	415
2	-0.9	-0.23	-0.33	372	261	3,616,286	515
3	-1.1	-0.24	-0.35	460	323	3,604,526	567
4	-1.3	-0.26	-0.36	503	361	3,611,506	644
5	-1.6	-0.27	-0.37	584	419	3,610,156	670
6	-1.7	-0.27	-0.37	638	456	3,611,172	781
7	-2.0	-0.29	-0.39	704	516	3,611,170	826
8	-2.3	-0.29	-0.39	803	594	3,610,010	974
9	-2.8	-0.32	-0.41	880	692	3,610,700	1,093
Richest	-4.9	-0.44	-0.44	1125	1121	3,607,504	1,212
All	-1.9	-0.30	-0.39	632	493	36,105,171	7,697

Notes:

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 11 Increasing the regular rate by 1 ppt -- Changes in VAT payments across household composition (S)**

Household Composition	Average VAT Payment per household			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
1 adult, no kids, 1 working	-1.5	-0.32	-0.41	486	376	5,307,186	838
1 adult, no kids, 0 working	-0.8	-0.34	-0.35	231	224	2,288,492	216
1 adult, kids, 1 working	-1.7	-0.35	-0.40	506	434	715,002	148
1 adult, kids, 0 working	-1.0	-0.31	-0.35	333	294	415,299	50
>1 adult, no kids, 0 working	-1.7	-0.38	-0.40	433	420	904,784	191
>1 adult, no kids, 1 working	-2.2	-0.30	-0.40	737	556	3,028,051	738
>1 adult, no kids, >1 working	-2.9	-0.30	-0.42	980	690	4,404,750	1,369
>1 adult, 1 kid, 0 working	-1.2	-0.29	-0.35	405	334	194,882	38
>1 adult, 1 kid, 1 working	-2.3	-0.30	-0.38	749	586	1,076,255	209
>1 adult, 1 kid, >1 working	-2.8	-0.29	-0.40	957	698	1,555,568	383
>1 adult, >1 kid, 0 working	-1.6	-0.34	-0.36	482	447	143,230	32
>1 adult, >1 kid, 1 working	-2.9	-0.30	-0.40	959	727	1,682,437	343
>1 adult, >1 kid, >1 working	-3.2	-0.30	-0.41	1058	761	1,552,968	374
1 adult, aged 60+	-1.1	-0.30	-0.34	359	311	6,551,864	950
>1 adult, all aged 60+	-2.0	-0.30	-0.37	674	551	6,284,404	1,818
All	-1.9	-0.30	-0.39	632	493	36,105,171	7,697

Notes:

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 12 Increasing the regular rate by 1 ppt -- Changes in Demographic breakdown across the distribution of tax payments (S)**

Demographic Breakdown	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Average
Average gain/loss as % of total spending <sup>1)</sup>	-0.5	-0.4	-0.4	-0.3	-0.2	-0.4
Average age of adults in household	49.1	50.6	52.2	55.9	58.7	53.3
% of single adult households	33.4	30.9	33.8	44.5	53.3	39.2
% of households with children	22.6	26.2	25.1	17.0	11.3	20.4
Average number of children (if children)	1.6	1.7	1.6	1.7	1.6	1.6
Age of youngest child (if children)	9.5	9.7	9.1	9.4	8.6	9.3
% of households with low education of head	5.2	5.3	8.5	7.3	10.5	7.4
% of workless households	26.0	30.9	41.1	52.4	61.3	42.4
% of households with 1 adult working	41.4	41.4	38.4	31.9	27.5	36.1
% of households with >1 adult working	29.1	24.6	18.6	13.7	9.9	19.2
% of households owning their home	44.0	49.3	50.8	48.3	48.1	48.1

Notes: <sup>1)</sup> Quintile sums. A positive figure denotes a gain in terms of a lower tax payment, whereas a negative number denotes a loss in terms of a higher tax payment.

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 13 Substituting reduced rates by regular rate -- Changes in VAT payments across the income distribution (S)**

Income Decile Group	Average VAT Payment per household			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
Poorest	-4.9	-2.84	-2.17	171	224	3,618,899	378
2	-6.2	-2.18	-2.16	286	289	3,606,492	466
3	-7.1	-1.93	-2.12	370	336	3,607,429	529
4	-8.5	-1.90	-2.14	448	398	3,612,900	590
5	-9.1	-1.72	-2.05	529	444	3,609,379	663
6	-10.0	-1.65	-2.00	604	499	3,610,875	748
7	-10.7	-1.53	-1.91	698	559	3,611,505	831
8	-11.3	-1.42	-1.93	799	589	3,612,256	973
9	-12.2	-1.26	-1.75	967	695	3,608,334	1,187
Richest	-13.4	-0.92	-1.50	1454	894	3,607,101	1,332
All	-9.3	-1.48	-1.89	632	493	36,105,171	7,697

Notes:

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 14 Substituting reduced rates by regular rate -- Changes in VAT payments across the expenditure distribution (S)**

Spending Decile Group	Average VAT Payment per household			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
Poorest	-4.4	-1.71	-2.35	255	185	3,612,140	415
2	-6.0	-1.62	-2.31	372	261	3,616,286	515
3	-7.3	-1.59	-2.26	460	323	3,604,526	567
4	-8.0	-1.60	-2.23	503	361	3,611,506	644
5	-9.3	-1.60	-2.23	584	419	3,610,156	670
6	-9.7	-1.52	-2.13	638	456	3,611,172	781
7	-10.4	-1.47	-2.00	704	516	3,611,170	826
8	-11.5	-1.43	-1.94	803	594	3,610,010	974
9	-12.4	-1.41	-1.80	880	692	3,610,700	1,093
Richest	-14.3	-1.27	-1.28	1125	1121	3,607,504	1,212
All	-9.3	-1.48	-1.89	632	493	36,105,171	7,697

Notes:

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 15 Substituting reduced rates by regular rate -- Changes in VAT payments across household composition (S)**

Household Composition	Average VAT Payment per household			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
1 adult, no kids, 1 working	-5.9	-1.21	-1.56	486	376	5,307,186	838
1 adult, no kids, 0 working	-4.3	-1.86	-1.92	231	224	2,288,492	216
1 adult, kids, 1 working	-7.8	-1.55	-1.81	506	434	715,002	148
1 adult, kids, 0 working	-6.5	-1.94	-2.20	333	294	415,299	50
>1 adult, no kids, 0 working	-8.1	-1.86	-1.92	433	420	904,784	191
>1 adult, no kids, 1 working	-11.0	-1.49	-1.97	737	556	3,028,051	738
>1 adult, no kids, >1 working	-12.4	-1.26	-1.80	980	690	4,404,750	1,369
>1 adult, 1 kid, 0 working	-8.3	-2.04	-2.47	405	334	194,882	38
>1 adult, 1 kid, 1 working	-12.1	-1.62	-2.06	749	586	1,076,255	209
>1 adult, 1 kid, >1 working	-14.0	-1.46	-2.00	957	698	1,555,568	383
>1 adult, >1 kid, 0 working	-10.9	-2.26	-2.43	482	447	143,230	32
>1 adult, >1 kid, 1 working	-14.8	-1.54	-2.04	959	727	1,682,437	343
>1 adult, >1 kid, >1 working	-15.7	-1.49	-2.06	1058	761	1,552,968	374
1 adult, aged 60+	-5.7	-1.58	-1.82	359	311	6,551,864	950
>1 adult, all aged 60+	-10.9	-1.61	-1.97	674	551	6,284,404	1,818
All	-9.3	-1.48	-1.89	632	493	36,105,171	7,697

Notes:

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.



**Table 16 Substituting reduced rates by regular rate -- Changes in Demographic breakdown across the distribution of tax payments (S)**

Demographic Breakdown	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Average
Average gain/loss as % of total spending <sup>1)</sup>	-3.1	-2.4	-2.0	-1.6	-1.0	-1.9
Average age of adults in household	54.7	52.8	52.3	52.8	53.8	53.3
% of single adult households	32.5	32.5	35.8	43.1	52.0	39.2
% of households with children	22.7	25.6	23.7	18.9	11.3	20.4
Average number of children (if children)	1.7	1.6	1.7	1.6	1.5	1.6
Age of youngest child (if children)	10.0	10.0	9.3	8.1	8.8	9.3
% of households with low education of head	8.9	7.5	7.5	6.6	6.3	7.4
% of workless households	49.7	43.3	37.2	40.1	41.5	42.4
% of households with 1 adult working	30.5	33.5	38.8	37.2	40.6	36.1
% of households with >1 adult working	17.5	21.0	21.6	19.8	15.9	19.2
% of households owning their home	34.1	45.0	49.7	54.5	57.1	48.1

Notes: <sup>1)</sup> Quintile sums. A positive figure denotes a gain in terms of a lower tax payment, whereas a negative number denotes a loss in terms of a higher tax payment.

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 17 Substituting reduced rates by revenue-neutral rate -- Changes in VAT payments across the income distribution (S)**

Income Decile Group	Average VAT Payment per household			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
Poorest	-0.9	-0.54	-0.41	171	224	3,618,899	378
2	-0.8	-0.27	-0.27	286	289	3,606,492	466
3	-0.8	-0.23	-0.25	370	336	3,607,429	529
4	-0.9	-0.20	-0.22	448	398	3,612,900	590
5	-0.6	-0.11	-0.13	529	444	3,609,379	663
6	-0.5	-0.08	-0.10	604	499	3,610,875	748
7	0.3	0.04	0.05	698	559	3,611,505	831
8	-0.2	-0.02	-0.03	799	589	3,612,256	973
9	1.1	0.11	0.15	967	695	3,608,334	1,187
Richest	3.5	0.24	0.39	1454	894	3,607,101	1,332
All	0.0	0.00	0.00	632	493	36,105,171	7,697

Notes:

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 18 Substituting reduced rates by revenue-neutral rate -- Changes in VAT payments across the expenditure distribution (S)**

Spending Decile Group	Average VAT Payment per household			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
Poorest	-1.2	-0.45	-0.62	255	185	3,612,140	415
2	-1.3	-0.35	-0.51	372	261	3,616,286	515
3	-1.3	-0.29	-0.41	460	323	3,604,526	567
4	-1.2	-0.24	-0.33	503	361	3,611,506	644
5	-1.2	-0.21	-0.29	584	419	3,610,156	670
6	-1.1	-0.17	-0.23	638	456	3,611,172	781
7	-0.4	-0.05	-0.07	704	516	3,611,170	826
8	-0.1	-0.01	-0.01	803	594	3,610,010	974
9	0.9	0.10	0.13	880	692	3,610,700	1,093
Richest	6.9	0.62	0.62	1125	1121	3,607,504	1,212
All	0.0	0.00	0.00	632	493	36,105,171	7,697

Notes:

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 19 Substituting reduced rates by revenue-neutral rate -- Changes in VAT payments across household composition (S)**

Household Composition	Average VAT Payment per household			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
1 adult, no kids, 1 working	1.2	0.24	0.31	486	376	5,307,186	838
1 adult, no kids, 0 working	-0.3	-0.14	-0.14	231	224	2,288,492	216
1 adult, kids, 1 working	0.5	0.09	0.10	506	434	715,002	148
1 adult, kids, 0 working	-1.0	-0.30	-0.34	333	294	415,299	50
>1 adult, no kids, 0 working	0.0	0.01	0.01	433	420	904,784	191
>1 adult, no kids, 1 working	-0.1	-0.02	-0.02	737	556	3,028,051	738
>1 adult, no kids, >1 working	1.2	0.13	0.18	980	690	4,404,750	1,369
>1 adult, 1 kid, 0 working	-1.8	-0.44	-0.54	405	334	194,882	38
>1 adult, 1 kid, 1 working	-0.8	-0.11	-0.14	749	586	1,076,255	209
>1 adult, 1 kid, >1 working	-0.2	-0.02	-0.03	957	698	1,555,568	383
>1 adult, >1 kid, 0 working	-2.1	-0.45	-0.48	482	447	143,230	32
>1 adult, >1 kid, 1 working	-0.6	-0.06	-0.08	959	727	1,682,437	343
>1 adult, >1 kid, >1 working	-0.3	-0.02	-0.03	1058	761	1,552,968	374
1 adult, aged 60+	-0.4	-0.10	-0.11	359	311	6,551,864	950
>1 adult, all aged 60+	-0.7	-0.10	-0.13	674	551	6,284,404	1,818
All	0.0	0.00	0.00	632	493	36,105,171	7,697

Notes:

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 20 Substituting reduced rates by revenue-neutral rate -- Changes in Demographic breakdown across the distribution of tax payments (S)**

Demographic Breakdown	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Average
Average gain/loss as % of total spending <sup>1)</sup>	-1.1	-0.5	-0.2	0.2	0.9	0.0
Average age of adults in household	56.6	54.5	52.9	51.9	50.5	53.3
% of single adult households	39.6	36.8	36.7	36.8	46.0	39.2
% of households with children	18.4	22.3	23.5	22.3	15.6	20.4
Average number of children (if children)	1.6	1.7	1.7	1.6	1.5	1.6
Age of youngest child (if children)	10.0	9.5	9.5	8.6	9.1	9.3
% of households with low education of head	9.9	7.7	8.1	5.8	5.4	7.4
% of workless households	57.0	46.8	41.8	35.4	30.8	42.4
% of households with 1 adult working	27.9	33.1	36.1	39.5	44.0	36.1
% of households with >1 adult working	13.3	18.2	19.7	22.5	22.2	19.2
% of households owning their home	37.5	45.9	52.1	54.1	50.9	48.1

Notes: <sup>1)</sup> Quintile sums. A positive figure denotes a gain in terms of a lower tax payment, whereas a negative number denotes a loss in terms of a higher tax payment.

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

## Results Tables – Behavioural Analysis

**Table 21 Abolishing VAT altogether -- Changes in VAT payments across the income distribution (B)**

Income Decile Group	Average VAT Payment per household <sup>1)</sup>			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
Poorest	16.3	9.53	7.26	171	224	3,618,899	378
2	23.5	8.24	8.14	286	289	3,606,492	466
3	27.3	7.39	8.12	370	336	3,607,429	529
4	33.4	7.46	8.40	448	398	3,612,900	590
5	38.2	7.22	8.60	529	444	3,609,379	663
6	42.5	7.04	8.51	604	499	3,610,875	748
7	49.6	7.11	8.87	698	559	3,611,505	831
8	50.9	6.37	8.64	799	589	3,612,256	973
9	61.2	6.33	8.81	967	695	3,608,334	1,187
Richest	80.8	5.56	9.04	1454	894	3,607,101	1,332
All	42.4	6.70	8.60	632	493	36,105,171	7,697

Notes: <sup>1)</sup> Measured in terms of the compensating variation (CV).

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 22 Abolishing VAT altogether -- Changes in VAT payments across the expenditure distribution (B)**

Spending Decile Group	Average VAT Payment per household <sup>1)</sup>			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
Poorest	12.6	4.95	6.82	255	185	3,612,140	415
2	19.5	5.23	7.48	372	261	3,616,286	515
3	25.7	5.59	7.96	460	323	3,604,526	567
4	29.6	5.89	8.21	503	361	3,611,506	644
5	35.6	6.09	8.50	584	419	3,610,156	670
6	38.2	5.98	8.37	638	456	3,611,172	781
7	44.8	6.36	8.67	704	516	3,611,170	826
8	52.1	6.49	8.78	803	594	3,610,010	974
9	61.5	6.99	8.89	880	692	3,610,700	1,093
Richest	104.2	9.26	9.30	1125	1121	3,607,504	1,212
All	42.4	6.70	8.60	632	493	36,105,171	7,697

Notes: <sup>1)</sup> Measured in terms of the compensating variation (CV).

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 23 Abolishing VAT altogether -- Changes in VAT payments across household composition (B)**

Household Composition	Average VAT Payment per household <sup>1)</sup>			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
1 adult, no kids, 1 working	32.2	6.64	8.58	486	376	5,307,186	838
1 adult, no kids, 0 working	16.9	7.33	7.56	231	224	2,288,492	216
1 adult, kids, 1 working	38.0	7.51	8.76	506	434	715,002	148
1 adult, kids, 0 working	22.7	6.82	7.72	333	294	415,299	50
>1 adult, no kids, 0 working	36.0	8.31	8.56	433	420	904,784	191
>1 adult, no kids, 1 working	49.3	6.69	8.87	737	556	3,028,051	738
>1 adult, no kids, >1 working	62.8	6.41	9.11	980	690	4,404,750	1,369
>1 adult, 1 kid, 0 working	27.3	6.75	8.19	405	334	194,882	38
>1 adult, 1 kid, 1 working	50.5	6.74	8.61	749	586	1,076,255	209
>1 adult, 1 kid, >1 working	63.2	6.61	9.06	957	698	1,555,568	383
>1 adult, >1 kid, 0 working	37.4	7.76	8.36	482	447	143,230	32
>1 adult, >1 kid, 1 working	65.0	6.78	8.95	959	727	1,682,437	343
>1 adult, >1 kid, >1 working	70.5	6.66	9.26	1058	761	1,552,968	374
1 adult, aged 60+	23.3	6.50	7.50	359	311	6,551,864	950
>1 adult, all aged 60+	46.2	6.84	8.38	674	551	6,284,404	1,818
All	42.4	6.70	8.60	632	493	36,105,171	7,697

Notes: <sup>1)</sup> Measured in terms of the compensating variation (CV).

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.



**Table 24 Abolishing VAT altogether -- Changes in Demographic breakdown across the distribution of tax payments (B)**

Demographic Breakdown	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Average
Average tax payments as % of total spending <sup>1)</sup>	5.1	7.2	8.2	9.2	11.2	8.6
Average age of adults in household	58.8	55.0	53.4	50.4	48.8	53.3
% of single adult households	60.6	44.9	36.1	29.9	24.5	39.2
% of households with children	10.5	16.5	21.9	25.8	27.4	20.4
Average number of children (if children)	1.6	1.6	1.6	1.6	1.7	1.6
Age of youngest child (if children)	9.0	9.3	9.3	9.1	9.8	9.3
% of households with low education of head	11.7	7.5	7.0	6.4	4.2	7.4
% of workless households	64.2	49.7	41.4	32.7	23.9	42.4
% of households with 1 adult working	26.7	34.7	37.2	42.3	39.8	36.1
% of households with >1 adult working	7.8	13.6	19.1	22.5	32.8	19.2
% of households owning their home	47.2	52.3	50.5	48.0	42.4	48.1

Notes: <sup>1)</sup> Quintile sums. Measured in terms of the compensating variation (CV).

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 25 Increasing the regular rate by 1 ppt -- Changes in VAT payments across the income distribution (B)**

Income Decile Group	Average VAT Payment per household <sup>1)</sup>			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
Poorest	-0.8	-0.47	-0.36	171	224	3,618,899	378
2	-1.2	-0.42	-0.41	286	289	3,606,492	466
3	-1.4	-0.38	-0.41	370	336	3,607,429	529
4	-1.7	-0.39	-0.43	448	398	3,612,900	590
5	-2.0	-0.38	-0.45	529	444	3,609,379	663
6	-2.2	-0.37	-0.44	604	499	3,610,875	748
7	-2.6	-0.37	-0.46	698	559	3,611,505	831
8	-2.7	-0.33	-0.45	799	589	3,612,256	973
9	-3.2	-0.33	-0.46	967	695	3,608,334	1,187
Richest	-4.3	-0.30	-0.48	1454	894	3,607,101	1,332
All	-2.2	-0.35	-0.45	632	493	36,105,171	7,697

Notes: <sup>1)</sup> Measured in terms of the compensating variation (CV).

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 26 Increasing the regular rate by 1 ppt -- Changes in VAT payments across the expenditure distribution (B)**

Spending Decile Group	Average VAT Payment per household <sup>1)</sup>			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
Poorest	-0.6	-0.24	-0.33	255	185	3,612,140	415
2	-1.0	-0.26	-0.38	372	261	3,616,286	515
3	-1.3	-0.29	-0.41	460	323	3,604,526	567
4	-1.5	-0.30	-0.42	503	361	3,611,506	644
5	-1.8	-0.32	-0.44	584	419	3,610,156	670
6	-2.0	-0.31	-0.43	638	456	3,611,172	781
7	-2.3	-0.33	-0.45	704	516	3,611,170	826
8	-2.7	-0.34	-0.46	803	594	3,610,010	974
9	-3.2	-0.37	-0.47	880	692	3,610,700	1,093
Richest	-5.5	-0.49	-0.49	1125	1121	3,607,504	1,212
All	-2.2	-0.35	-0.45	632	493	36,105,171	7,697

Notes: <sup>1)</sup> Measured in terms of the compensating variation (CV).

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 27 Increasing the regular rate by 1 ppt -- Changes in VAT payments across household composition (B)**

Household Composition	Average VAT Payment per household <sup>1)</sup>			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
1 adult, no kids, 1 working	-1.7	-0.34	-0.44	486	376	5,307,186	838
1 adult, no kids, 0 working	-0.8	-0.37	-0.38	231	224	2,288,492	216
1 adult, kids, 1 working	-2.0	-0.39	-0.46	506	434	715,002	148
1 adult, kids, 0 working	-1.1	-0.34	-0.39	333	294	415,299	50
>1 adult, no kids, 0 working	-1.9	-0.43	-0.44	433	420	904,784	191
>1 adult, no kids, 1 working	-2.6	-0.35	-0.47	737	556	3,028,051	738
>1 adult, no kids, >1 working	-3.3	-0.34	-0.48	980	690	4,404,750	1,369
>1 adult, 1 kid, 0 working	-1.4	-0.34	-0.42	405	334	194,882	38
>1 adult, 1 kid, 1 working	-2.7	-0.36	-0.45	749	586	1,076,255	209
>1 adult, 1 kid, >1 working	-3.4	-0.35	-0.48	957	698	1,555,568	383
>1 adult, >1 kid, 0 working	-1.9	-0.40	-0.43	482	447	143,230	32
>1 adult, >1 kid, 1 working	-3.4	-0.36	-0.47	959	727	1,682,437	343
>1 adult, >1 kid, >1 working	-3.7	-0.35	-0.49	1058	761	1,552,968	374
1 adult, aged 60+	-1.2	-0.33	-0.38	359	311	6,551,865	950
>1 adult, all aged 60+	-2.4	-0.36	-0.44	674	551	6,284,404	1,818
All	-2.2	-0.35	-0.45	632	493	36,105,171	7,697

Notes: <sup>1)</sup> Measured in terms of the compensating variation (CV).

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 28 Increasing the regular rate by 1 ppt -- Changes in Demographic breakdown across the distribution of tax payments (B)**

Demographic Breakdown	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Average
Average gain/loss <sup>2)</sup> as % of total spending <sup>1)</sup>	-0.6	-0.5	-0.4	-0.4	-0.2	-0.4
Average age of adults in household	48.3	49.9	53.4	55.8	59.0	53.3
% of single adult households	21.1	28.8	35.5	45.4	65.2	39.2
% of households with children	29.4	27.5	21.1	15.2	9.1	20.4
Average number of children (if children)	1.7	1.7	1.6	1.7	1.6	1.6
Age of youngest child (if children)	9.6	9.1	9.4	9.3	8.9	9.3
% of households with low education of head	4.6	4.4	7.3	8.6	11.9	7.4
% of workless households	21.8	30.4	42.1	50.8	66.7	42.4
% of households with 1 adult working	40.1	43.0	37.4	34.4	25.7	36.1
% of households with >1 adult working	34.5	23.7	18.5	12.6	6.6	19.2
% of households owning their home	45.6	49.6	52.3	51.5	41.5	48.1

Notes: <sup>1)</sup> Quintile sums. A positive figure denotes a gain in terms of a lower tax payment, whereas a negative number denotes a loss in terms of a higher tax payment. <sup>2)</sup> Measured in terms of the compensating variation (CV).

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 29 Substituting reduced rates by regular rate -- Changes in VAT payments across the income distribution (B)**

Income Decile Group	Average VAT Payment per household <sup>1)</sup>			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
Poorest	-3.0	-1.73	-1.32	171	224	3,618,899	378
2	-3.4	-1.20	-1.19	286	289	3,606,492	466
3	-3.8	-1.02	-1.12	370	336	3,607,429	529
4	-3.9	-0.88	-0.99	448	398	3,612,900	590
5	-4.1	-0.77	-0.92	529	444	3,609,379	663
6	-4.2	-0.70	-0.84	604	499	3,610,875	748
7	-4.4	-0.63	-0.78	698	559	3,611,505	831
8	-4.4	-0.55	-0.75	799	589	3,612,256	973
9	-4.4	-0.46	-0.64	967	695	3,608,334	1,187
Richest	-4.3	-0.30	-0.48	1454	894	3,607,101	1,332
All	-4.0	-0.63	-0.81	632	493	36,105,171	7,697

Notes: <sup>1)</sup> Measured in terms of the compensating variation (CV).

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 30 Substituting reduced rates by regular rate -- Changes in VAT payments across the expenditure distribution (B)**

Spending Decile Group	Average VAT Payment per household <sup>1)</sup>			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
Poorest	-2.6	-1.03	-1.42	255	185	3,612,140	415
2	-3.3	-0.89	-1.27	372	261	3,616,286	515
3	-3.6	-0.79	-1.12	460	323	3,604,526	567
4	-3.9	-0.78	-1.09	503	361	3,611,506	644
5	-4.2	-0.71	-0.99	584	419	3,610,156	670
6	-4.4	-0.68	-0.96	638	456	3,611,172	781
7	-4.3	-0.62	-0.84	704	516	3,611,170	826
8	-4.5	-0.56	-0.75	803	594	3,610,010	974
9	-4.7	-0.53	-0.67	880	692	3,610,700	1,093
Richest	-4.4	-0.39	-0.39	1125	1121	3,607,504	1,212
All	-4.0	-0.63	-0.81	632	493	36,105,171	7,697

Notes: <sup>1)</sup> Measured in terms of the compensating variation (CV).

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 31 Substituting reduced rates by regular rate -- Changes in VAT payments across household composition (B)**

Household Composition	Average VAT Payment per household <sup>1)</sup>			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
1 adult, no kids, 1 working	-3.6	-0.73	-0.95	486	376	5,307,186	838
1 adult, no kids, 0 working	-2.9	-1.25	-1.29	231	224	2,288,492	216
1 adult, kids, 1 working	-3.7	-0.73	-0.85	506	434	715,002	148
1 adult, kids, 0 working	-4.0	-1.19	-1.34	333	294	415,299	50
>1 adult, no kids, 0 working	-3.9	-0.91	-0.94	433	420	904,784	191
>1 adult, no kids, 1 working	-4.4	-0.60	-0.79	737	556	3,028,051	738
>1 adult, no kids, >1 working	-4.4	-0.45	-0.63	980	690	4,404,750	1,369
>1 adult, 1 kid, 0 working	-4.0	-0.98	-1.20	405	334	194,882	38
>1 adult, 1 kid, 1 working	-4.1	-0.55	-0.70	749	586	1,076,255	209
>1 adult, 1 kid, >1 working	-4.5	-0.47	-0.64	957	698	1,555,568	383
>1 adult, >1 kid, 0 working	-4.3	-0.88	-0.95	482	447	143,230	32
>1 adult, >1 kid, 1 working	-4.1	-0.43	-0.57	959	727	1,682,437	343
>1 adult, >1 kid, >1 working	-4.4	-0.42	-0.58	1058	761	1,552,968	374
1 adult, aged 60+	-3.7	-1.03	-1.19	359	311	6,551,864	950
>1 adult, all aged 60+	-4.4	-0.65	-0.79	674	551	6,284,404	1,818
All	-4.0	-0.63	-0.81	632	493	36,105,171	7,697

Notes: <sup>1)</sup> Measured in terms of the compensating variation (CV).

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.



**Table 32 Substituting reduced rates by regular rate -- Changes in Demographic breakdown across the distribution of tax payments (B)**

Demographic Breakdown	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Average
Average gain/loss <sup>2)</sup> as % of total spending <sup>1)</sup>	-1.9	-1.2	-0.9	-0.7	-0.3	-0.8
Average age of adults in household	57.6	55.0	53.4	51.5	48.9	53.3
% of single adult households	65.8	48.3	37.0	28.8	16.0	39.2
% of households with children	8.5	14.3	19.0	27.2	33.2	20.4
Average number of children (if children)	1.5	1.5	1.5	1.7	1.8	1.6
Age of youngest child (if children)	10.3	10.5	9.8	8.5	9.0	9.3
% of households with low education of head	13.2	8.1	5.8	5.2	4.6	7.4
% of workless households	63.8	51.5	41.8	33.6	21.2	42.4
% of households with 1 adult working	29.9	33.1	37.6	42.2	37.8	36.1
% of households with >1 adult working	5.6	14.0	18.1	21.6	36.7	19.2
% of households owning their home	18.3	37.2	52.4	61.0	71.6	48.1

Notes: <sup>1)</sup> Quintile sums. A positive figure denotes a gain in terms of a lower tax payment, whereas a negative number denotes a loss in terms of a higher tax payment. <sup>2)</sup> Measured in terms of the compensating variation (CV).

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 33 Substituting reduced rates by revenue-neutral rate -- Changes in VAT payments across the income distribution (B)**

Income Decile Group	Average VAT Payment per household <sup>1)</sup>			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
Poorest	0.0	0.00	0.00	171	224	3,618,899	378
2	0.7	0.25	0.25	286	289	3,606,492	466
3	1.0	0.27	0.29	370	336	3,607,429	529
4	1.8	0.40	0.45	448	398	3,612,900	590
5	2.4	0.45	0.54	529	444	3,609,379	663
6	2.9	0.49	0.59	604	499	3,610,875	748
7	3.8	0.55	0.69	698	559	3,611,505	831
8	4.1	0.51	0.69	799	589	3,612,256	973
9	5.6	0.58	0.80	967	695	3,608,334	1,187
Richest	8.6	0.59	0.96	1454	894	3,607,101	1,332
All	3.1	0.49	0.63	632	493	36,105,171	7,697

Notes: <sup>1)</sup> Measured in terms of the compensating variation (CV).

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 34 Substituting reduced rates by revenue-neutral rate -- Changes in VAT payments across the expenditure distribution (B)**

Spending Decile Group	Average VAT Payment per household <sup>1)</sup>			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
Poorest	-0.3	-0.11	-0.15	255	185	3,612,140	415
2	0.2	0.05	0.08	372	261	3,616,286	515
3	0.9	0.19	0.28	460	323	3,604,526	567
4	1.2	0.24	0.34	503	361	3,611,506	644
5	1.9	0.33	0.46	584	419	3,610,156	670
6	2.2	0.34	0.47	638	456	3,611,172	781
7	3.2	0.45	0.62	704	516	3,611,170	826
8	4.2	0.52	0.70	803	594	3,610,010	974
9	5.4	0.62	0.79	880	692	3,610,700	1,093
Richest	12.0	1.06	1.07	1125	1121	3,607,504	1,212
All	3.1	0.49	0.63	632	493	36,105,171	7,697

Notes: <sup>1)</sup> Measured in terms of the compensating variation (CV).

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 35 Substituting reduced rates by revenue-neutral rate -- Changes in VAT payments across household composition (B)**

Household Composition	Average VAT Payment per household <sup>1)</sup>			Other Data			
	Euros per week	% of household net income	% of household spending	Net income (Euros per week)	Spending (Euros per week)	No of Households (weighted)	Sample Size (unweighted)
1 adult, no kids, 1 working	1.9	0.39	0.51	486	376	5,307,186	838
1 adult, no kids, 0 working	0.1	0.06	0.06	231	224	2,288,492	216
1 adult, kids, 1 working	2.7	0.53	0.62	506	434	715,002	148
1 adult, kids, 0 working	0.1	0.04	0.05	333	294	415,299	50
>1 adult, no kids, 0 working	2.2	0.50	0.51	433	420	904,784	191
>1 adult, no kids, 1 working	3.8	0.52	0.69	737	556	3,028,051	738
>1 adult, no kids, >1 working	5.9	0.60	0.85	980	690	4,404,750	1,369
>1 adult, 1 kid, 0 working	0.8	0.21	0.25	405	334	194,882	38
>1 adult, 1 kid, 1 working	4.2	0.56	0.72	749	586	1,076,255	209
>1 adult, 1 kid, >1 working	5.9	0.61	0.84	957	698	1,555,568	383
>1 adult, >1 kid, 0 working	2.1	0.44	0.47	482	447	143,230	32
>1 adult, >1 kid, 1 working	6.4	0.67	0.88	959	727	1,682,437	343
>1 adult, >1 kid, >1 working	7.0	0.66	0.92	1058	761	1,552,968	374
1 adult, aged 60+	0.4	0.12	0.14	359	311	6,551,864	950
>1 adult, all aged 60+	3.4	0.50	0.61	674	551	6,284,404	1,818
All	3.1	0.49	0.63	632	493	36,105,171	7,697

Notes: <sup>1)</sup> Measured in terms of the compensating variation (CV).

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 36 Substituting reduced rates by revenue-neutral rate -- Changes in Demographic breakdown across the distribution of tax payments (B)**

Demographic Breakdown	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Average
Average gain/loss <sup>2)</sup> as % of total spending <sup>1)</sup>	-0.5	0.1	0.4	0.7	1.3	0.6
Average age of adults in household	59.1	56.5	53.0	49.8	48.2	53.3
% of single adult households	69.2	51.5	36.7	23.9	14.7	39.2
% of households with children	7.6	12.1	18.4	30.1	34.0	20.4
Average number of children (if children)	1.5	1.5	1.5	1.7	1.8	1.6
Age of youngest child (if children)	9.5	9.8	9.4	9.2	9.2	9.3
% of households with low education of head	14.6	8.0	6.8	3.1	4.2	7.4
% of workless households	70.0	54.0	42.2	27.0	18.6	42.4
% of households with 1 adult working	24.8	34.7	37.7	44.1	39.3	36.1
% of households with >1 adult working	4.7	9.5	18.2	26.1	37.4	19.2
% of households owning their home	22.4	48.2	51.0	57.2	61.7	48.1

Notes: <sup>1)</sup> Quintile sums. A positive figure denotes a gain in terms of a lower tax payment, whereas a negative number denotes a loss in terms of a higher tax payment. <sup>2)</sup> Measured in terms of the compensating variation (CV).

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

**Table 37 Expenditure Shares modelled in the Demand System (in per cent from modelled total expenditures) – Pre- und Post-Reform**

	Food	Services	Medical	Transport	Energy	Leisure	Restaurants
Pre-Reform	27.68	10.09	7.10	19.49	13.44	12.59	9.60
Abolishing VAT Altogether (B)	26.63	9.14	8.49	19.48	12.28	13.78	10.21
Increasing the Regular Rate by 1 ppt (B)	26.90	9.68	7.44	19.31	13.60	13.12	9.94
Substituting Reduced Rates by Regular Rate (B)	28.59	9.59	7.16	19.01	12.78	12.84	10.02
Substituting Reduced Rates by Revenue-Neutral Rate (B)	28.28	9.52	7.35	19.08	12.71	13.00	10.06

Notes: Average demand shares.

Sources: Own calculations using the LWR data (2002-2007) provided by the FDZ.

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