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Different Reference Points: Tax Planning of Married Couples in East and West Germany

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Abstract: This study evaluates the tax planning behavior of married couples with regard to the allocation of tax schedules between spouses in the context of the German income tax splitting. The focus lies on the disparities between East and West German couples. The assumption is that the tax planning behavior of married couples in Germany depends on different reference points referring to the theory by Tversky and Kahneman (1991). The analysis utilizes administrative data from statistics on German income tax returns for the year 2004 (FAST 2004). The result of an alternative specific conditional logit estimation indicates that West German couples are substantially more likely to choose different tax schedules than East Germans (between 17.6 and 19.1 percentage points). West Germans are more likely to allocate the advantageous tax bracket to the husband instead of the wife. Further logit and OLS estimations as well as a Blinder-Oaxaca decomposition support these findings. The conclusion of this analysis is that tax planning behavior of married couples is influenced by the differences in the socialization of people, caused by the fact that before 1990, East Germany had different tax institutions and political regimes compared to West Germany.

Keywords: Income Tax Splitting; Household Decision; East and West Germany

JEL Classification: H24; H31

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1 Introduction

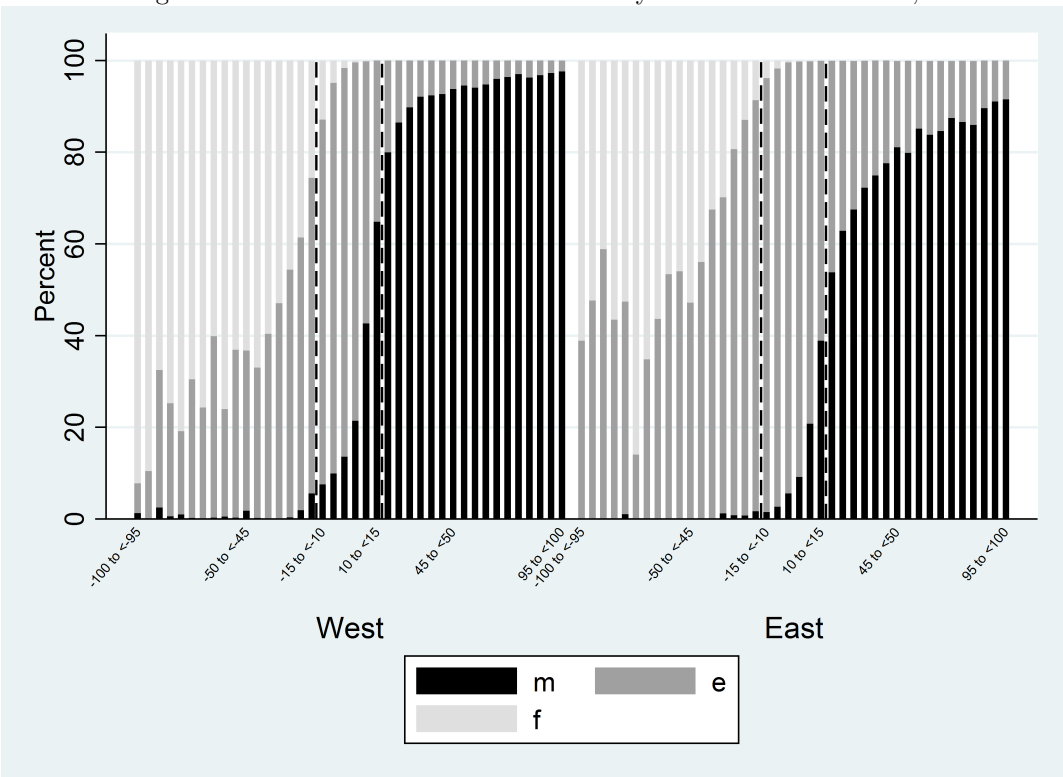
In rational choice theory, we would expect that couples always choose the tax plan that maximizes their aggregate income, under the assumption that the marriage is regarded as one decision unit. What we see in reality is that there are deviations or anomalies[1] in the tax planning behavior of married couples. Figure 1 shows tax choices of married couples in East and West Germany. If all couples would choose income maximizing tax classes, the area on the left hand side would be completely filled out with light grey, the area in the middle with medium grey, and the area on the right hand side with dark grey. The figure illustrates that about 20% of West Germans couples and about 40% of East German couples do not choose the income maximizing tax class combination.

This divergent behavior can be triggered by different channels. One explanation approach is pictured in the reference-dependent model by Tversky and Kahneman (1991). This model states the opposite of the Coase theorem: the result of a decision process is *not* independent of claims in the initial situation (Kahneman et al., 1990). Accordingly, there is a reference point that influences allocations. This reference point is referred to as the initial or default situation (Tversky and Kahneman, 1991), but norms or comparison to a social group can also be seen as a reference point (Van der Stadt et al., 1985). The case of German income tax splitting is convenient to investigate the question, whether anomalies in tax planning behavior exist and how they could be explained. First, German married couples can decide how they allocate tax schedules within the couple. Second, until 1990, there were two completely different political and tax regimes in place in East and West Germany and after 1990, East Germany implemented the same (tax) laws as West Germany. Third, these different political regimes have a long persisting influence on the individuals. This influence on tax planning behavior is not investigated so far. Since East Germans experienced two different kinds of political systems since World War II, East Germany is regarded as the treated group in this analysis. West Germans continuously lived in a democratic system in the same time period and hence are used as control group.

There is evidence that East and West Germans have different perceptions on institutions (Alesina and Fuchs-Schündeln, 2007; Rainer and Siedler, 2009), behave differently regarding cooperation and solidarity (Ockenfels and Weimann, 1999), and have different gender role attitudes (Bauernschuster and Siedler, 2010). Alesina and Fuchs-Schündeln (2007) use survey data from 1997 and 2002 to study if East Germans favor state interventions more than West Germans. They find that

[1] For other anomalies in consumer behavior see Kahneman, Knetsch, and Thaler (1991).

Figure 1: Share of tax class combinations by income difference in 1,000 €.



Note: Own calculations with data from the German income tax statistics of 2004. The figure displays the shares of chosen tax class combinations for the range of income differences from -100,000 € to 100,000 €, in steps of 5,000 €, for East and West German couples. m is the male favoring combination, e the egalitarian combination, and f the female favoring combination. The area in the middle, between the dashed lines, represents the range of income differences, where it is total net income maximizing (we further refer to the case of total net income maximization as the optimal choice) to choose e. Left from this area, it is optimal to choose f; right from this area, it is optimal to choose m. Within the areas on the right hand side and on the left hand side of the area in the middle, it is never optimal to choose e, because the income difference is too large (appendix 2 explains this topic in more detail).

East Germans have higher preferences for redistribution than West Germans, which they explain by the different forms of government in East and West Germany before 1990. They state that the Eastern German communism in the former GDR (German Democratic Republic) indoctrinated people or just accustomed them to a high level of state interventions. Alesina and Fuchs-Schündeln (2007) also argue that there might be an indirect effect due to poorness caused by communism in East Germany before 1990. They find that it lasts about one to two generations until the differences between East and West Germans diminish. Using survey data from 1991, 1994 and 2002, Rainer and Siedler (2009) focus on the question, if a political regime influences social trust and institutional trust of individuals. Their findings are that East Germans had lower social trust than West Germans shortly after the collapse of communism in East Germany and that this difference

did not change after reunification. Institutional trust was lower too, but it increased until 2002. Nevertheless, West Germans had still higher institutional trust in 2002 than East Germans.

Another example for different behavior of East and West Germans is shown in a study by Ockenfels and Weimann (1999), which is based on laboratory experiments with East and West Germans. They conduct a dictator game and a solidarity game and find that East Germans give less to others than West Germans. This result suggests that East Germans are more selfish than West Germans, but the authors state that the average belief of East Germans on what the others will give, equals the real average giving, which is the same for West Germans. Hence, it might be just a different perception of how the others act that is influenced by different economic and social experiences in East and West Germany. Results regarding the different gender role attitudes of East and West Germans by Bauernschuster and Rainer (2010) are related to the studies mentioned above. They find that East Germans have a more nontraditional and egalitarian view of working mothers and the role of wives in the family compared to West Germans. The authors explain this result by social norms that occurred during the time of different political regimes in Germany. In the GDR, full time work performed by women was supported by a wide spread governmental provided child care, whereas the West German government incentivized maternal leave and part time work of mothers.

This brief overview on previous studies illustrates that the different political regimes continue to have an effect on positions in East and West Germany. The analysis focuses on a special aspect of the German income tax splitting, which allows to observe if people react only to economic incentives or if they achieve some other objectives in their decisions. Differences in the handling of income tax splitting by East and West Germans could give indications how to adjust family taxation. This is important for policy makers, because family taxation is not just an instrument to generate tax revenue, but to a large extent also an instrument of family politics. This aspect is also reflected in the ongoing discussion in Germany whether income tax splitting should be abolished or not. There are different arguments for the abolition. The most important ones seem to be the disincentive for women to participate in the labor market and the disincentive to work full-time instead of part-time, respectively, because a higher "secondary" income reduces the tax advantage of a married couple.[2] This effect is strengthened in Germany by the possibility to choose different tax schedules for the spouses. When spouses have different tax schedules, one schedule includes very high marginal tax rates compared to individual taxation and the other schedule includes low marginal tax rates compared to individual taxation. Accordingly, an incentive arises to allocate

[2]Selin (2014) finds that the switch in the Swedish tax system from joint to individual taxation of spouses in 1971, increased the labor market participation of married women significantly.

the tax bracket with the higher relative tax burden to the lower income and the bracket with the lower average tax burden to the higher income. Since married women have a lower income than their husbands in most cases, this institution discourages higher labor market participation of married women.

The contribution of this paper is to test, if East and West German married couples' tax planning behavior is influenced by different reference points. The use of the official income tax statistics can produce new insights in this field, because it provides data from the reactions of people to real institutions. The paper is organized as follows: section 2 provides an overview on the institutional background. Sections 3 and 4 present the theoretical framework, the data description, and the empirical approach. In section 5, the results are discussed, section 6 provides a robustness check and section 7 concludes.

2 Institutional Background

2.1 Differences Between East and West Germany

The case of the reunified Germany is very special since Germany was divided into two different political and economic regimes for over forty years. Before the separation, the population did not differ systematically between the Eastern and Western part of Germany in terms of economic and socio-demographic parameters (Alesina and Fuchs-Schündeln, 2007; Bauernschuster and Rainer, 2010). At the end of World War II, Germany was divided into four occupation zones. East Germany was administered by the Soviet Union, while West Germany was governed by the Western powers: the United States, Great Britain and France. In 1949, two new German states with very different characteristics were founded and they developed in different directions. In West Germany, the Federal Republic of Germany (FRG) emerged to a democratic society with a free market economy. In East Germany, a socialist regime with a regulated economy, was in place.

West Germany's economy grew very fast in the 50s and 60s. In East Germany, scarcity and uniformity of goods characterized the economy and in 1961, the German Democratic Republic (GDR) eventually cut connections to the West by the construction of the Berlin Wall. The different economic designs were interrelated to different economic inequalities within societies. In East Germany, income was less unequally distributed than in West Germany (Huschka et al., 2009). According to the different political goals, the tax systems increasingly diverged. The socialist regime in the GDR used taxes, among other things, to hamper the development of private

entrepreneurship and supported employers, who worked mainly in publicly owned firms, by low wage taxes (Duda, 2010; Buck, 1996). The differences in the two tax systems were also reflected in the treatment of married couples.

Before 1958, household taxation was in place in West Germany. Under this principle, the incomes of all family members are added and the tax function is applied to this sum. There were some exemptions, but in general, this principle of taxation results in a disadvantage for spouses, when both partners receive income. Accordingly, in 1958, a reform with the objective to remove the disadvantage in income taxation for marriages took place in West Germany. The income tax splitting was implemented and is still in place today (Bundesministerium für Familie, Senioren, Frauen und Jugend, 2006). This principle of taxation provides a tax advantage for married couples compared to not married couples, as long as the income tax is progressive and the incomes of the partners are different. Before 1990, individual taxation with deductions for married people[3] was applied in East Germany (Kreyenfeld, 2004). After reunification and a period of transition of two years, income tax splitting, hence joint taxation, was completely in place in East Germany, too.

Family politics were very different in the two German states. The FRG privileged one-earner-couples and set incentives for mothers to stay at home. One important instrument for this policy was the income tax splitting for married couples. The GDR tried to increase fertility, too, but with a different approach. Political instruments were used to integrate women into the labor market and to support working mothers.[4] Accordingly, there were financial incentives to get married and have children, but no tax incentives for one-earner-couples (Kreyenfeld, 2004). After the reunification of Germany, East Germans faced the same institutions like West Germans. This historical setting allows to look at two groups that experienced different political regimes and have different knowledge and customization with income tax splitting, but the same language and nation. The next subsection gives a short overview on Germany's income tax splitting in 2004.

2.2 Income Tax Schedules for Spouses in Germany

The German income tax law treats married couples differently than singles. It provides a special tax schedule that assesses the incomes of the spouses jointly and includes tax advantages for the

[3]In special cases it was possible to declare the income jointly for spouses (Duda, 2010), but in principle the spouses where taxed individually.

[4]There was a "right and duty" to work, implemented in the East German constitution since 1961. Women were expected to fulfill this duty in East Germany like men (Kreyenfeld, 2004).

married couple compared to two singles[5]. This so called "Ehegattensplitting" treats a married couple as one tax unit. Equation 1 shows the comparison between the income taxation of a married couple and a not married couple:

$$2 * T(0.5 * Y_C) \leq T(Y_M) + T(Y_F), \tag{1}$$

with $Y_M + Y_F = Y_C$ and Y as taxable income, subscripts M for male, F for female and C for couple, and T as tax function. The terms on the right hand side represent the tax due of two singles, which is simply the sum of their respective tax dues. On the left hand side, the tax due of a married couple is calculated by applying the tax function to half of the sum of the spouses' incomes and then double this amount. Since the German income tax is progressive, the married couple receives a tax advantage ("splitting advantage")[6] as long as the partners have different amounts of income. If both earnings are the same, there is no tax advantage compared to not married persons.

Equation 1 refers to yearly incomes, but this analysis is interested in another specific characteristic of the German tax law for married couples: the different withholding taxes of husband and wife on a monthly basis. The reason for a different treatment of the monthly pre-tax payments by the spouses is the yearly splitting advantage. Income taxes are withhold from earnings of employees[7] on a monthly basis and they are separately taken from each partner. If the spouses had unequal earnings and this would not be considered by the financial authorities, then the one with the higher earning would pay more taxes than necessary according to the yearly tax burden. To prevent this case, the law provides special payroll tax classifications ("Steuerklassen") for spouses. They can choose between three tax class combinations and change their decision only once a year. The choice is always dependent on the choice of the other partner: If one decides to have class 3, the other has to choose class 5 and vice versa, and if one has class 4 the other also has to choose 4. These schedules differ in terms of the number of tax credits they include and the application of

[5]Married couples have the option to assess separately (§26 I EStG 2004 – The German Income Tax Act), but in standard cases it is more profitable to assess jointly.

[6]Steiner and Wrohlich (2004) illustrate the splitting advantage for different income distributions within the couple.

[7]This paper deals only with married couples who receive their whole or the majority of their income as employees.

the tax function[8]:

$$
\begin{aligned}
T_3 &= 2 * T(0.5 * Y) \\
T_4 &= T(Y) \\
T_5 &= 2 * (T(1,25 * Y) - T(0.75 * Y)),
\end{aligned}
$$

where the subscript indicates the tax class. The basic tax-free allowance is incorporated in the tax formula[9]. For class 4, the standard formula is applied to the taxable income. The spouse who receives class 3 gets double basic tax-free allowance and the person with class 5 none. Hence, the partner with class 3 faces a lower marginal tax rate compared to tax class 4 and the partner with class 5 faces a higher marginal tax rate than with class 4. The different application of tax schedules results in different relative pre-tax payments, emphasized by the average tax rates in figure 2. The relative tax burden at class 5 increases already at very low incomes strongly compared to class 4 and especially to class 3. This difference in tax burdens is mainly driven by the different distribution of tax credits and the difference in marginal tax rates. The two kinks in the average tax rate function at tax class 5 result from a jump of $1.25 * Y$ to a higher tax bracket, while $0.75 * Y$ remains in a lower tax bracket for a certain range.

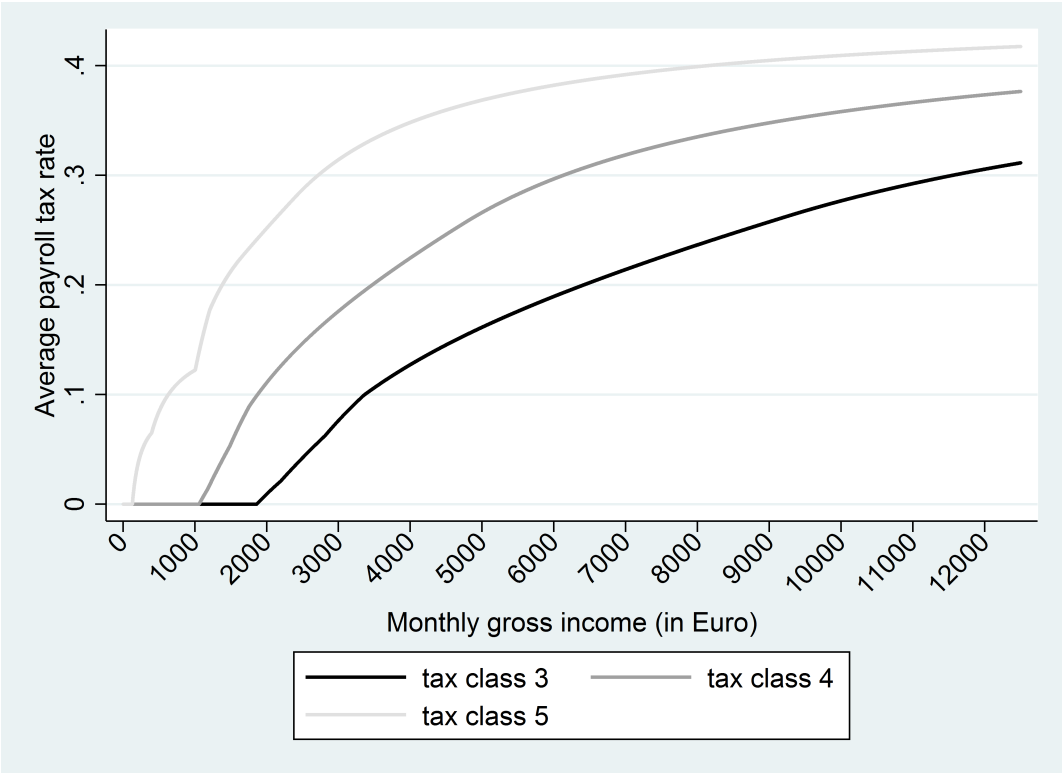
3 The Decision Framework

In the introduction, we considered a marriage as one decision unit. This assumption could be questioned. There is a wide literature on household decision problems that states that a household should not be regarded as one subject. Lundberg, Pollak, and Wales (1997) provide evidence from a natural experiment that the demand functions of a household depend on the allocation of income within the family. Accordingly, the maximization of a family utility function is not a good depiction of the considered decision problem. Since it is beyond the scope of this paper to evaluate the exact game theoretic decision making of a married couple, we rely on the simple model of inequity aversion by Fehr and Schmidt (1999). The advantage of this model is that it simplifies the decision making to the utility maximization of one spouse. This corresponds to the theory on reference points by Tversky and Kahneman (1991), because it considers only one decision maker. This decision maker weights his/her and the other spouse's monetary advantage from receiving a better tax bracket with inequality aversion parameters. Hence, if he/she does not

[8]For more details see appendix 1.

[9]In 2004 the basic tax-free allowance was 7,664 €. Details for other allowances are shown in appendix 1.

Figure 2: Average tax rates by different payroll tax classes.



Note: Own calculations using the program chart ("Programmablaufplan" 2004) by the German Federal Ministry of Finance. Each curve represents the average payroll tax rate for monthly pre-tax payments on wage earnings. The three functions correspond to the three tax schedules that can be chosen by spouses. These tax functions are based on the German income tax schedule 2004, and include all standard deductions from table 11 in appendix 1.

like the other spouse to have an advantage, he/she puts more weight on his own tax advantage. If he/she is indifferent, he/she puts the same weights on both advantages. To utilize the model of inequity aversion for this analysis, the monetary tax advantages are extended by reference points that generate additional utility.

The utility generated by one alternative is assumed to be a linear function of the weighted net incomes, the utility from choosing the reference point alternative, and some personal characteristics of the couple:

$$U_i^j = (1-\beta)\, Y_{iM}^j + \beta Y_{iF}^j + rd_i^j + \gamma X_i + \epsilon_i \tag{2}$$

β is the weighting parameter that assesses the inequity aversion of the decision maker. Y_{iI}^j is the net income of person $I = M, F$ in couple i at combination $j = m, e, f$ ($m$ale favoring: 35, $e$galitarian: 44, $f$emale favoring: 53). The monetary incentive (net income) to choose one of the

given combinations is complemented by utility, which is generated by choosing the one combination that is the reference point. This utility is $r \geq 0$ and it is multiplied by the dummy d_i^j that denotes the reference point. If $d^k = 1$, then k is the reference point. X_i is a vector of couple specific personal characteristics. ϵ_i captures unobserved preferences and shocks in the decision making that are not captured by the reference point dummy or observed variables.

To understand the decision situation, we regard the case that the husband receives higher income than his wife as an example.[10] He compares his utility generated by the choice of 35, which is – m, the male favoring combination – with his utility generated by choosing 44, which is e, the egalitarian combination[11]:

$$U_i^m - U_i^e = (1-\beta) \underbrace{[Y_{iM}^m - Y_{iM}^e]}_{\substack{\text{advantage male} \\ \text{(3 vs 4)}}} - \beta \underbrace{[Y_{iF}^e - Y_{iF}^m]}_{\substack{\text{advantage female} \\ \text{(4 vs 5)}}} + \underbrace{r(d_i^m - d_i^e)}_{\substack{\text{utility from} \\ \text{reference point}}} + (\epsilon_i^m - \epsilon_i^e) \tag{3}$$

Equation 3 illustrates that if m is the reference point, all else equal, it is more likely that combination m is chosen, because r is multiplied by a positive term. If e is the reference point, this term becomes negative and it is more likely that e is chosen if the monetary incentive stays constant. The strength of the influence by the reference point depends on the amount of r.

Since the utility of the combinations is not directly observable, it is treated as latent variable. Only the concrete choice of the decision making is observable, hence we define the observable outcome variable y_i as chosen combination. For couple i holds

$$\begin{aligned} y_i &= m \text{ if } U_i^m - U_i^e > 0 \text{ and} \\ y_i &= e \text{ if } U_i^m - U_i^e < 0. \end{aligned}$$

In the case that the wife has higher income, combinations f (53) and e (44) are compared. Accordingly, the observable result in this case would be

$$\begin{aligned} y_i &= f \text{ if } U_i^f - U_i^e > 0 \text{ and} \\ y_i &= e \text{ if } U_i^f - U_i^e < 0. \end{aligned}$$

The theory suggests that a couple is more likely to choose a combination, if this combination

[10] The opposite case, when the wife earns higher income is vice versa.

[11] In this analysis only the comparisons between m and e and f and e are considered. The comparison between m and f is neglected, because it is just a special case of the previously mentioned comparisons.

equals their reference point, independent of the monetary incentives. Since we do not know the reference points of the couples in the first place, but suggest that there might be a difference between East and West German couples, we replace d_i^j by an East dummy that takes the value 1 if the couple lives in East Germany. With this approach, we can test empirically if the probability to choose one of the three alternatives differs between East and West Germans, when controlling for economic incentives and socio-demographic characteristics. Hence, the null-hypothesis to test is

$$\frac{\Delta P(y = j|X)}{\Delta East} = 0. \tag{4}$$

When we find a significant difference in the probabilities to choose the alternatives between East and West Germans, we can argue that $d_{East} \neq d_{West}$. Kahneman (1992) states that it is a special and important case when the status quo is the reference point. According to the different experiences with institutions in East and West Germany, especially regarding tax and family politics, we guess that the reference point of West German couples is m (income tax splitting with the husband as the main earner), which was the status quo before 1990 in West Germany. The reference point of East German couples is guessed to be e (individual taxation), which was the status quo before 1990 in East Germany.

4 Data Description and Estimation Approach

The empirical analysis aims at testing whether married couples in East and West Germany have different probabilities to choose one of the three tax class combinations. This question can be addressed by the estimation of a discrete choice model. We use two main specifications to test our hypothesis. The first specification takes into account that the dependent variable consists of three alternatives and that alternative specific independent variables are important: the net incomes of the spouses at specific tax schedules. The second specification condenses the model into a binary decision problem with the choice between equal and unequal tax classes for the spouses. We use logit estimations and accordingly assume that the error term is type I extreme value distributed. The respective models are estimated using a stratified 10%-sample, drawn from the German income tax statistics for the year 2004 ("Faktisch anonymisierte Lohn- und Einkommensteuerstatistik" – FAST 2004).

4.1 Data Description

The sample is drawn from the population of all filed tax returns for the year 2004 in Germany. Table 1 shows the distribution of tax classes in the original sample for East and West Germans. People with tax class 3, 4, or 5 represent 43% of the observations[12] in the West German subsample and 39% in the East German subsample. Married couples, where both spouses have income from non-self-employed work (e, m/f) represent 15% in the West German subsample and 20% in the East German subsample. Accordingly, there are some differences in the subsamples, but not very strong disparities.

Table 1: Overall shares of tax classes in East and West Germany

Tax class	West	East
1	46%	51%
2	2%	2%
3	26%	16%
44 (e)	5%	14%
35/53 (m/f)	10%	6%
4	1%	2%
5	1%	1%
Without	9%	8%
Sum	100%	100%

In the following analysis, we use only the observations with combination $e/m/f$; accordingly, one observation corresponds to one married couple. The hypothetical tax payments for all three tax class combinations for each spouse are calculated by using the algorithm from the program chart published by the German Federal Ministry of Finance[13] for 2004. These calculated tax payments allow to identify the net incomes for all three alternatives for each spouse. This implemented algorithm does not fit for every case, since there are some issues that are not included in the data set[14]. To get a sample with a better fit, outliers are excluded. Accordingly, the upper and

[12]Observations with combination e, m, or f include two working people, the other observations include one working person. The first digit is the tax class of the husband and the second digit denotes the tax class of the wife.

[13]This algorithm ("Programmablaufplan") is published every year for the mechanical calculation of monthly tax payments.

[14]One problem is that real pre-tax payments depend on the monthly income. If monthly income fluctuates, it is not possible to predict precisely the tax payment as long as only yearly incomes are available.

lower 5% of the density function of the comparison with the actual tax payment are dropped. Afterwards, about 77% of the male income tax payments are predicted with a lower deviation than 5% from the actual tax payment and about 82% of female tax payments are predicted with a lower deviation than 5%.[15] The sample now consists of 263,453 observations.

Table 2: Descriptive statistics.

	West (206,020 obs)			East (57,433 obs)		
	mean	(sd)	median	mean	(sd)	median
Equal	0.344	(0.475)	0	0.725	(0.447)	1
Optimal choice	0.787	(0.410)	1	0.608	(0.488)	1
Net income male at m in 1,000 €	34.590	(13.157)	32.405	26.205	(12.532)	24.699
Net income male at e in 1,000 €	29.966	(10.963)	28.212	23.130	(10.484)	21.633
Net income male at f in 1,000 €	24.699	(9.888)	22.693	19.027	(9.058)	17.632
Net income female at m in 1,000 €	14.455	(6.978)	13.507	16.206	(6.651)	15.735
Net income female at e in 1,000 €	17.821	(8.569)	16.779	19.880	(8.041)	19.294
Net income female at f in 1,000 €	19.850	(10.346)	18.561	22.246	(9.689)	21.87
Income difference in 1,000 €	18.968	(22.465)	17.271	5.187	(19.236)	3.591
Total gross income in 1,000 €	57.699	(22.731)	53.675	48.688	(21.124)	44.726
Share of income substitutes male	0.0001	(0.007)	0	0.0001	(0.008)	0
Share of income substitutes female	0.0002	(0.007)	0	0.0001	(0.006)	0
Costs of tax consulting in 1,000 €	0.051	(0.183)	0	0.029	(0.142)	0
Younger than 35	0.113	(0.317)	0	0.069	(0.253)	0
Older than 54	0.173	(0.378)	0	0.164	(0.370)	0
Children dummy	0.604	(0.489)	1	0.654	(0.476)	1
Number of children	0.998	(0.975)	1	1.003	(0.901)	1
Religious affiliation male	0.690	(0.462)	1	0.189	(0.392)	0
Price in 1,000 €	0.254	(0.757)	0	0.444	(0.898)	0
Additional payment in 1,000 €	−0.600	(1.823)	−0.412	−0.951	(1.469)	−0.738

Table 2 displays descriptive statistics of variables that are important for this analysis:

- **Equal** denotes the share of couples who choose combination e. There is a striking difference between East and West German couples: 72.5% of East Germans and only 34.4% of West Germans choose the egalitarian combination. This topic is further discussed below.
- **Net income** is the yearly gross income of the male or female spouse minus individual income

[15] Accordingly, there is a measurement error in the hypothetical net incomes. Since we found no correlation with personal characteristics, we will assume it to be random.

tax payments at a certain tax schedule. These alternative specific variables illustrate how much better or worse off a spouse is at a certain tax class combination compared to another combination.

- **Income difference** is the yearly gross income earned by the husband minus the yearly gross income earned by the wife. Within this variable we have again a striking difference in the mean and medium values. The mean of income difference is almost four times larger in West Germany than in East Germany.

- **Total gross income** of couples in East and West Germany differs too. West German couples have on average a 9,011 € higher total gross income than East German couples. A comparison of the kernel densities of income difference and total gross income between East and West Germany is shown in figure 3.

- **Share income substitutes male** is the sum of unemployment benefits, parental leave allowance, sickness benefits, "bad weather" payments, etc. of the husband related to his gross income. Correspondingly, the definition of **share income substitutes female** is for the wife.

- **Costs of tax consulting** is the amount paid to a tax adviser by the couple. These three, previously mentioned, economic variables have very small values and do not differ substantially between East and West Germans.

- **Younger than 35** denotes a dummy variable that is 1 if the husband is younger than 35 years, and **older than 54** denotes a dummy variable that is 1, if the husband is older than 54 years. These cohorts are defined according to the age of the husband at reunification.[16] Younger than 34 means, that the husband was 20 years or younger at reunification. Older than 54 means that the husband was 40 years or older at reunification. The youngest cohort had relatively few experiences with tax institutions in the GDR, the middle cohort had more experience, and in the oldest cohort people lived the largest part of their lives in the GDR and might be influenced by its institutions more than persons from other generations. The share of the old cohort is very similar in both subgroups, but the youngest cohort has a lower share in East Germany than in West Germany. An explanation might be that there are less possibilities to work for young people in East Germany than in West Germany. Accordingly, a lot of young people move to West Germany. Another reason might be that young East Germans are less frequently married and employed than their West German counterparts.

[16] Age male and female are highly correlated and accordingly, only the husband's age is used.

- The **children dummy** variable is 1 if the couple has children.[17]
- **Number of children** contains the number of children up to four. The number of children is very similar, around one, and the share of East German couples, who have children is five percentage points higher than the share of West German couples.
- **Religious affiliation male** is a dummy variable that is 1 if the husband is either member of the Evangelic or the Catholic Church and zero otherwise.[18] We observe a big difference in this variable: 69% of West German husbands are affiliated to the Christian Church, whereas only 19% of the East German husbands are members of the Christian Church. This disparity can be attributed to the anti-clerical policy in the former GDR.
- **Price** and **additional payment** are not included in the estimation model, because they are implicitly captured by the alternative specific net incomes of husband and wife. These variables are shown in this descriptive statistic for further information. Price denotes the amount of money a couple forgoes when it does not choose the total net income maximizing tax class combination. This price is on average 190 € larger for East German couples. Additional payment denotes the difference between pre-tax payments and fixed tax due after the income tax return is done. On average couples get repayments by the financial authorities. These repayments are on average 351 € larger for East German couples.

Before we continue with the estimation model, we take a closer look at the choices made by West and East German married couples. The presented shares of e-choosers are very persistent over the West and East German federal states as figure 4 shows. Just the two biggest city states, Berlin and Hamburg, deviate to a certain extent from their subgroup-states. Both states have a larger, but still very small part of f-choosers. Hamburg has a slightly higher share of e-choosers than the other West states and Berlin has a slightly lower share of e-choosers than the other East states. The case of Hamburg might be explained by higher educated women, who are more likely to live in a metropolis than in the country side or smaller villages. Berlin includes West Berlin, which might explain the lower share of e-choosers. According to figure 4, it is strongly persisting over the federal states that West Germans allocate the "better"[19] tax class more often to the husband and East Germans decide more often to have an equal tax treatment for the spouses. The further analysis will test if there are significant and robust differences in the choice of tax schedules between East and West German couples.

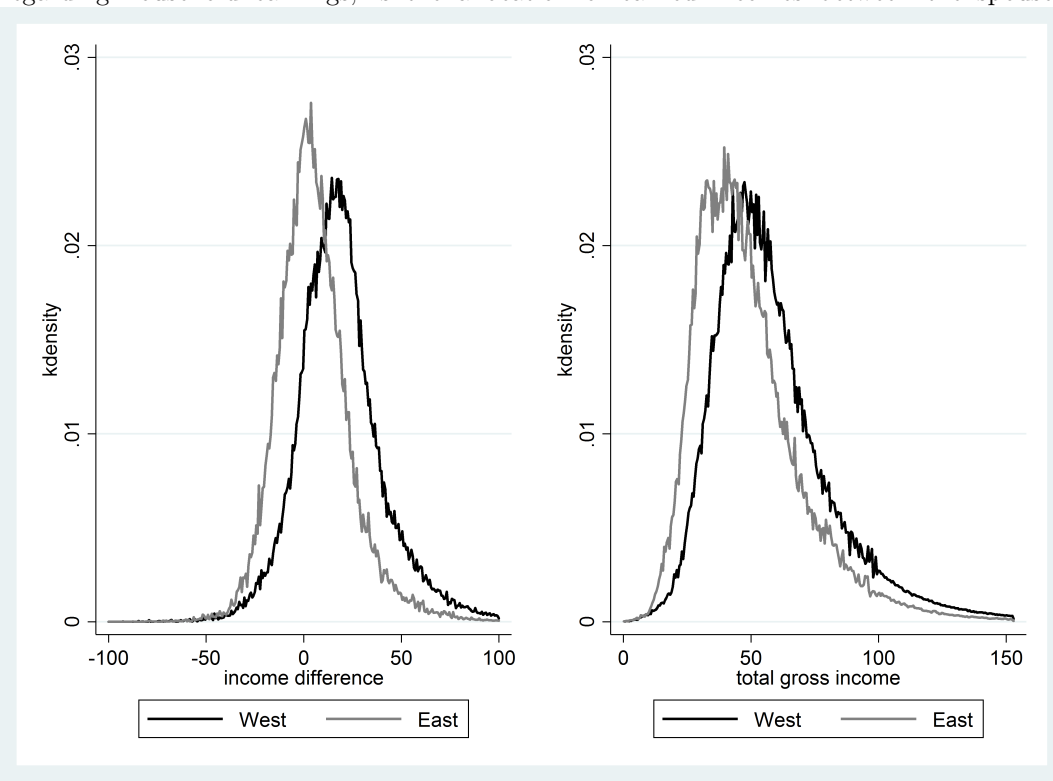
[17] Only children that are relevant for tax issues, mainly for child allowances, are displayed in the data. Accordingly, only information on children who are younger than 27 years is available.

[18] The religious affiliations of husband and wife are highly correlated.

[19] The term "better" is used for the tax class with the lower relative tax liability, hence class 3.

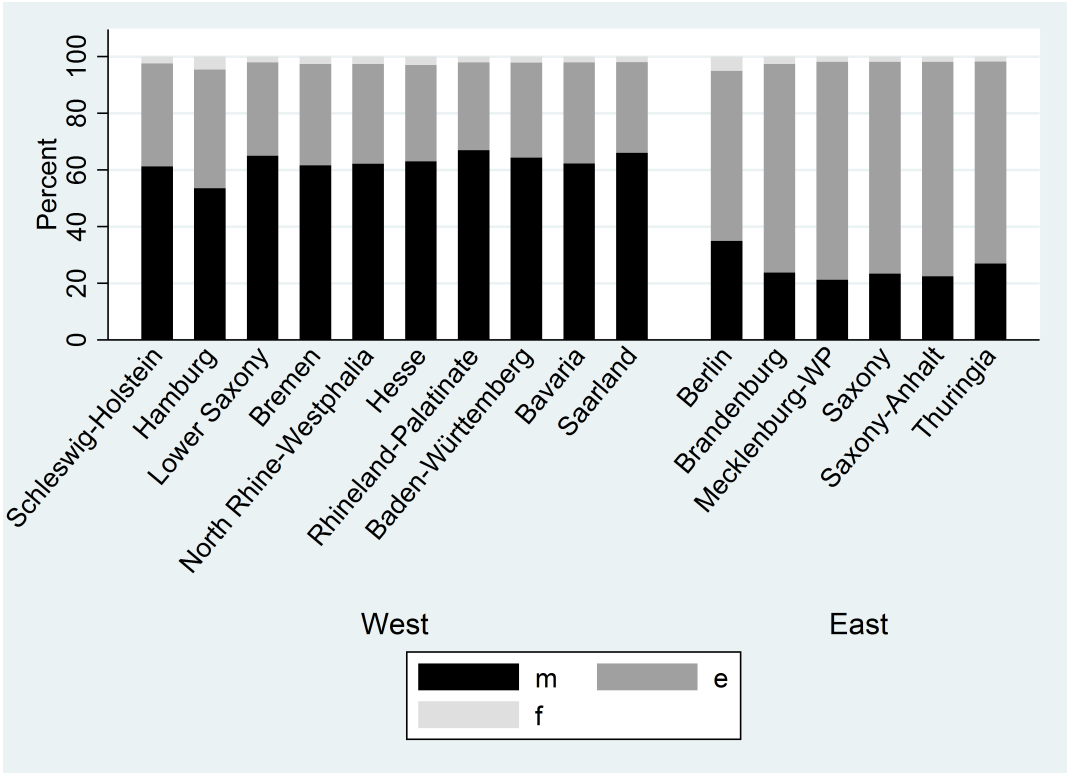
Figure 3: Kernel densities of income difference and total gross income in 1,000 €.

This figure shows kernel densities of income difference and total gross income in East and West Germany. There is more probability mass around zero for the East German density function and more mass in the positive range (where the husband has the higher income) for East and West Germans. The kernel densities of total gross income show a similar picture: West Germans have higher total incomes. Since East Germans have an approximately 15% lower average total gross income, but an about 70% lower average income difference, the main disparity between East and West German couples, regarding household earnings, is the allocation of earned incomes between the spouses.



Source: Own calculations with data from the German income tax statistics of 2004.

Figure 4: Tax class combinations by federal states.



Source: Own calculations with data from the German income tax statistics of 2004.

4.2 Estimation Approach

The first objective of the empirical analysis is to identify the difference in the probability to choose one of the three schedule combinations between East and West German couples. The second objective is to get further insights into the different choosing behaviors, especially regarding socio-demographic variables. The first point is addressed by the estimation of an alternative specific conditional logit model and the second point by a logit estimation.

4.2.1 Alternative Specific Conditional (ASC) Logit Model

The outcome variable of the decision process is a categorical variable with three non-ordered characteristics: the schedule combinations m, f, and e. To a certain extent, the choice of these combinations can be explained by economic incentives. These incentives are represented by the alternative specific amounts of net incomes of husband and wife. These variables capture the implicit price when selecting one of the possible combinations. Depending on the incomes, one alternative can result in a higher disposable income within the year than another combination.

Considering the net incomes of husband and wife helps also to control for the income difference between the spouses.

In addition, it is possible that other case specific economic incentives exist. For instance, drawing income substitutes might influence the decision on the schedules, because most transfer payments are calculated with the previous yearly net income, which is influenced by the tax bracket. Another indicator for tax planning that is not directly linked to the earned net income is costs of tax consulting. People who pay a tax adviser might have more complicated cases or special objectives that cannot be directly observed. To control for age, the cohort dummy variables are included. Other personal characteristics are if the couple has children and if the husband is affiliated to the Christian Church. These variables capture attitudes on family and gender roles.

Since two variables are alternative specific and the others are case specific, in this analysis an alternative specific logit model is used (Cameron and Trivedi, 2009). Following the decision model presented in section 3, the probability for couple i to choose alternative j is

$$P(y_i = j|Y_{iM}^j, Y_{iF}^j, x_i) = \frac{e^{Y_{iM}^j\beta + Y_{iF}^j(1-\beta) + x_i'\gamma_j}}{\sum_{l=1}^{3} e^{Y_{iM}^l\beta + Y_{iF}^l(1-\beta) + x_i'\gamma_l}}, \tag{5}$$

with $j = m, f, e$ denoting the three alternatives, and x_i' as the vector of case specific variables, including the East dummy. γ_j is a vector of alternative specific coefficients. Since the outcome variable can take on three values that are not in a particular order, the definition of a base category is needed. Combination e is provided by default by the tax authorities, which means that the tax class combination changes only if both spouses decide and agree. Accordingly, it is intuitive to choose e as the base category and calculate the coefficients of the other categories against this one. The variable of main interest is the *East* dummy variable that takes on the value 1, if the couple lives in East Germany and 0, if the couple lives in West Germany. If the coefficient of this dummy is significantly different from zero, this can be interpreted as a difference in the probability to choose a special tax class combination, which cannot be solely explained by economic incentives or socio-demographic characteristics. This dummy variable captures the systematic differences between East and West German couples.

4.2.2 Logit Model

The logit model is a more general application of the previously presented alternative specific conditional logit model. It condenses the decision problem into a choice of two alternatives: to choose the egalitarian alternative e or to choose different tax brackets, i.e. m or f. This

simplification of the model helps to get further insights into differences between East and West German couples, because marginal effects of the logit model are easier to interpret and to calculate than marginal effects of the asc logit model. Since the logit model does not include case specific variables, net incomes of husband and wife are replaced by the income difference. This variable is a good substitute for the relative incomes and the total income, because larger total income is correlated with a larger income difference between the partners. In this specification, we can not control for the alternative specific "price" directly, but we leave the other case specific economic incentives unchanged. Hence, the other control variables are the same in the logit as in the asc logit estimation. The probability for couple i to choose equal tax classes is now

$$P(y_i = 1|x_i) = \frac{1}{1 + e^{-x_i'\gamma}},$$

with $y_i = 0$ denoting unequal tax schedules and $y_i = 1$ denoting equal tax schedules.

5 Results

Results from the asc logit model are presented in the next subsection 5.1 and focus on the probabilities of East and West German couples to choose one of the three tax class combinations. In the following subsection 5.2 a logit estimation checks the previous results and provides further information on the different behavior of East and West German couples.

5.1 ASC Logit Estimation

Table 3 displays five specifications of the asc logit model. Column 1 includes the alternative specific variables, which are the net incomes, and the case specific economic incentives (share of income substitute male and female, and costs of tax consulting). Specification 2 controls additionally for socio-demographic variables (number of children, religious affiliation of the husband, and age group). In column 3, age group is replaced by cohort dummy variables. In column 4, quadratic terms for the net income variables and the age group variable are added since the influence of these variables might change with larger income and age. In column 5, the age group variable is again replaced by cohort dummy variables.

The coefficients of the alternative specific variables net income male and female are positive and significant at the 1%-level for all specifications. This result denotes that an alternative is more

Table 3: Coefficients from asc logit estimation with dependent variable combination.

Alternative specific	(1)	(2)	(3)	(4)	(5)
Net income male in 1,000 €	0.701***	0.685***	0.687***	0.943***	0.949***
	(116.56)	(111.18)	(110.73)	(66.11)	(66.56)
Net income female in 1,000 €	1.416***	1.384***	1.378***	2.333***	2.328***
	(166.11)	(157.22)	(156.30)	(122.96)	(123.01)
Net income male squared				−0.002***	−0.002***
				(−24.25)	(−24.69)
Net income female squared				−0.010***	−0.010***
				(−72.74)	(−72.84)
Case specific: combination m					
East	−1.551***	−1.474***	−1.478***	−1.633***	−1.626***
	(−77.26)	(−64.30)	(−64.25)	(−64.13)	(−63.94)
Share income substitutes male	4.711***	4.338***	4.363***	4.823***	4.873***
	(5.86)	(5.40)	(5.38)	(5.66)	(5.68)
Share income substitutes female	0.990	0.858	1.000	−0.825	−0.714
	(0.60)	(0.57)	(0.64)	(−0.50)	(−0.42)
Costs of tax consulting in 1,000 €	−0.0944*	−0.205***	−0.222***	−0.126**	−0.128**
	(−1.65)	(−3.63)	(−3.36)	(−2.15)	(−2.18)
Number of children		0.428***	0.415***	0.385***	0.381***
		(38.36)	(36.10)	(31.25)	(31.35)
Religious affiliation male		0.338***	0.344***	0.371***	0.373***
		(15.88)	(16.15)	(15.98)	(16.10)
Age group		0.083***		0.260***	
		(14.87)		(6.22)	
Age group squared				−0.011***	
				(−4.04)	
Younger than 35			−0.289***		−0.348***
			(−9.01)		(−9.69)
Older than 54			0.270***		0.276***
			(9.61)		(9.18)
Constant	2.703***	1.389***	2.059***	2.419***	3.716***
	(97.89)	(25.16)	(57.19)	(15.16)	(67.84)
Case specific: combination f					
East	−0.750***	−0.824***	−0.778***	−0.921***	−0.965***
	(−11.60)	(−11.40)	(−10.78)	(−15.49)	(−16.36)
Share income substitutes male	1.584	1.397	1.427	0.641	0.476
	(0.88)	(0.68)	(0.76)	(0.39)	(0.30)
Share income substitutes female	13.25***	10.80**	10.13*	9.134*	9.262*
	(3.24)	(2.48)	(1.87)	(1.87)	(1.73)
Costs of tax consulting in 1,000 €	−0.957***	−0.770***	−0.719***	−0.0524	−0.0508
	(−3.83)	(−3.26)	(−3.46)	(−0.56)	(−0.56)
Number of children		0.301***	0.456***	0.339***	0.342***
		(8.54)	(12.66)	(11.29)	(11.46)
Religious affiliation male		−0.075	−0.115*	−0.216***	−0.222***
		(−1.08)	(−1.65)	(−3.85)	(−3.97)
Age group		−0.176***		−1.183***	
		(−8.55)		(−13.85)	
Age group squared				0.069***	
				(12.54)	
Younger than 35			1.440***		0.991***
			(17.35)		(13.88)
Older than 54			0.433***		0.211***
			(4.79)		(2.97)
Constant	−5.836***	−4.542***	−6.350***	−1.534***	−6.456***
	(−98.86)	(−27.69)	(−73.66)	(−4.88)	(−85.24)
Cases	263,453	252,809	252,809	252,809	252,809

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

likely to be chosen, if the corresponding net income of one spouse, all else equal, is larger for this alternative. The explanation is very intuitive: if it pays more to choose a special combination, then it is more likely that it is selected. The negative signs of the quadratic net income variables show that this effect diminishes at large net incomes.

The central hypothesis of this paper is confirmed by the estimated coefficient of the East dummy variable, which is different from zero and significant at the 1%-level for all specifications. Accordingly, there is evidence that East and West German couples have a systematically different choosing behavior, when it is controlled for economic incentives and for socio-demographic characteristics. The East dummy coefficient is negative, which means that it is less likely for East Germans to choose m or f compared to e. This result confirms the guess that East Germans are more likely to choose the egalitarian combination, even when controlling for economic circumstances. Since this is a non-linear model, it is not possible to interpret the amount of these coefficients directly, besides of the significance and the sign. Accordingly, based on this estimation we calculate the change in predicted choosing probabilities for the East dummy.

Table 4: Change in the predicted probability to choose combination j for a 0 to 1 switch in *East*.

	(1)	(2)	(3)	(4)	(5)
m	−0.183	−0.167	−0.167	−0.170	−0.170
e	0.191	0.177	0.176	0.182	0.182
f	−0.009	−0.009	−0.009	−0.013	−0.013
Economic variables	yes	yes	yes	yes	yes
Socio-demographic variables	no	yes	yes	yes	yes
Age group	no	yes	no	yes	no
Cohort dummies	no	no	yes	no	yes
Age group squared	no	no	no	yes	no
Net incomes squared	no	no	no	yes	yes

Note: Based on regressions displayed in table 3.

Table 4 presents the change in the predicted probability to choose one combination if the East dummy variable switches from 0 to 1. In the first specification, the East Germans' likelihood to choose the egalitarian combination is 19.1 percentage points larger than the West Germans' likelihood. Including socio-demographic variables decreases this difference to 17.7 percentage points. Replacement of the age group variable by cohort dummies in column 3 changes the probability difference to 17.6 percentage points. Adding squared terms in specification 4 and replacing the age group variable by cohort dummy variables in specification 5 results in a small increase to 18.2 percentage points. Following these estimates, the probability for East German

couples to choose e is between 17.6 and 19.1 percentage points larger than for West Germans. The main part of the difference between East and West German couples results from the different handling of combination m. The difference in the choosing probability of f is, depending on the specification, just 0.9 or 1.3 percentage points. The regression results confirm the descriptive statistic from figure 1, which suggests that East Germans are also more likely to choose e in the range where it would be more profitable to choose m or f. Hence, West Germans are more likely to allocate the better tax class to the husband, whereas East Germans are more likely to select equal tax classes, all else equal, and the null-hypothesis from equation 4 can be rejected.

Apart from the economic incentives it is especially interesting how socio-demographic variables influence the decision making, because it can help to give inference on the reference point hypothesis. Table 3 presents the estimates of socio-demographic variables, too. Couples who have more children are more likely to choose different tax classes. This result may be explained by the fact that parents organize their family stronger with a special allocation of roles than couples without children. Couples where the husband is affiliated to the Christian Church are more likely to choose the combination m compared to e and less likely to choose f compared to e. This could be explained by a more conservative attitude linked to the religious affiliation of these couples.

According to the age group coefficients, older people are more likely to choose m and less likely to choose f compared to e. This result is confirmed for combination m by the cohort dummies, since people who are under the age of 35 years are less likely to choose the combination m compared to e, but more likely to choose f compared to e. People who are older than 54 are more likely to choose m than e. For combination f, the coefficients of the cohort dummies show that people who are older than 54 are more likely to choose f compared to e. This suggests that there is a u-shape effect of age, when we look at the comparison of e and f, which is also supported by the positive sign of the squared age group variable. The increasing likelihood to choose m with the increase in age group could be related to a change in the gender role view toward a more equal gender role attitude of couples in the last decades. Since this analysis is especially interested in the differences between East and West Germany, results in the next subsection give more information on the different influences of the mentioned socio-demographic variables.

5.2 Logit estimation

To check the previous results, we start with a logit estimation and compare the results to an OLS estimation in table 5. The logit and OLS specifications correspond to columns 2 and 3 in table

4, respectively.[20] The effect of the East dummy is positive and significant at the 1%-level. The average marginal effect of the East dummy in the logit estimation is 18.8 percentage points or 18.6 percentage points, which is very similar to the difference in probabilities to choose e in the asc logit estimation (17.7 and 17.6 for these specifications). The effect in the OLS estimation is with 22.0 and 21.8 percentage points a little bit larger, but in the same magnitude.

Table 5: Logit and OLS estimation.

equal=1/unequal=0	(1) logit (ame)	(2) logit (ame)	(3) OLS	(4) OLS
East	0.188***	0.186***	0.220***	0.218***
	(0.003)	(0.003)	(0.003)	(0.003)
Income difference	−0.011***	−0.011***	−0.009***	−0.009***
	(0.000)	(0.000)	(0.000)	(0.000)
Share income substitutes male	−0.592***	−0.594***	−0.607***	−0.607***
	(0.119)	(0.120)	(0.138)	(0.139)
Share income substitutes female	−0.827**	−0.799**	−0.547***	−0.523***
	(0.361)	(0.361)	(0.100)	(0.101)
Costs of tax consulting	0.047***	0.049***	0.059***	0.061***
	(0.009)	(0.009)	(0.007)	(0.007)
Number of children	−0.084***	−0.088***	−0.090***	−0.094***
	(0.001)	(0.001)	(0.002)	(0.002)
Religious affiliation male	−0.063***	−0.063***	−0.075***	−0.075***
	(0.003)	(0.003)	(0.003)	(0.003)
Age group	−0.005***		−0.005***	
	(0.001)		(0.001)	
Younger than 35		−0.015***		−0.016***
		(0.004)		(0.005)
Older than 54		−0.050***		−0.049***
		(0.003)		(0.004)
Constant			0.692***	0.670***
			(0.007)	(0.004)
N	252,809	252,809	252,809	252,809
R^2			0.336	0.337

p values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The next step is to analyze East-West differences. Table 6 shows the specifications from table 5 completely interacted with the East dummy. The result of an adjusted Wald test is that the interaction terms and the East dummy are jointly significant different from zero. Accordingly,

[20] Except that the alternative specific net income variables are replaced by income difference and the dependent variable is equal/unequal tax classes.

Table 6: Logit and OLS estimation results with equal as dependent variable.

	(1) logit (coef)	(2) logit (coef)	(3) OLS	(4) OLS
East	-0.553^{***}	0.586^{***}	-0.007	0.157^{***}
	(0.093)	(0.038)	(0.015)	(0.005)
Income difference	-0.070^{***}	-0.070^{***}	-0.009^{***}	-0.009^{***}
	(0.001)	(0.001)	(0.000)	(0.000)
Share income substitutes male	-5.271^{***}	-5.300^{***}	-0.782^{***}	-0.784^{***}
	(1.281)	(1.266)	(0.139)	(0.140)
Share income substitutes female	-5.185^{*}	-4.878	-0.471^{***}	-0.441^{***}
	(3.115)	(3.107)	(0.112)	(0.113)
Costs of tax consulting	0.388^{***}	0.399^{***}	0.077^{***}	0.079^{***}
	(0.061)	(0.062)	(0.008)	(0.008)
Number of children	-0.645^{***}	-0.673^{***}	-0.105^{***}	-0.109^{***}
	(0.013)	(0.013)	(0.002)	(0.002)
Religious affiliation male	-0.409^{***}	-0.408^{***}	-0.078^{***}	-0.078^{***}
	(0.021)	(0.021)	(0.004)	(0.004)
Age group	-0.052^{***}		-0.007^{***}	
	(0.005)		(0.001)	
Younger than 35		-0.055^{*}		-0.005
		(0.031)		(0.005)
Older than 54		-0.390^{***}		-0.057^{***}
		(0.027)		(0.005)
East∗Income difference	0.004^{**}	0.004^{***}	-0.001^{***}	-0.001^{***}
	(0.001)	(0.001)	(0.000)	(0.000)
East∗Share income substitutes male	3.889^{**}	4.025^{**}	0.612^{***}	0.632^{***}
	(1.612)	(1.613)	(0.196)	(0.196)
East∗Share income substitutes female	-0.422	-0.624	-0.338^{*}	-0.372^{*}
	(3.596)	(3.586)	(0.200)	(0.194)
East∗Costs of tax consulting	-0.598^{***}	-0.572^{***}	-0.122^{***}	-0.119^{***}
	(0.117)	(0.121)	(0.019)	(0.019)
East∗Number of children	0.494^{***}	0.452^{***}	0.077^{***}	0.070^{***}
	(0.020)	(0.020)	(0.003)	(0.003)
East∗Religious affiliation male	0.026	0.049	0.015^{**}	0.019^{***}
	(0.038)	(0.038)	(0.006)	(0.006)
East∗Age group	0.146^{***}		0.021^{***}	
	(0.010)		(0.002)	
East∗Younger than 35		-0.414^{***}		-0.079^{***}
		(0.055)		(0.010)
East∗Older than 54		0.364^{***}		0.047^{***}
		(0.049)		(0.008)
Constant	1.592^{***}	1.296^{***}	0.721^{***}	0.679^{***}
	(0.051)	(0.026)	(0.008)	(0.004)
N	252,809	252,809	252,809	252,809
R^2			0.340	0.340
Adjusted Wald test (interaction terms, East) F	529.51	460.41	636.53	554.35
Prob > F	0.000	0.000	0.000	0.000

p values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

socio-demographic variables influence the decision behavior of married couples in East and West Germany differently. Since the logit model is a non-linear one, the marginal effects of the interaction terms cannot be interpreted like in an OLS model. It is not possible to interpret these effects correctly, because they show only the direct derivative of the interaction term, which is

$$\frac{\partial F(u)}{\partial x_1 x_2} = \beta_{12} F'(u),$$

with $F(u)$ as cumulative distribution function and $u = \beta_1 x_1 + \beta_2 x_2 + \beta_{12} x_1 x_2 + \beta X$. According to Norton et al. (2004), the cross partial derivative

$$\frac{\partial^2 F(u)}{\partial x_1 \partial x_2} = \beta_{12} F'(u) + (\beta_1 + \beta_{12} x_2)(\beta_2 + \beta_{12} x_1) F''(u)$$

should be calculated. To solve this problem, we use two approaches that avoid calculating the cross partial derivatives, but are appropriately to interpret. The first one is to calculate the discrete change in the East dummy for both values of certain dummy variables and compare the difference with the OLS coefficient of the respective East interaction term. The second approach is to compute the average marginal effect of the East dummy at certain values of socio-demographic variables and plot the results (figure 5).

First, we calculate the effect of a predicted change in the East dummy when a socio-demographic variable is zero or one. The difference in the effect of a characteristic is represented by the comparison of the two marginal effects. The difference between these effects shows the diverging influence of the variable on the tax decision between East and West German couples. In table 7, we calculate these differences as

$$ME_{East*x_k} = \left(\frac{\Delta P}{\Delta East} \middle| x_k = 1 \right) - \left(\frac{\Delta P}{\Delta East} \middle| x_k = 0 \right).$$

The table shows these effects for the cohort dummy variables, the children dummy and the religion dummy and compares them to the coefficients from the OLS estimation, which are directly interpretable. One problem that is addressed in table 7 is that the calculation of the marginal effects at the observed values includes certain systematic differences in the other variables. To avoid this problem, we additionally calculate the same effects by holding the other variables constant at the median. Table 7 also shows that the levels of the marginal effects, calculated as observed and at the median[21], are different, but the probability change when the socio-demographic dummy changes is very similar.

[21] The effect "as observed" means that the average marginal effect for all observations at the observed characteristics is calculated. "At median" means that the marginal effect at the median observation is calculated.

Table 7: Discrete change of *East* at certain values compared to OLS coefficients of the interaction terms.

$\frac{\Delta P}{\Delta East}$	ME as observed	ME at median	OLS coef
at younger35=1	0.120***	0.172***	
at younger35=0	0.194***	0.276***	
difference	−0.074	−0.104	−0.079***
at older54=1	0.232***	0.347***	
at older54=0	0.175***	0.276***	
difference	0.057	0.071	0.047***
at child=1	0.220***	0.276***	
at child=0	0.120***	0.170***	
difference	0.100	0.106	0.070***
at religious affiliation male=1	0.190***	0.276***	
at religious affiliation male=0	0.187***	0.266***	
difference	0.003	0.010	0.019***

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: Based on specifications 2 and 4 in table 6 with number of children replaced by a child dummy variable.

Table 7 shows that the young cohort in East Germany is 7.4 to 10.4 percentage points less likely compared to their middle cohort to choose equal tax classes than their West German counterparts.[22] This means that the difference in the probability to choose e between the middle and the young cohort is larger in East Germany than in West Germany. In terms of reference points, this means that the young cohort in East Germany is less influenced by the tax and political regime in the former GDR than the middle cohort. The young cohort was 20 years old or younger at the reunification, hence the influence of the reference point seems to mitigate for people who experienced less time in the GDR.

The effect of being in the oldest cohort is different, too. The East effect is between 4.7 and 7.1 percentage points larger for people who are older than 54. The results from the marginal effects of the old cohort can also be interpreted in terms of different reference points. This cohort was 40 years or older at the time of reunification. As we have seen in the previous analysis, couples in East Germany have a very high probability to choose e. According to table 7, this probability still increases if a couple is in the old cohort. The old East cohort is strongest influenced, if it is measured in years of living in the GDR, by the political and tax regime in the GDR. This fact is

[22] The results in this table compare only the relative difference in influence of socio-demographic variables in East and West Germany, but not differences in the levels of the effects.

also revealed in their choosing behavior.

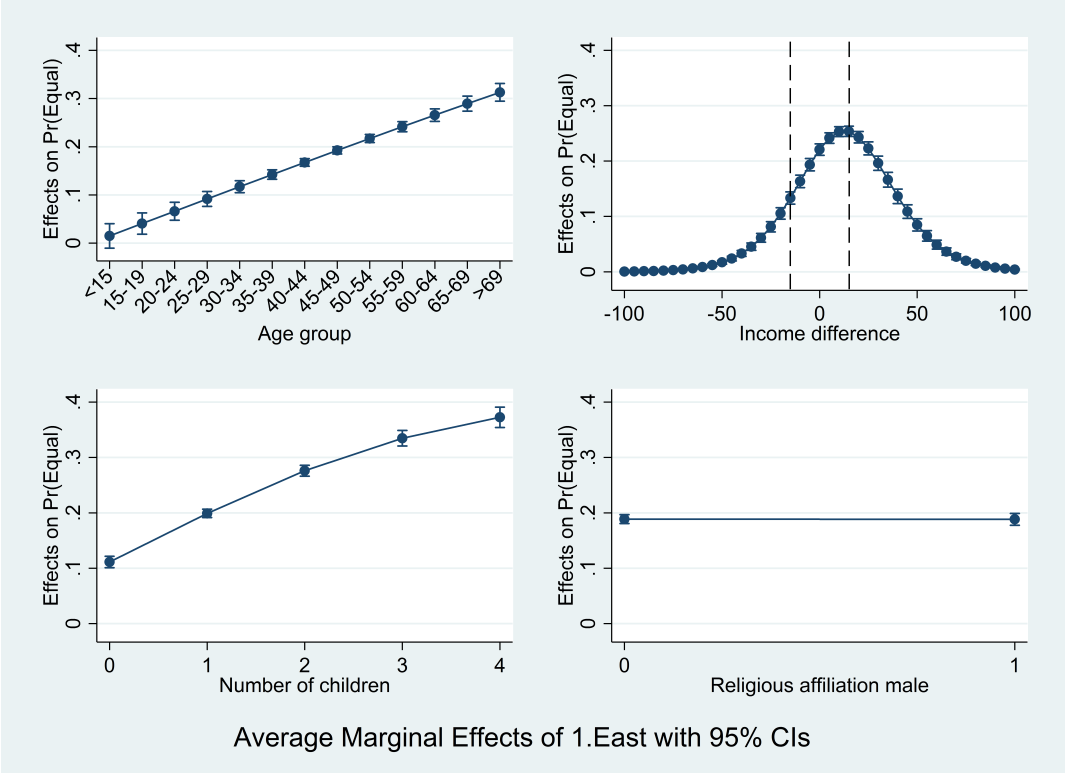
Another big difference exists in the decision behavior of families in East and West Germany. For couples who have at least one child, the East effect is between 7.0 and 10.6 percentage points stronger than for couples without children. Before reunification, family politics and family taxation in East Germany pointed at the participation of mothers in the labor market, whereas in West Germany the opposite policy took place for a long time. The different choosing behaviors of East and West German couples with children still seem to represent these different policies in 2004.

The difference in the effect of religious affiliation between East and West German couples is between 0.3 and 1.9 percentage points, which is rather small compared to the other differences. Accordingly, the religious affiliation of the husband changes the East effect only slightly. Hence, the religious affiliation of the husband seems to have the same relative influence in East and West Germany. This gives evidence that the attitudes of members in the Christian Church are very similar, but at different levels in East and West Germany in terms of the likelihood to choose a certain tax class.

The second step in the presentation of the marginal effects is to plot the East effect at different values of certain socio-demographic variables. Figure 5 shows the East effect at values of age group, number of children, religious affiliation male, and the income difference. These plots support the results from table 7. With increasing age group, the effect of the East dummy on the probability to select combination e increases. Also the increase in the number of children leads to an increasing effect of the East dummy on the probability to choose equal tax classes. The East effect measured for religious and non-religious couples is about the same.

We additionally included in this figure the income difference, where it was not possible to get results on a dummy variable like in table 7. The plot of the East effect on the probability to choose equal tax classes relates to the descriptive figure 1. The area between the dashed lines represents, again, the range where it can be efficient to choose e. The areas on the right and on the left represent the range, where it is never optimal to choose e. The plot shows that the probability to choose e is also larger than in West Germany, when it is not optimal to choose e. This is especially the case, when the husband has the higher earnings. This result shows that even when the income difference is hold constant and it is net income maximizing to choose m or f East German couples are more likely to choose the egalitarian combination. Accordingly, this gives evidence for the hypothesis that there are differences in the attitudes and preferences on distribution within in the marriage between East and West German couples.

Figure 5: Average marginal effects of the East dummy at certain values of other variables.



Note: Based on regression results from the logit estimation in column 1 in table 6.

The findings of this study are in line with the results by Alesina and Fuchs-Schündeln (2007). Their interpretation of differences in self-reported preferences for state intervention between East and West Germans is that individual preferences are highly influenced by the political regime people lived in. By adopting this view, the results of this analysis can be interpreted as follows. Since East and West Germans face the same tax law and institutions since fourteen years in 2004, disparities in the behavior seem to be driven by a different socialization before 1990. This interpretation is based on our result that East German couples have a higher preference for equal tax treatment. In the former GDR women were used to work full-time and to earn their own money, which was not the case for many of the West German women. This difference in female labor supply could have influenced the beliefs of couples how the two partners should be taxed – equally or not. A second reason might be the fact that the tax law of the former GDR had no marital income splitting. Accordingly, East Germans were not used to this institution until reunification.[23]

The results of this study also support the findings of Bauernschuster and Rainer (2010). They

[23]Another explanation might be that East German couples stick to the default combination more often than West German couples, because they are less aware of the possibilities to change this combination.

find that East Germans have a more egalitarian view of men and women. The difference in tax planning behavior of East and West German couples points into the same direction: East German couples prefer equal tax treatment whereas West Germans prefer unequal tax treatments with a disadvantage for the wife. This consistency gives evidence that expressed attitudes correspond to real decisions and behavior. Additionally, our analysis shows that the differences in the choosing behavior are stronger for older cohorts. This is a hint showing that older people are stronger influenced by the different political regimes and accordingly, by the reference points than younger people.

One problem that could arise is that married couples in East and West Germany might be systematically different. With that a problem of sample selection arises. The decision to marry might influence the choice of tax schedules differently for East and West German couples. It might be influenced by social experiences and environments, which were different in the former GDR and the Federal Republic of Germany. To address these problems to a certain extent, the robustness check in the next section points at dividing the difference in behavior into the share that is driven by differences in the characteristics of the subsamples and the share that is a result of other influences.

6 Robustness check

To check the previous results and to strengthen the point that one part of the different choosing behavior is due to differences in the observed variables in the subsamples and one part cannot be explained by these differences a Blinder-Oaxaca decomposition is conducted in this section. This decomposition allows to identify the share that explains the difference in the expected values of the dependent variable for the two subsamples and a share that is not explained by observed variables (Greene 2012):

$$E\left[Equal|x_k^{West}\right] - E\left[Equal|x_k^{East}\right] = \left(x_k^{West} - x_k^{East}\right)' \beta^{East} + x_k'^{West}\left(\beta^{West} - \beta^{East}\right), \qquad (6)$$

where $West$ and $East$ denote the two subsamples, respectively. The estimation is done by OLS and the reference coefficient for the two subgroups is drawn from a pooled OLS model like Jann (2008) suggests. The left hand side in equation 6 defines the difference in table 8. The first term on the right hand side of equation 6 represents the part of the difference that is explained by differences in the characteristics of the subgroups. The second term denotes the unexplained part, which represents the different effects of personal characteristics in East and West Germany. Table

8 shows the results from the Blinder-Oaxaca decomposition.

Table 8: Results from the Blinder-Oaxaca decomposition.

Equal	(1)	(2)
Differential		
Prediction West	0.342^{***}	0.342^{***}
	(0.000)	(0.000)
Prediction East	0.725^{***}	0.725^{***}
	(0.000)	(0.000)
Difference	-0.382^{***}	-0.382^{***}
	(0.000)	(0.000)
Decomposition		
Explained	-0.162^{***}	-0.127^{***}
	(0.000)	(0.000)
Unexplained	-0.220^{***}	-0.255^{***}
	(0.000)	(0.000)
N	263,453	263,453

p values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The control variables in column 1 are income difference, relative income substitutes male/female, cost of tax consulting, age group, number of children and religious affiliation of the husband. To additionally control for possible differences in the economic wealth, total income of a couple is included in column 2. The difference in the probability to choose equal tax classes is 38.2 percentage points, which corresponds to the descriptive statistic in table 2. Due to specification 1, 16.2 percentage points of this difference (a share of 42%) are explained by differences in the observed characteristics of the two subgroups. 22.0 percentage points of the difference (a share of 58%) are not explained by the observed characteristics. This means on the one hand, that this part of the difference might be influenced by unobserved characteristics and on the other hand, that this part might include disparities in the choosing behavior resulting from different reference points in East and West Germany. Specification 2 shows that the inclusion of the total income of the couple decreases the explained part by 3.5 percentage points. Accordingly, the unexplained share increases and the result that the different choosing behaviors of East and West German couples can not be completely explained by differences in the subgroups holds.

7 Conclusion

The main result of this analysis is that West German couples have a 17.6 to 19.1 percentage points higher probability to choose different tax schedules for husband and wife than East German couples. This result seems to be driven by former political differences between East and West Germany due to the time of German separation. These findings are in line with other studies like Alesina and Fuchs-Schündeln (2007), Rainer and Siedler (2009), Bauernschuster and Rainer (2010), and Ockenfels and Weimann (1999), who find that East and West Germans have different social preferences. This paper contributes to the literature by evaluating tax decisions with administrative data in this context and adds evidence for the theory of the status quo bias (Kahneman 1992). The results are relevant for economic research, as well as for policy makers. It should be considered that reactions of economic subjects can be highly influenced by different reference points. Hence, studies conducted with data from one country are not automatically applicable to other countries. The same applies for policy reforms.

An implication for the German income tax splitting is that East and West German couples handle tax planning in terms of tax class choice completely different. What becomes obvious, is that the splitting and the choice of different tax classes is much more fitted for the economic circumstances and attitudes of West German married couples than for East German married couples. Since income differences are much larger in West Germany, West German couples benefit more from the splitting advantage. Accordingly, they make more use of the different allocation of tax classes, which also has implications for the labor supply of married women in West Germany. Additionally, the possibility to allocate a "good‘" and a "bad" tax class to the spouses accounts more for the gender role attitudes of West German couples than to the more egalitarian view of East German married couples.

One conclusion is that the income tax splitting is a West German tax institution that subsidizes mainly West German marriages and reinforces traditional West German gender roles. Another possible conclusion is that the policy makers should replace the current income tax splitting by another taxation principle for marriages that mitigates the disincentive of secondary earners to participate in the labor market. A solution would be to implement individual taxation with deductions for maintenance of the spouse if he or she does not work or earn not enough money. The Swedish case (Selin, 2014) could be a model for such a reform.

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Appendix 1

Calculation of the monthly tax payments: Table 9 shows the tax function according to the tax law in 2004. Y is the amount of income that is left after all allowances are deducted from gross income (except of the basic tax-free allowance). The amount of these tax deductions depends on personal characteristics and the chosen tax class. For the calculation of the monthly amount of income tax due, the monthly income is extrapolated to the whole year. Then, all allowances are deducted and the tax function is applied. Afterwards, the amount of income tax is divided by twelve. Table 11 shows the allowances depending on the tax class. Income tax is not the only

Table 9: Taxable income (Y) and tax function $T(Y)$ in €.

Y	$T(Y)$
$0 - 7,664$	0
$7,665 - 12,739$	$(Y - 7,664) * \left[(793.10 * 10^{-8}) * (Y - 7,664) + 0.16\right]$
$12,740 - 52,151$	$(Y - 12,739) * \left[(265.78 * 10^{-8}) * (Y - 12,739) + 0.2405\right] + 1,016$
$52,152 - \infty$	$0.45 * Y - 8,845$

Source: §32a EStG 2004.

tax levied on the gross income. There are the church tax (if the taxable person is member of either the Catholic or Protestant Church) and a solidary surcharge (Solidaritätszuschlag), which was implemented after the German reunification. These taxes are calculated as a percentage of the income tax due. Church tax is 9%[24] and solidary surcharge is 5.5% of the income tax due. If one has children, child allowances (Kinderfreibeträge) lower the tax base for the church tax and the solidary surcharge, but not for the monthly income tax. The procedure is shown in table 10, where c denotes the number of children. Here the child allowances only influence the amount of

Table 10: Church tax and solidary surcharge.

Tax class	3	4	5
Y – child allowance $= Y_{child}$	Y^3 – 5,808 €$\times c$	Y^4 – 2,904 € ×c	Y^5 – 0 €$\times c$
church tax =	$T(Y^3_{child}) * 0.09$	$T(Y^4_{child}) * 0.09$	$T(Y^5_{child}) * 0.09$
solidary surcharge =	$T(Y^3_{child}) * 0.055$	$T(Y^4_{child}) * 0.055$	$T(Y^5_{child}) * 0.055$

church tax and solidary surcharge, but the choice of tax class also determines who receives the

[24] Bavaria, Baden–Württemberg: 8% plus church fee (Kirchgeld).

monthly amount of child benefits. The person in class 3 receives the total amount for all children and the person in class 5 receives no child benefits, in class 4 the child benefits are divided.[25]

Table 11: Tax allowances and tax classes.

Tax class	3	4	5
gross income			
– pension allowance (Versorgungsfreibetrag §19 II EStG)	yes	yes	yes
– increment to pension allowance	yes	yes	yes
(Zuschlag zum Versorgungsfreibetrag)			
– standard deduction for pensions	102 €	102 €	102 €
(Versorgungsbezüge-Pauschbetrag §9a I EStG)			
– allowance for elderly retired persons	yes	yes	yes
(Altersentlastungsbetrag §24a)			
–/+ registered allowance/additional amount	yes	yes	yes
(Freibetrag/Hinzurechnungsbetrag §39 a I EStG)			
– standard deduction for employees	920 €	920 €	920 €
(Arbeitnehmer-Pauschbetrag §9a EStG)			
– standard deduction for special expenes	72 €	36 €	–
(Sonderausgaben-Pauschbetrag §10c EStG)			
– provisional lump sum (Vorsorgepauschale)	yes ×2	yes	–
= Taxable income			

Source: §39b EStG 2004.

Appendix 2

Due to the progressivity of the German income tax schedule the tax gain of receiving class 3 compared to 4 is not equal to the loss by applying 5 compared to 4 at the same income level. Figure 6 shows that the tax advantage of choosing 3 and the disadvantage of choosing 5 compared to 4 are asymmetric. In the range from 0 to 59,043 €[26] of yearly gross income, the disadvantage of class 5 exceeds the advantage of class 3. At higher incomes the advantage of 3 increases further, while the disadvantage of 5 remains unchanged. This comparison emphasizes that couples, where both have or one partner has higher earnings than 59,043 €, should always choose m or f. Even if

[25]In Germany exist child allowances and child benefits. Parents receive child benefits every month. At the end of the year the financial authority checks if the couple is better off by keeping the child benefits or by paying them back and receiving a child allowance instead.

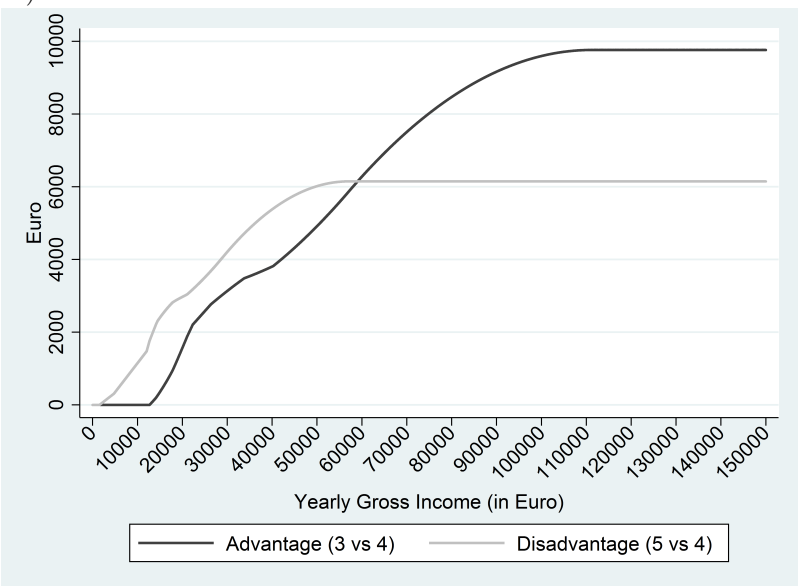
[26]This is the yearly gross income, where the lines cross in figure 6.

the couple has equal earnings, they should choose different tax classes in this range, because the advantage of class 3 always exceeds the disadvantage of class 5.

When both partners have lower earnings than 59,043 € the picture is not clear: the optimal tax class combination now depends on the income difference and the level of income. What becomes clear is that the closer the incomes are in this range, the more profitable it is to choose e. The larger the income difference is, the lower is the advantage of e until it gets optimal to choose m or f.

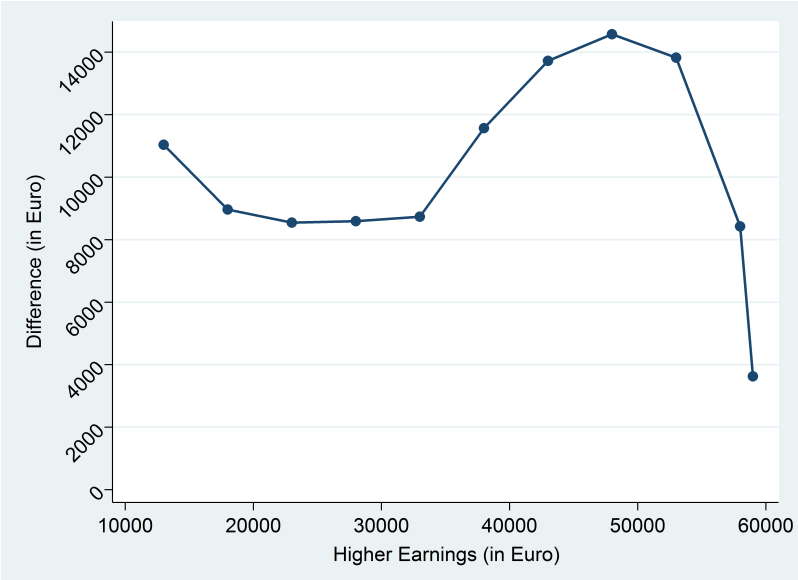
Figure 7 presents the range of income differences between spouses, conditional on the income of the higher earner, in which it is still optimal to choose e. If the income difference becomes larger, it gets optimal to change the tax class combination from e to m or f, depending on who receives the higher income. The graph shows that a couple with a higher earner who receives yearly gross income of about 30,000 € should take e if the second earner receives income that is up to about 8,500 € lower than the higher income. In contrast, a couple with a higher earner, who receives about 50,000 € should choose e if the second earner has up to about 14,000 € lower earnings. If the income of the second earner is lower than his/her difference suggests, the couple should change their tax class combination, if they want to maximize their aggregate monthly net income.

Figure 6: Tax advantage and disadvantage for class 3 and 5 compared to 4 (German income tax schedule in 2004).



Source: Own calculations using the program chart ("Programmablaufplan" 2004) by the German Federal Ministry of Finance.

Figure 7: Range of income differences when e is still optimal, conditional on the income of the higher earner for selected values.



Source: Own calculations using the program chart ("Programmablaufplan" 2004) by the German Federal Ministry of Finance.