# Withheld from Working More?

# Withholding Taxes and the Labor Supply of Married Women

Tim Bayer[γ], Lenard Simon[β], and Jakob Wegmann[β]

**Preliminary draft – Please do not cite or circulate**

August 8, 2023

## Abstract

Can the complexity of income tax systems impact labor supply decisions? We study this question in the context of withholding taxes paid by married couples in Germany. In a first step, we document with the help of a survey that less than 20 % of the interviewed married individuals understand that withholding taxes are tax prepayments which are fully credited against the final income tax and, therefore, do not determine the income tax burden. Making use of a reform that decreased the withholding tax burden for some married women more than for others, while inducing no differences in income taxes, allows us to then estimate the elasticity of labor income with respect to the withholding tax. In line with our survey findings, we show that women adjust their labor supply following a change in withholding taxes. Importantly, the German institutional setting allows couples to partly redistribute the withholding tax burden from one partner to the other, and the majority shifts parts of the withholding tax burden from the husband to the wife. Our results suggest that the increased withholding tax burden of married women in Germany contributes to their low labor supply. The finding also highlights that governments should be aware that overwithholding results in an overestimation of the actual income tax and thus distorts labor supply incentives.

**JEL Classification:** H21, H31, J16, J20, K34

**Keywords:** Withholding Taxes, Income Taxation, Gender, Labor Supply

# 1 Introduction

Most countries use third-party withholding to collect income taxes during the year. Typically, employers withhold monthly prepayments to income taxes which are then fully credited against the final income tax liabilities of their employees. This provides governments with a constant income stream during the year and increases tax compliance (Bagchi and Dušek, 2021; Slemrod, 2019). However, withholding tax rates do not necessarily reflect true effective income tax rates. Often, there is overwithholding as many taxpayers pay higher withholding taxes than actual income taxes (Engström et al., 2015; Gelman et al., 2022; Hauck and Wallossek, 2023; Rees-Jones, 2018). In this case, a lump-sum tax refund is paid to employees by the government after the end of the tax year. Conversely, in the case of under-withholding, employees must make an additional lump-sum tax payment to the government. This inter-linkage between withholding taxes and income taxes makes it more complex to understand the income tax system. As a consequence, the design of withholding taxes can distort labor supply when individuals use their monthly take-home pay to infer their income tax burden.

It is difficult to study the effects of withholding taxes, as they are typically a function of the income tax. Therefore, it is usually not possible to use reforms of the income tax system to draw conclusions regarding the role of withholding taxes. However, the German income tax system offers an institutional setting that allows investigating the effects of a reform of withholding taxes on labor supply. We illustrate the core feature of the institutional setting in Figure 1 which displays average withholding tax rates by gender and labor income in Germany. Conditional on labor income, married women pay, on average, higher withholding tax rates than married men. This is the consequence of the German withholding tax system that allows couples to shift parts of the withholding tax burden from one partner to the other by choosing certain withholding tax classes (*"Lohnsteuerklassen"*). As a consequence of the choice of withholding tax classes, couples with identical income structures can end up paying different withholding taxes. Importantly, the decision on withholding tax classes does not affect the final income tax rate. However, a married couple can minimize its joint withholding tax burden by shifting some part of the withholding tax burden from the spouse with higher labor income, i.e., the primary wage earner, to the spouse with lower labor income, i.e., the secondary wage earner. This explains the pattern in Figure 1: Married women are typically the

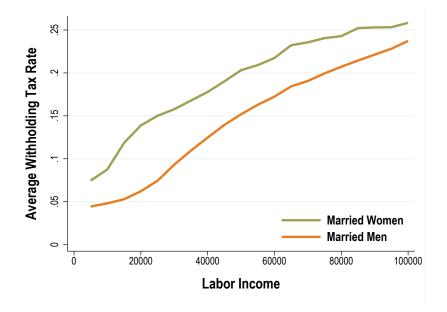secondary wage earner and hence face, on average, a higher withholding tax rate conditional on labor income.



Figure 1: Average Withholding Tax Rate by Gender

*Notes:* The figure displays the average realized withholding tax rate by gender for married couples in Germany for annual labor income levels of up to 100,000 €. Calculations are based on a 10 % sample of income tax returns in 2010. The figure illustrates that through the choice of withholding tax classes (*"Lohnsteuerklassen"*), married couples shift a substantial share of the withholding tax burden from men to women (RDC of the Federal Statistical Office and Statistical Offices of the Federal States, 2010).

Given a fixed income tax schedule, these differences in withholding tax rates should have no real effects.[1] If individuals react strongly to withholding taxes, this suggests that withholding taxes are misunderstood and used as a proxy for income taxes. This could be due to the larger salience of withholding taxes compared to income taxes. While withholding taxes are directly observed on the monthly payslip, the actual income taxes can only be inferred after receiving the final income tax statement.[2] Withholding taxes could therefore constitute a central cornerstone in understanding how people learn about the tax rates they face.

An additional motivation to study the effect of withholding taxes on labor supply is based on joint taxation. The underlying rationale of joint taxation is based on the idea that married

---

[1] This holds in a unitary household model and in the absence of interest rates and liquidity constraints. Shapiro and Slemrod (1995) find that the financial situation of households is not correlated with the propensity to consume withholding tax savings.

[2] Moreover, we find with the help of a survey that in only 37 % of interviewed married couples who file a joint tax declaration both spouses take part in preparing the tax declaration. This indicates that many individuals do not invest much time in understanding the final income tax statement.

households act as one economic unit like in unitary household models, and are, consequently, taxed jointly. Thereby, governments set the identical economic incentives for both partners irrespective of their individual wage income and governments remain impartial about the distribution of labor supply within the household. Consequently, in joint taxation systems, the government also does not have to take a stance on how the marriage bonus induced by joint taxation should be distributed within the household, as it is paid out to the household as a whole.

However, withholding taxes are inherently individual taxes. Therefore, in countries with tax withholding and joint taxation, policymakers cannot remain impartial when deciding how the marriage bonus should be distributed between partners throughout the year. Also, governments are forced to decide on the individual marginal and average withholding tax rates. Interestingly, the implemented solutions vary substantially between countries, as we will discuss in more detail later in the paper. The gap in average tax rates presented in Figure 1 reflects the consequence of the implemented withholding tax system for married individuals in Germany. If individuals use payslips or monthly transfers to infer their net income, the gender gap in withholding taxes might contribute to a misperception about the returns to labor within couples.

To measure knowledge about withholding taxes and to better understand decision-making processes on household finances in the German population, we conducted a pre-registered online survey. We find that more than 80 % of the surveyed married and employed individuals wrongly think that the choice of withholding tax classes affects the final income tax burden. This suggests that individuals with the same income tax burden, but with differing withholding tax rates, might perceive their income tax burden differently and consequently make different labor supply decisions. Additionally, we investigate the impact of the system of withholding tax classes on the organization of household finances. As seen in Figure 1, couples often choose withholding tax classes that shift parts of the withholding tax burden from men to women. For only about 40 % of these couples, we monitor patterns that are consistent with compensating these women, i.e., the husband making a relatively larger monetary transfer to his wife, or to a shared bank account, than vice versa. If women are not compensated for the unequal distribution of the withholding tax burden, the observed pattern of assignment of withholding tax classes lowers their own disposable net income. Hence, they might overestimate their

3

individual income tax burden, which can decrease their incentives to work and potentially also affect their bargaining power within the couple.

Motivated by these findings, we investigate empirically whether withholding taxes impact labor income. The German institutional context provides us with a unique opportunity to causally study the effects of withholding taxes. Germany offers different withholding tax schedules for couples so that households with an identical income structure and income tax burden can pay very different withholding taxes. However, the choice of withholding tax schedules is not random as households self-select into them. Accordingly, the differing levels of withholding taxes stemming from the different schedules cannot be exploited for a causal analysis. We circumvent this problem by analyzing a tax reform in 2010 that cut withholding taxes for married women differently across withholding tax schedules. Applying a Difference-in-Differences setup with continuous treatment intensity, we are able to investigate how married women react to a cut in withholding taxes while keeping income tax payments constant. The reform is the result of a technical detail in the automatic deduction of health care costs that passed the German parliament as part of a larger income tax reform. There was no discussion about the change in public sessions of the parliament and there exists not a single newspaper article about the reform. Hence, we expect no anticipation effect, and any change in labor income can be traced back to the cut in withholding taxes.

We conduct the analysis using administrative tax records from a 5 % sample of the German Taxpayer Panel (TPP) which contains extensive information on the population of taxpayers in Germany for the years 2001 to 2018 (RDC of the Federal Statistical Office and Statistical Offices of the Federal States, 2018). The dataset is very well suited for studying the effects of withholding taxes as it does not only provide information on income and the withholding tax class but also includes numerous other characteristics of the household that allow us to better understand underlying mechanisms in the heterogeneity analysis.

For married women, we estimate an elasticity of labor income with respect to the marginal net-of-withholding tax rate of about 0.1 using a static Diff-in-Diff. Estimating an event study Diff-in-Diff, we find that the treatment effect increases monotonically over time. We attribute this change in the size of the treatment effect over time to the way taxpayers learn about their tax rates. We argue that employees use the information on withholding taxes from their

4

monthly payslips to learn about their income taxes which takes time as they first have to realize that their monthly net wage has changed and then recognize the persistence of this change. Moreover, it might also take time to adapt one's labor supply, possibly after negotiations with one's employer or a change of employer.

The fact that individuals react to withholding taxes implies that governments should be careful when designing withholding tax schedules. As we show in this study, many countries introduce withholding tax systems for married couples to reduce overwithholding stemming from joint taxation benefits. We demonstrate that as soon as countries try to set withholding tax rates for married couples they have to decide what the individual marginal and average withholding tax rates are that each spouse faces and thereby have to make a decision on how the joint taxation benefit is divided among spouses. We show that different implementations can result in significantly different withholding tax rates for primary and secondary earners. Based on our empirical findings, it becomes evident that the design of withholding tax systems cannot be inherently incentive-neutral. Instead, it requires a deliberate decision on how to influence the work incentives of both primary and secondary earners. This is especially relevant as it shows that the withholding tax system can be used to increase the labor market participation of secondary earners.

**Related Literature.** In this paper, we provide the first real-world evidence on the effects of withholding taxes on labor supply.[3] Previous evidence comes from a laboratory experiment by Becker, Fooken, and Steinhoff (2019). Their paper studies the hypothesis that taxpayers have false perceptions of net labor income due to withholding taxes. Using treatments with different levels of withholding tax rates, they design their experiment in a way that these withholding tax rates and the corresponding adjustments of lump-sum payments should not influence the behavior of rational agents.[4] Contrary to standard economic theory, the authors, however, find that people describing themselves as money-motivated significantly reduce their effort when facing higher withholding tax rates.

---

[3]Buettner, Erbe, and Grimm (2019) show how the choice of withholding tax classes depends on spouses' labor income but they do not study the effect of withholding tax class choice on labor income.

[4]Here, they model a world without interest rates and liquidity constraints which do not perfectly fit the real economy. Positive interest rates might give an incentive to have a low withholding tax rate because interest can be earned between paying the withholding tax and having to pay additional tax payments. Liquidity constraints might also give an incentive to have a low withholding rate to not run out of money during the year.

We are not the first to study the effects of withholding taxes. Economists have generally expressed a positive view on overwithholding, as withholding taxes are associated with more savings, less consumption, liquidity for the government and higher tax compliance. Hence, our results suggest that policymakers face a difficult trade-off when designing withholding taxes. We discuss the related research in Section 6.

Our paper contributes to the existing literature on the complexity of tax systems. Undoubtedly, the interlinkage between withholding tax and income tax and particularly the possibility to choose withholding tax classes add complexity for taxpayers. This complexity might impact their decision-making. Using an experimental setting, Abeler and Jäger (2015) find that taxpayers subject to more complex tax systems do not react to new taxes sufficiently. This shows that the complexity of tax systems can induce taxpayers to make irrational decisions. It is therefore relevant that, as well documented, an overwhelming majority of taxpayers do not understand how income taxation works. For example, many individuals do not know which tax rates apply to them personally (Chetty, Friedman, and Saez, 2013; Enrick, 1963, 1964; Fujii and Hawley, 1988; Lardeux, 2022; Wagstaff, 1965), and they do not understand the difference between marginal and average tax rates (Gideon, 2017; Liebmann and Zeckhauser, 2004; Rees-Jones and Taubinsky, 2020). However, the literature on income taxation finds large elasticities of taxable income with respect to the income tax, which shows that people react to the amount of taxes they have to pay (Gruber and Saez, 2002; Neisser, 2021; Saez, Slemrod, and Giertz, 2012). People thus respond to income taxes even though they do not have a good understanding of them due to, e.g., mental or time constraints. This poses the question which heuristics individuals use to determine their response to income taxation. Throughout this paper, we document that withholding taxes serve as one of these heuristics in a complex system of income taxation.

Other research finds that taxpayers act on more salient parts of a tax system. Using a field experiment in a grocery store, Chetty, Looney, and Kroft (2009) find that, although consumers are aware of which tax rate they have to add, consumers' demand for goods is higher when sales taxes are not added to the price tag.[5] As linear commodity prices are relatively simple to understand and calculate, the authors take that as an indication for the hypothesis that behavioral responses of taxpayers could be very different from those predicted by standard

---

[5]Feldman and Ruffle (2015) arrive at a very similar finding.

economic theory in cases of more complex taxes such as income taxes. It has already been shown in the literature that withholding taxes substantially impact real-world decisions other than labor supply, namely saving, consumption and tax compliance. A detailed discussion of these papers can be found in Section 6.1.

The particularities of the German institutional setting allow us to also contribute to the literature on the determinants of the gender earnings gap which is particularly pronounced in Germany. As previously shown in Figure 1, married women pay, conditional on labor income, higher withholding tax rates than married men. Therefore, we argue that, given our estimates, a reduction of withholding tax payments for married women in Germany might increase labor supply and thus labor income of married women. The existing system of withholding tax classes for married couples might then be an additional contributing factor to the gender gap in labor supply in Germany. We therefore contribute to a discussion of how to optimally design a tax system while creating the smallest possible detrimental incentives for labor supply of women and keeping states' budgets stable.

Previous literature has shown that labor supply of women can be detrimentally affected by the design of tax systems. This holds true in particular for systems with joint taxation of married couples, in which marginal and average tax rates of secondary earners are increased, while those of primary earners are decreased. LaLumia (2008) studies the effects of the United States turning from an individual taxation scheme to joint taxation of married couples in 1948. She estimates that the reform decreased the employment likelihood of highly-educated married women by about two percentage points. Examining the 1971 abolishment of joint taxation of married couples in Sweden using register panel data, Selin (2014) finds that employment rose significantly more for wives of high-income earners after the reform. This is in line with expectation because this is the group that profited most from joint taxation so that joint taxation should have kept their labor supply substantially lower than it would have been without it. Bick and Fuchs-Schündeln (2017), based on Bick and Fuchs-Schündeln (2018), look at the United States and 13 European countries with joint taxation of married couples. They estimate that changing to a system of individual taxation while keeping government revenue constant would increase hours worked by women by more than 70 hours per year in ten of these countries. As an example, they calculate benefits of 113 annual hours for the United States and of even 280 annual hours for Germany.

**Outline.** The rest of the paper is structured as follows: Section 2 presents in detail the institutional setting and the results from our survey, thereafter Section 3 presents the data and the sample selection, and Section 4 explains our empirical strategy. Section 5 discusses the results and Section 6 investigates the policy implications of our findings. Section 7 concludes.
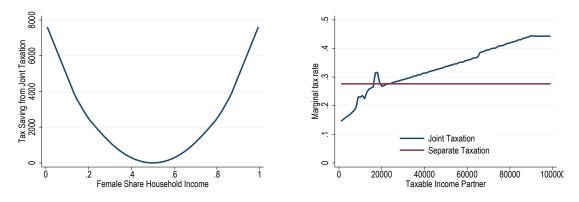
## 2 Institutional Setting

In this section, we first provide necessary context for our study by explaining the German joint taxation system and subsequently present the German withholding tax system for married couples. Thereafter, we describe the reform of withholding taxes that we use to identify causal effects. Finally, we shed more light on the understanding of withholding taxes among married couples in Germany by presenting the results of our survey.

### 2.1 Income Taxation of Married Couples

Married couples in Germany have two different options when it comes to filing their income taxes. They can choose to either file their income taxes separately as if they were still single, or to file their income taxes jointly. By choosing the latter, couples can potentially realize joint taxation benefits.[6] Under joint income taxation, the individual income tax schedule is applied to half of the joint taxable income for each couple, and the resulting tax burden is then doubled. Due to the progressivity of the German income tax system, this creates joint taxation benefits for couples with differing marginal income tax rates. Put differently, for a fixed household income, a couple receives more joint taxation benefits the more unequal the intrahousehold distribution of income.

We illustrate this feature in Figure 2a, where we plot the joint taxation benefit of a couple with an household income of 80,000 € against the female share in the household income. If both spouses contribute equally to the household income, there are no benefits from joint taxation. If, however, one partner for example contributes 80 % to the household income, opting for joint taxation will save the couple around 2,000 € in yearly income taxes.

---

[6]In fact, for the vast majority of couples choosing joint taxation is at least weakly better than choosing separate taxation. Only couples in which one partner has a significant amount of income replacement payments can be better off by choosing separate taxation. The reason for that is that those payments, while not being taxable, can increase the marginal income tax rate of the couple ("Progressionsvorbehalt").

8

(a) Joint Tax Benefits for Joint Income 80,000 €   (b) Marginal Income Tax for Income of 24,000 €

Figure 2: Joint Income Taxation

*Notes:* The figure illustrates the system of joint income taxation in Germany. Panel (a) plots the joint taxation benefits depending on the intra-household income distribution for a household with joint income of 80,000 €. Panel (b) shows the marginal income tax rate depending on the income of the partner for an individual earning 24,000 € under both joint and separate taxation. In this example, we assume that both spouses contribute to public health care, to the public pension system, and claim no further deductions.

As a side effect of this joint taxation system, the secondary earner within the couple faces, in the presence of joint taxation benefits, a higher marginal income tax rate under joint income taxation than under separate income taxation. Figure 2b shows that as soon as the partner income exceeds the own income, an individual is confronted with substantially higher marginal income tax rates. The marginal tax rate for an individual with an own income of 24,000 € is 27.5 % under separate taxation, but increases to approximately 35 % under joint taxation if their spouse has an income of 60,000 €.

## 2.2 Withholding Taxes of Married Couples

The German government wants to enable couples to profit from the joint taxation benefit already during the year. Therefore, couples have the choice to reduce their withholding tax burden.[7] Married couples can influence both the sum of their monthly withholding tax payments and the allocation of the withholding tax burden to each spouse. They can effectively

---

[7]Germany levies withholding taxes, which are prepayments to the final income tax and which are withheld at source by employers on behalf of their employees. Usually, the withholding taxes are deducted from the monthly paycheck and then credited against the income tax liability at the end of the tax year. Such withholding taxes are part of the tax system of all developed countries with Switzerland as a special case as only employees living outside of Switzerland and/or without a permanent Swiss residence permit are subject to withholding taxes.

choose between three different withholding tax schedules.[8] These withholding tax schedules assign each partner a certain withholding tax class, which determines the personal withholding tax payments.

**Symmetric Schedule.** After marriage, each couple in which both spouses receive labor income gets assigned the same "default" withholding tax schedule, which we will call the symmetric schedule. This withholding tax schedule is symmetric since it assigns each spouse the same withholding tax class "IV". In this withholding tax class, the monthly withholding tax payments are calculated as if the individual was single, only taking into account the own individual income. Hence, for a couple without joint taxation benefits, the withholding tax would be the same as the income tax. If a couple realizes joint taxation benefits, the paid withholding tax of both spouses will exceed their final income tax liability and the couple will receive a tax refund after filing an income tax return. We illustrate this in Figure 3 for a couple in which the husband earns 50,000 € and the wife earns 30,000 €. Being in the symmetric withholding tax schedule causes the couple to receive the joint taxation benefits of 288 € as a lump sum tax refund after filing their income taxes.

To avoid this overpayment of withholding taxes during the year, a couple can decide to switch from the "default" symmetric schedule to a withholding tax schedule that aims at reducing the monthly withholding tax payments to account for the joint taxation benefits.[9]

**Men- or Women-favoring Schedule.** The most popular alternative withholding tax schedules are the men-/women-favoring withholding tax schedules. In those schedules, one spouse is assigned the favorable withholding tax class ("III"), while the other spouse is assigned the

---

[8]In our analysis, we leave out the fourth, least commonly chosen withholding tax schedule. This withholding tax schedule is called "IV with factor" and was introduced in 2010 with the goal to mitigate the negative effects of the men-/women-favoring withholding tax schedules, while still enabling couples to profit from the advantage of joint taxation during the year. To do so, the tax office takes into account the past income of both spouses and calculates the exact advantage of joint taxation for both spouses individually. Thereby, the tax office can set the withholding tax for both individuals at a level that allows the household to profit from the advantage of joint taxation during the year. More details on the effects of this schedule on marginal and average withholding tax rates can be found in Section 6 where we discuss different implementations of withholding tax schedules that account for joint taxation benefits. There are no official statistics on the use of "IV with factor". Official government agencies estimate, however, that even 10 years after its introduction less than 1 % of the couples are using this schedule (*Kleine Anfrage Bundestag* 2019). We observe "IV with factor" as "IV" in the data.

[9]Switching away from the symmetric schedule requires the stated consent of both spouses. For switching back, however, unilateral action suffices. The only exception are couples in which only one spouse earns labor income. Those couples are automatically assigned the men-/women-favoring withholding tax schedule.
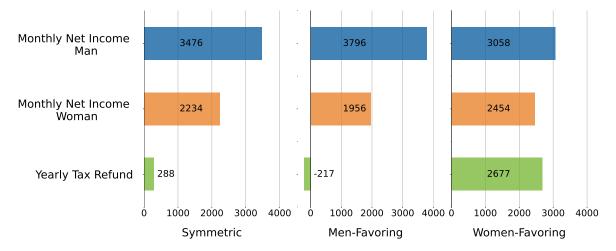
Figure 3: Example illustrating the different withholding tax schedules

*Notes:* The figure illustrates how the different withholding tax schedules affect the monthly net incomes of both spouses and the yearly tax refund in the year 2022. Net incomes are calculated for a household in which the husband earns 50,000 € and the wife earns 30,000 €. The assessed yearly income tax burden of the household is 11,181 € under the assumption that the couple claims no additional deductions. The figure shows how the different withholding tax schedules shift the withholding tax burden from one partner to the other and how they can affect the yearly refund from the final income tax.

unfavorable withholding tax class ("V"). The spouse in "III" is taxed as if she was the single earner, while the withholding tax in "V" is calculated as if the spouse was contributing a third of the household income (Spangenberg, Färber, and Späth, 2020). This leads to a lower withholding tax burden for the spouse in "III" as compared to being in withholding tax class "IV" while increasing the withholding tax burden of the spouse in "V". The second column in Figure 3 shows that, in the presence of joint taxation benefits, this decreases the joint withholding tax payments during the year if the primary earner is assigned to "III". Choosing the men-favoring schedule shifts the timing of the realization of the joint taxation benefit for the couple forwards and eliminates the lump-sum tax refund at the end of the year. In this concrete example, it even leads to the household paying too little in withholding taxes during the year which obliges them (in the absence of other deductions) to make an additional tax payment at the end of the year.

Conversely, if this couple had chosen the women-favoring schedule, which in this case puts the primary earner into the unfavorable withholding tax class and the secondary earner into the favorable withholding tax class, they would have paid even higher withholding taxes than under the "default" symmetric schedule and would have received an even larger tax refund at

the end of the year. However, this misallocation of favorable and unfavorable withholding tax classes rarely happens.

**Effect on Tax Rates.** The shift of withholding tax burden from the primary to the secondary earner cannot only reduce the joint withholding tax burden but also has large effects on the withholding taxes paid by each spouse. The left-hand side of Figure 4 displays the average withholding tax rate by withholding tax class. Being in the unfavorable withholding tax class leads to a much higher and being in the favorable withholding tax class to a much lower average withholding tax rate compared to the default withholding tax class. An individual earning 4,000 € monthly gross income pays on average around 20 % in withholding taxes in the default withholding tax class. The average withholding tax burden of the same individual increases to around 30 % when being in the unfavorable withholding tax class and reduces to around 10 % when being in the favorable withholding tax class. Similarly, the marginal withholding tax rate is also affected by the different withholding tax classes. We depict the marginal withholding tax rate by withholding tax class in Figure D.2.

**Choice of the Different Schedules.** The right-hand side of Figure 4 shows the frequency with which the different withholding tax schedules are chosen and which withholding tax class they allocate to each spouse. Approximately 50% of the couples pick the men-favoring schedule that shifts the withholding tax burden from men to women, and around 45% stick with the symmetric schedule. Less than 10% of the couples pick the women-favoring schedule with lower withholding tax rates for women than for men.

While the different choices of withholding tax schedules that we have discussed here have strong effects on the amounts of withholding tax payments, they do not affect the final income tax burden of the couple. Couples cannot decrease their final income tax burden by choosing a certain withholding tax schedule, but can only change the timing of the income tax payments throughout the year.[10]

---

[10]Of course, taking into account discount rates and liquidity constraints, couples can have benefits from delaying their income tax payments.
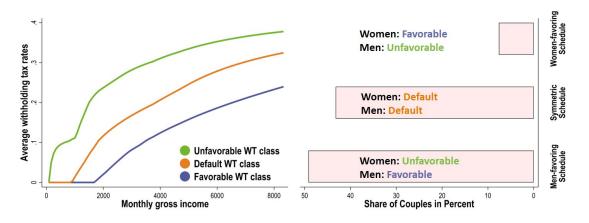
Figure 4: Illustration of different withholding tax schedules

*Notes:* The figure illustrates the frequency and implications of the different withholding tax schedules. On the left-hand side, the average withholding tax rate by withholding tax class is shown. Compared to the default withholding tax class, being in the unfavorable withholding tax class leads to a much higher and being in the favorable withholding tax class to a much lower average withholding tax rate. On the right-hand side, for the year 2010 the possible withholding tax schedules and their frequency are shown for couples where both partners have labor income. Approximately 50 % of these couples choose the men-favoring schedule, in which the man is assigned the favorable withholding tax class and the woman the unfavorable withholding tax class. Around 45 % of the couples choose the symmetric schedule, which keeps both spouses in the default withholding tax class. Finally, less than 10 % of the couples choose the women-favoring schedule.

## 2.3 Withholding Tax Reform of 2010

**Background.** For the causal identification of the effect of withholding taxes on labor supply, we make use of a German tax reform in 2010 that enabled taxpayers to deduct a much larger share of their contributions to health care insurance. As everyone in Germany is forced to hold health insurance, it decreased the income tax burden for all taxpayers. Conditional on income, the reform of the income tax was identical for everyone independent of the withholding tax schedule. Furthermore, as the contributions to health care insurance are automatically taken into account in the calculation of the withholding tax, the reform was equivalent to a cut in withholding taxes for all taxpayers. Crucial for the identification of causal effects in our setting is that the reform, in addition, introduced that social security contributions are now taken into account for the calculation of withholding taxes for taxpayers in the unfavorable withholding tax class. Previously, they were only considered for taxpayers in the other withholding tax classes. This has the effect that the reform reduced the withholding tax - but only the withholding tax - for taxpayers in the unfavorable withholding tax class substantially more than for taxpayers in the other withholding tax classes.

**Reform Effect.** Figure 5 shows how annual withholding taxes changed from 2009 to 2010 by withholding tax class and annual gross labor income. For spouses in the favorable withholding tax class, the reform decreased the withholding tax burden by up to around 800 €. However, there was almost no change, and if then a slight increase, in withholding taxes for annual gross labor incomes lower than 32,000 €. For the default withholding tax class, the reform decreased the withholding tax burden by up to around 1,200 € with a substantially smaller cut for lower incomes. In contrast, women in the unfavorable withholding tax class profited from a cut by up to approximately 3,000 € with even a considerable reduction in withholding taxes for low incomes. In other years, such substantial year-to-year changes have not occurred. Figure D.3 shows this for the years between 2006 and 2016 and for an annual individual income of 25,000 €, an income which is fairly common in the unfavorable tax class.[11] The described reform is the only substantial reform in withholding taxes during our sample period.
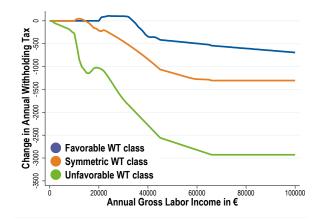


Figure 5: Effects of the 2010 Reform on Withholding Taxes by Withholding Tax Class

*Notes:* The figure plots the effect of the withholding tax reform 2010 on withholding tax payments depending on the withholding tax class. It illustrates the absolute change in the annual withholding tax payments caused by the reform.

**Anticipation and Salience.** The reform, which was passed into law half a year before its onset, was arguably non-salient in the sense that it was unknown to taxpayers that there was a reform that changed withholding taxes depending on the withholding tax class a given taxpayer is in. There was no public debate about this part of the reform, just about the reform decreasing eventual income taxes, and there is no indication that people were made aware of

---

[11]The pattern is essentially the same for annual individual incomes of 15,000 €, 30,000 €, 50,000 €, and 70,000 €.

the connection of the reform to withholding tax classes. This assessment is corroborated by looking at Google Trends for relevant terms. No striking movements are visible around the dates of the reform announcement and introduction. This means that couples are then not expected to have either changed their withholding tax schedules around the reform date in response or adjusted their labor supply already prior to the reform. Furthermore, the reform's non-salience means that spouses in the unfavorable withholding tax class might be unaware that their eventual income tax liability, regardless of it being perceived individually or jointly with their spouse, was not changed to the same extent. The only feature concerning withholding taxes that was indeed salient is that they ended up getting more money after withholding taxes every month, i.e., a higher net income on their payslips.[12]

## 2.4 Survey: Exploring the Understanding of Withholding Taxes

In this study, we argue that the lack of understanding of withholding taxes can affect labor supply decisions. To underpin our argument, we conducted a pre-registered online survey to be filled out by married couples living in Germany.[13] In this survey, we ask the participants directly about their understanding of withholding taxes in Germany and try to identify channels through which a misunderstanding of withholding taxes can affect labor supply. Furthermore, we document which characteristics of couples are associated with a higher misunderstanding of the withholding tax system. By this, we want to gauge which couples could be particularly affected by distorted labor supply incentives to an extent that our administrative tax records do not allow us to. Moreover, we tentatively investigate the impact of the choice of withholding tax schedules on married couples' eventual intra-household distribution of labor income.

In this section, we focus on the core results of our final analysis sample consisting of 506 respondents (258 men, 248 women). We provide more details on our survey in Appendix C. Section C.1 includes information on the implementation and our sample restrictions, Section C.2

---

[12]In addition, households might eventually also realize that they get lower tax refunds or have to pay higher additional tax payments in the upcoming year. However, it remains unclear whether they would connect this to the change on their payslip, particularly because tax refunds or additional tax payments occur jointly to the married couples.

[13]We have pre-registered our survey at the Open Science Foundation.

displays our descriptive figures, Section C.3 provides more-in-depth analysis, and Section C.4 displays the original survey questionnaire in German and a translation into English.

**Understanding of Withholding Taxes.** The most important information we want to elicit with the help of our survey is whether married individuals understand the withholding tax system. We focus on two essential aspects by investigating (1) whether they know that withholding taxes do not affect a married couple's joint final income tax burden and (2) whether they understand that withholding taxes, however, affect their monthly payslip.

First, we elicit whether our survey participants know that withholding taxes, and thus the choice of withholding tax schedules, do not affect a married couple's joint final income tax burden. We do so by creating a realistic example of labor incomes of two spouses (one spouse earning 60,000 € per year, the other one 30,000 €) and then ask the survey participants to select the withholding tax schedule which results in the lowest final income tax burden of the couple.[14] We ask this question once at the beginning of the survey and again towards the end after the respondents have received extensive information about the withholding tax system. As discussed in Section 2.2, irrespective of the choice of the withholding tax schedule, the final income tax burden of the couple is the same. We find that only around 16 % of the surveyed individuals know about the irrelevance of the withholding tax schedule for the final income tax burden at the beginning of our survey. In Figure C.1, we document that there exists heterogeneity in this knowledge across subgroups. Men (20 %) are better informed than women (13 %), while the knowledge is largely independent of the respondents' withholding tax classes, even though men are over-represented in the favorable withholding tax class as compared to the unfavorable one.

Second, we document whether the individuals know that and how they can influence the amount of withholding taxes they have to pay every month with the help of withholding tax schedules - so whether they know that and how they can impact the size of monthly wage transfers from their employers while keeping their gross labor income constant.[15] We document that among all respondents, we classify 61 % (63 % of men, 60 % of women) as knowledgeable. In Figure C.2, we illustrate that this knowledge about the interlinkage between withholding

[14]See Question D7 in Appendix C.4 for the exact wording of the question.
[15]See Question D10 in Appendix C.4 for the exact wording of the question.

tax classes and the monthly payslip is homogeneous with respect to gender, withholding tax classes, age except for the youngest cohort, and tax filing activity.[16]

Combining the two knowledge questions, we find that 48 % of all respondents know that and how withholding tax classes change withholding taxes but not that withholding taxes are tax prepayments and have no impact on the final income tax burden. This is a remarkable finding as it implies that a large share of married couples in Germany might fall for the fallacy that they can save income taxes by choosing a certain withholding tax schedule. Couples who know that the partner in the favorable withholding tax class is subject to lower withholding tax rates and the partner in the unfavorable one is subject to higher withholding tax rates (compared to the symmetric schedule and to individual taxation) might then strategically assign their primary earner to the favorable and their secondary earner to the unfavorable class (corresponding to the men- or women-favoring withholding tax schedule). This then distorts the relative intra-household distribution of labor income as paid out by the employers.

**Filing of Taxes.** One way to gauge which couples are particularly affected by this distortion and thus by adverse labor supply incentives for women is to examine the role of the filing of taxes in the income tax declaration made in the calendar year following the respective tax year. We asked respondents about their tax filing behavior and concentrate on those who file their income taxes jointly as a married couple as it is the case for our analysis sample in the administrative data.[17]

Looking at heterogeneities by gender, we find that among these respondents 56 % of men but only 37 % of women state that they usually do the majority of the tax declaration alone. This difference in tax filing behavior is driven by couples in the men-favoring withholding tax schedule. Of all men in the men-favoring withholding tax schedule, 65 % do the tax declaration mostly alone, while this only applies to 35 % of the women in that schedule. In the symmetric schedule, however, the gender difference is much lower with 50 % of the men and 46 % of the women claiming to do the tax declaration mostly alone, respectively. This shows that a more

---

[16]Panel A in Table 1, however, indicates that this knowledge might be lower for respondents in the women-favoring withholding tax schedule. The same pattern can be observed for the knowledge of the irrelevance of withholding tax schedules for the final income tax burden. This might reflect that couples in the women-favoring schedule are different from others, e.g., in the importance they give to tax optimization.

[17]This applies to 82 % of our respondents. A joint tax declaration has to be signed by both spouses but no other participation in filing the declaration is needed. See Question D17 in Appendix C.4 for the exact wording of the question.

gender-equal exposure to the income tax system correlates with a less distortive distribution of withholding taxes.

As documented in Figure C.1, women less often than men know that withholding taxes do not have an influence on the final income tax burden. This gender gap in knowledge about the tax system could be linked to the amount of time and effort spent dealing with it by preparing tax declarations. Moreover, we see that those respondents that do most of the tax declaration alone also exhibit a larger knowledge about the irrelevance of withholding taxes for the final income tax burden at the beginning of the survey. For women, knowledge increases from 10 % to 17 % when they deal with the tax declaration mostly alone, for men from 16 % to 25 %.

A possible conclusion from these findings is that couples in which the husband predominantly cares about taxes are also more affected by the incentive distortions arising from the shifting of the withholding tax burden from husbands to wives. This may indicate a self-manifesting role of the household division of tasks, whereas this division itself might be linked to gender norms.

**Gender Norms.** As Buettner, Erbe, and Grimm (2019) show with administrative tax records, German married couples are more likely to choose the men-favoring withholding tax schedule when the husband outearns the wife than choosing the women-favoring schedule when the wife outearns the husband.[18] This phenomenon could be attributed to a gender norm that prescribes the husband to be the main breadwinner (Bertrand, Kamenica, and Pan, 2015). As a consequence, couples with such a norm should be more likely to choose the men-favoring withholding tax schedule.

We investigate this by asking the respondents three questions, each with seven ordered answer options, to elicit their norms regarding gender roles in households.[19] From the answers to these questions, we create a standardized index of the traditionality of gender norms where a higher value means that the respondent wants to have a larger role for husbands than for wives with regard to decision-making in the household and to market work.

---

[18]Moreover, they also more often "wrongly" choose the men-favoring schedule when the wife outearns the husband than they "wrongly" choose the women-favoring schedule when the husband outearns the wife.

[19]See Question D18 in Appendix C.4 for the exact wording of the questions. All three questions have been asked in this form in previous waves of the German Socio-Economic Panel (GSOEP).

As shown in Figure C.3, respondents in the men-favoring have more traditional gender norms than those in the symmetric withholding tax schedule. This holds true for both men and women and indicates that those most affected by distortions of labor supply incentives are also those who favor a traditional division of market and non-market work. This is particularly relevant as the figure also shows that women who hold more traditional gender views are, as expected, also those that have the highest margin for adjusting their working hours as they tend to have fewer working hours than women with more progressive gender norms.

**Organization of Household Finances.** The basic assumption underlying withholding tax classes is that households consisting of married couples are organized jointly and act as an economic unit. If this assumption does not hold, the choice of withholding tax schedule might have impacts on the eventual intra-household distribution of labor income and via this on the size of each spouse's budget and on their within-household bargaining power. To gain insights into such impacts we have to gain knowledge about potential money transfers between spouses. Sophisticated couples could make transfers from the spouse in the favorable withholding tax class to the spouse in the unfavorable withholding tax class and thereby re-establish the "default" relative intra-household earnings.

We thus asked in detail whether and how couples use shared bank accounts, onto which bank account they let their employers transfer their wage payments, whether and how they transfer (parts of) these wage payments to another bank account, and to which bank account potential tax refunds are transferred.[20] We present our main findings in the following and refer to Appendix C.3 for a more in-depth derivation of these findings.

We test the basic assumption of the joint organization of household finances tentatively by interpreting the absence of a shared bank account as an indication of a lack of joint organization of household finances. If a couple does not have a shared bank account, it is very likely that the distortion of the relative intra-household distribution of labor income induced by shifting some part of the withholding burden from one partner to the other by choosing the men- or women-favoring withholding tax schedule remains largely unchanged as this couple is less likely to have established a compensatory sharing rule. In addition, even if married couples

---

[20]See Questions D16a to D16f and Question D17c in Appendix C.4 for the exact wording of the questions.

have a shared bank account they might not use it to re-distribute labor income from one spouse to the other.

As shown in Panel B of Table 1, as much as 47 % of the respondents in the men-favoring withholding tax schedule state to not have a shared bank account as a couple. We consider these couples unlikely to account for the distortion of the relative intra-household distribution of labor income arising from the choice of that schedule. In this context, it is interesting that shared bank accounts do not seem to be used more often by couples in the men-favoring schedule than by those in other schedules, indicating that they are not commonly used to counteract this distortion. We document in Panel B of Table 1 that the distortion is even aggrevated by the way couples deal with tax refunds. 42 % of the couples in the men-favoring withholding tax schedule (16 % of those with and 72 % of those without a shared bank account) let tax refunds be transferred to the husband's personal bank account whereas that share is lower for couples in the other withholding tax schedules. In comparison, only 24 % of the women in the men-favoring schedule get the tax refunds onto their personal bank account.

Turning the attention towards wage transfers between the spouses instead of tax refunds, we tentatively calculate that even among couples in the men-favoring schedule with a shared bank account 21 % do not seem to account for the distortion effects of being in the men-favoring schedule by wage transfers between the spouses so that we can monitor a counteracting strategy for only 42 % of all couples in the men-favoring schedule.[21] We thus expect relative intra-household earnings to be distorted in favor of the husband for the majority of the couples in the men-favoring schedule. Furthermore, married women's disposable net income, given constant income taxes, is lowered. This might lead them to overestimate their individual income tax burden, which can detrimentally affect their bargaining power within the household and decrease their perceived work incentives.

---

[21]See Appendix C.3 for a derivation of these findings.

Table 1: Survey descriptives by withholding tax schedule

| | (Reported) Withholding tax schedule | | | | |
| | Men-favoring | Symmetric | Women-favoring | Do not know | Overall |
|---|---|---|---|---|---|
| *Panel A: Individuals that know that the choice of withholding tax schedules...* | | | | | |
| ...is irrelevant for the income tax | 16 % | 18 % | 8 % | 18 % | 16 % |
| | (0.03) | (0.03) | (0.04) | (0.05) | (0.02) |
| ...impacts withholding taxes | 66 % | 63 % | 48 % | 54 % | 61 % |
| | (0.04) | (0.03) | (0.07) | (0.06) | (0.02) |
| *Panel B: Couples...* | | | | | |
| ...without a shared bank account | 47 % | 42 % | 42 % | 49% | 45 % |
| | (0.04) | (0.03) | (0.07) | (0.06) | (0.02) |
| ...for whom tax refunds are transferred to the husband's account | 42 % | 32 % | 24 % | 37 % | 35 % |
| | (0.04) | (0.03) | (0.06) | (0.06) | (0.02) |
| N | 177 | 214 | 50 | 65 | 506 |

*Notes:* The table summarizes our survey findings with regard to knowledge about withholding taxes and the organization of household finances. Standard errors are displayed in parentheses. The survey questions are documented in Appendix C.4.

# 3 Data and Sample

Our study is based on a 5 % sample of extensive administrative tax records from the German Taxpayer Panel. In the first subsection, we describe this data source. In the second subsection, we describe how we construct our estimation sample and summarize basic socio-demographic characteristics of our sample.

## 3.1 German Taxpayer Panel

The German Taxpayer Panel (TPP) is an administrative dataset that contains information on the population of taxpayers in Germany for the years 2001 to 2018.[22] It includes information on various characteristics such as income, gender, age, number and age of children, withholding tax class and other tax-related information. The TPP consists of a total of around 63 million records for individuals for whom tax information is available for at least two years. Due to its large size, the data is primarily offered as a sample through research data centers. The waves of the TPP for the years 2001 to 2011 were created from the annual income tax statistics, which include data from the tax returns of about 27 million German taxpayers who filed their income taxes. Starting in 2012, the annual federal statistics on wages and income tax replaced

---

[22]RDC of the Federal Statistical Office and Statistical Offices of the Federal States, 2018, DOI:10.21242/73111.2018.00.01.2.1.1

the income tax statistics that had been used previously, and the TPP has been continued using data from this statistic. As a result, from 2013 on, the TPP also includes data on about 12 million taxpayers who did not file their income taxes but who did pay withholding taxes. However, due to the late availability, we do not consider those taxpayers in our analysis.

## 3.2 Sample Selection and Characteristics

In our analysis, we use the administrative tax records from the years 2006 to 2016 and focus on dual-earner married couples in the two most common withholding tax schedules: the men-favoring and the symmetric schedule.[23] We do so for two reasons. First, as shown in Section 2.2, the vast majority of couples, around 95 %, has chosen either the men-favoring or symmetric schedule. Second, we deem the couples in those two schedules to be more comparable. In most couples in the women-favoring schedule, only the woman is earning labor income. Hence, these couples are very different from the couples in the other two schedules. For the men-favoring and symmetric schedules, we keep couples in which both spouses received labor income in 2009, the year before the aforementioned withholding tax reform was implemented.[24] This restriction ensures that these individuals are actually treated at the time of the reform. Moreover, we focus on couples in which both spouses are between 20 and 60 years old.[25] To ensure that labor income is the main source of income, we exclude couples in which, in the year 2009, at least one spouse received income of more than 1,000 € from self-employment.

**Financial Crisis.** The withholding tax reform of 2010, which we use for our identification, partially coincides with the financial crisis in Germany. We see in our data that couples in the men-favoring schedule experienced more extreme variations in labor income during the crisis years. Therefore, to make the couples in the two schedules more comparable, we exclude couples which were especially affected by the crisis. We do so by excluding couples in which at least one spouse received unemployment benefits or short-time work compensation in 2009

---

[23]At the time of the reform, same-sex couples were not yet allowed to benefit from joint taxation and were not allowed to choose their withholding tax classes. Thus, our sample contains only opposite-sex couples.

[24]We also exclude individuals earning no more than 5,400 € per year. This condition ensures that we exclude individuals in marginal employment, who can earn at most 450 € per month and are exempt from the income tax.

[25]We want to abstract from early retirement decisions and thus do not consider income at older ages.

and by removing all couples in which at least one spouse had a change in annual labor income of more than 25 % from any one year to the next during the pre-reform years.

**Balanced vs. Unbalanced Panel.**  In our main estimation sample, we only consider couples who file their income taxes for every year of the sample period and who do not violate any of the sample restrictions during the sample period. This leaves us with 11,039 couples and we refer to this sample as the balanced sample. As robustness, we also perform our analysis using an unbalanced sample in which we allow the couples to not necessarily show up in each year of the sample period. This happens if a couple does not file their income taxes in a given year or if they violate one of our sample restrictions in a given year. The unbalanced estimation sample consists of 23,233 couples. We prefer the balanced sample for two reasons. First, as mentioned before, the administrative tax records include individuals that did not file their income taxes only from 2013 onward. Since couples in the symmetric withholding tax schedule do not have the obligation to file their taxes, their labor market income could be missing in a given year in the unbalanced sample. In contrast, the balanced sample makes sure that we can observe everyone's labor market outcomes for every year. Second, it allows us to abstract from extensive margin effects that could arise from married women leaving employment.[26] Our main interest is in finding out whether and to which extent married women increase their labor supply in response to a decrease in their withholding tax rate. In the unbalanced sample, other channels such as childbirth could play a role.

**Descriptive Statistics.**  Table 2 displays descriptive statistics of basic socio-demographic characteristics for the balanced sample in the year 2009. The descriptive statistics for the unbalanced sample are similar and can be found in Table D.1 in the Appendix. The results show that couples picking the men-favoring schedule have higher male income and lower female income than couples picking the symmetric schedule. Accordingly, for couples in the symmetric schedule, women earn 46 % of household income, while they earn only 29 % in households who picked the men-favoring schedule. This is not surprising as for couples with a man as the main earner, picking the men-favoring choice minimizes the withholding tax burden for the household. The table reveals that households in the two schedules are also different with

---

[26]As we have to condition on having labor income in the pre-reform year, we cannot investigate whether they move from having no labor income to being employed.

respect to other observables. Specifically, couples in the men-favoring schedule are more likely to be Catholic and less likely to live in Eastern Germany.[27]

Table 2: Descriptive Statistics for the Year 2009

|  | Men-Favoring | Symmetric |
|---|---|---|
| Income Wife | 19651.74 | 33321.58 |
|  | (8470.72) | (13402.3) |
| Income Husband | 49737.3 | 39453.28 |
|  | (17046.99) | (15233.01) |
| Female Income Share | 0.29 | 0.46 |
|  | (0.09) | (0.11) |
| Age Wife | 44.63 | 44.69 |
|  | (4.47) | (4.97) |
| Age Husband | 46.57 | 46.39 |
|  | (4.43) | (4.8) |
| Eastern Germany | 0.08 | 0.36 |
|  | (0.27) | (0.48) |
| Has a Child | 0.67 | 0.31 |
|  | (0.47) | (0.46) |
| Number of Children | 1.42 | 0.76 |
|  | (0.88) | (0.86) |
| Catholic Wife | 0.4 | 0.23 |
|  | (0.49) | (0.42) |
| Catholic Husband | 0.37 | 0.2 |
|  | (0.48) | (0.4) |
| Public Servant Wife | 0.12 | 0.12 |
|  | (0.32) | (0.33) |
| Public Servant Husband | 0.2 | 0.15 |
|  | (0.4) | (0.36) |
| N | 5772 | 5267 |

*Notes:* The table displays descriptive statistics for the year 2009 for the balanced panel for couples who picked either the men-favoring or symmetric withholding tax schedule. They are calculated based on the sample restrictions outlined in Section 3.2. Specifically, we focus on households with dual earners in 2009, in which both partners have received no unemployment benefits and short-time work compensations in 2009, are between 20 and 60 years old in 2009, have no income from self-employment of more than 1,000 € in 2009 and whose incomes were stable between 2006 and 2009, i.e., the income for both household members fluctuated by less than 25 % from one year to the other.

All in all, the descriptives strongly suggest that the two groups are different in observable socio-demographic characteristics. However, using a Difference-in-Differences approach we do not rely on the two groups having the same observable characteristics. We discuss which

---

[27]Eastern Germany comprises the area of the former German Democratic Republic plus West Berlin.

assumptions we need for our identification and potential threats arising from the different sample compositions extensively in the next section.

**Determinants of Schedule Choice.** To further clarify which characteristics of a couple are correlated with the choice of the men-favoring schedule compared to the choice of the symmetric schedule, we regress the choice of the withholding tax schedule on various characteristics of the couple. The results in Table 3 show that a few characteristics stand out. First, living in the former East of Germany is associated with a 20 percentage points lower probability of choosing the men-favoring schedule. Since we also control for the female income share, this cannot be driven by the fact that the earning differences within couples are lower in the East due to the historically higher labor market participation of women. We suspect that more egalitarian gender norms (Boelmann, Raute, and Schönberg, 2021; Campa and Serafinelli, 2019) and lower historical institutional exposure in the East due to the take-over of West German institutions as late as 1990 lead couples to choose the men-favoring schedule less often. Second, we see that the higher the female income share, the less likely the couple chooses the men-favoring schedule. A one percentage point increase in the female income share is associated with a 1.8 percentage point decrease in the choice of the men-favoring schedule. This is intuitive since the more the man earns relative to the woman in a couple, the higher the gains in terms of withholding tax payments from choosing the men-favoring schedule. Finally, having children also significantly increases the likelihood of choosing the men-favoring schedule. The first child increases the likelihood by around 15 percentage points and every further child by another 6 percentage points. This shows that in many couples the man is likely considered the main breadwinner as soon as the couple is having children, mirroring the stylized fact that the birth of the first child is a fundamental event in explaining the persistence gender inequality in earnings (Kleven et al., 2019).

Table 3: Determinants of the Choice of Withholding Tax Schedules

|  | Choice of Men-Favoring Schedule |
|---|---|
| Eastern Germany | −0.221*** |
|  | (0.011) |
| Female Income Share | −0.017*** |
|  | (0.001) |
| Income Wife (1000 Euro) | −0.005*** |
|  | (0.001) |
| Income Husband (1000 Euro) | −0.0 |
|  | (0.00) |
| Has a Child | 0.113*** |
|  | (0.011) |
| Number of Children | 0.058*** |
|  | (0.006) |
| Catholic Wife | 0.005 |
|  | (0.01) |
| Catholic Husband | 0.027*** |
|  | (0.01) |
| Age Wife | 0.003** |
|  | (0.001) |
| Age Husband | 0.005*** |
|  | (0.001) |
| Constant | 0.891*** |
|  | (0.054) |
| N | 11039.0 |
| Adj. $R^2$ | 0.51 |

*Notes:* The table displays which characteristics of a couple are predictive for the choice of the men-favoring schedule instead of the symmetric schedule. The coefficients stem from the regression of a dummy indicating the men-favoring schedule on various characteristics of couples in the year 2009, just before the withholding tax reform, using the balanced sample. Heteroscedasticity-robust standard errors are displayed in brackets. The regression also includes commuting days, commuting distance and a public servant dummy as regressors. As they have no explanatory power and for better readability, we do not display these regressors in this table. The full regression results including all regressors can be found in Table D.2.

Taken together, this evidence illustrates that we should additionally control for some of these characteristics in our analysis. In the next section and in Appendix A, we discuss how we do that by controlling for the pre-reform incomes of both spouses and for dummies indicating the parental status and the residence in East Germany using a cell fixed effects approach.

# 4 Empirical Strategy

In this paper, we study the causal effect of withholding taxes on labor supply. Identification of this effect would be straightforward if withholding tax schedules were randomly assigned to each couple. However, since, as shown before in Table 3, the choice of withholding tax schedules is highly endogenous, simply comparing the outcomes of individuals in the different withholding tax schedules can potentially lead to a biased estimate of the effect of withholding taxes on labor supply.

We circumvent this problem by making use of a withholding tax reform in 2010 in Germany, which we outline in Section 2.3. The reform disproportionally reduced the withholding tax burden of individuals in the unfavorable withholding tax class compared to individuals in the other two withholding tax classes. As argued in Section 3.2, we focus our analysis on comparing women in the unfavorable withholding tax class, who received a large withholding tax cut, to women in the default withholding tax class, who only experienced a modest withholding tax cut. A naive approach would simply compare the evolution of incomes over time between these two groups using a difference-in-differences design. However, as previously shown in Figure 5, individuals' exposure to the reform is not only determined by their withholding tax class but also by their own pre-reform labor income. The latter is problematic since it implies that depending on the own pre-reform labor income there are large differences in the absolute and relative changes in withholding tax payments induced by the reform.

**Treatment Intensity.**    To account for these differences in the intensity of treatment and to be able to calculate the elasticity of labor income with respect to withholding taxes, we perform our analysis using a continuous treatment variable. The continuous treatment variable measures the percent change in the marginal net-of-withholding-tax rate of the woman induced by the reform and can therefore be understood as a measure of treatment intensity.[28] We construct the treatment variable for each couple by taking the labor income of the woman in

---

[28]This measure is standard in the literature on income tax elasticities. Following Saez, Slemrod, and Giertz (2012), regressing log income on this measure of treatment intensity allows us to obtain the elasticity of labor income with respect to the withholding tax.

2009 and calculating the percent change of her marginal net-of-withholding-tax rate resulting from using the tax schedule of 2010 compared to using the one of 2009.[29]

**Difference in Differences.** Using the treatment intensity, we are able to estimate a difference-in-differences equation which yields us an estimate for the elasticity of labor income with respect to the withholding tax:

$$
\begin{aligned}
\text{Log Income}_{i,t} = & \beta \text{ Treatment Intensity}_{w,2010} \times \mathbb{1}(\text{Post Reform}_t) \\
& + \alpha_{c,2009} \times \theta_t + \gamma X_{c,t} + \eta_i + \epsilon_{i,t},
\end{aligned}
$$

(1)

where $\beta$ measures the percent change in labor income if the marginal net-of-withholding-tax rate of the woman increases by one percent. $\eta_i$ controls for time-invariant individual fixed effects. Further, $X_{c,t}$ controls for time-varying characteristics of the couple $c$. These include the number of children, region of residence, and, for both spouses, age, age squared and a dummy for being a public sector worker. Finally, we add couple-level cell fixed effects $\alpha_{c,2009}$ interacted with year dummies $\theta_t$. The cell fixed effects control for the strongest predictors of the withholding tax schedule, as shown in Figure 3, namely for binned own and spousal pre-reform labor income interacted with dummies for parenthood and residence in East Germany.[30] By interacting the cells with year dummies we allow for different time trends across cells. While controlling for own pre-reform income is common in the literature, additionally also controlling for partner pre-reform income is not. In our setting, however, this is useful and necessary and we explain the underlying reason in detail in Appendix A.[31]

**Identifying Assumptions.** The validity of our identification strategy relies on two main assumptions. First, it has to hold that there is no selection of couples into treatment. As

---

[29]The exact formula used is: $\text{Treatment Intensity}_{w,2010} = \frac{\text{MNWR}_{w,2009}^{2010} - \text{MNWR}_{w,2009}^{2009}}{\text{MNWR}_{w,2009}^{2009}}$, where $\text{MNWR}_{w,2009}^{2010}$ is the marginal net-of-withholding-tax rate woman $w$ faces in 2009 applying the tax schedule of 2010, while $\text{MNWR}_{w,2009}^{2009}$ is the marginal net-of-withholding-tax rate woman $w$ faces in 2009 applying the tax schedule of 2009. The subscript $w$ denotes that we calculate the treatment intensity using the income and tax rates of the woman in each married couple.

[30]We do so by dividing own and partner income into bins of 10,000 €, ranging from 0 to 100,000 €. We then interact the own and partner income bins with dummies for parenthood and residence in East Germany, leaving us with 400 couple-level cells.

[31]Typically, the literature measures the elasticity of taxable income with an IV approach (see Saez, Slemrod, and Giertz, 2012). This is not needed in our setting, as the dense income cell fixed effects ensure that almost all variation in treatment intensity stems from the variation in withholding tax classes.

discussed before, the reform was arguably nonsalient and therefore not anticipated by the average taxpayer.[32] However, it could be that individuals changed their withholding tax schedule as a result of the reform. This would alter the treatment intensity they are subject to and thereby bias our results. We depict the share of couples in the three different withholding tax schedules and the transitions between the different withholding tax schedules over time in Figure D.1. Looking at all couples in the 5 % sample of the TPP shows that couples generally stick to the withholding tax schedule they have chosen and that there are only a few couples changing between the withholding tax schedules over time.[33] Also, there is no evidence for an increase in withholding tax schedule changes around the time of the reform. This makes us confident that there was no selection into treatment in our setting.

Second, we have to assume that the parallel trend assumption holds. It assumes that the labor market outcomes of treated and untreated individuals would have evolved the same in absence of the reform, irrespective of the treatment intensity. This implies that all observed post-reform differences in outcomes are due to differences in the treatment intensity induced by the reform.

One implication of this assumption is that we should see no economically significant effect of the treatment intensity on labor supply in the years before the withholding tax reform. We check this by also estimating a dynamic version of Equation 1 in which we replace the post reform dummy with year dummies.[34] Economically insignificant estimates for the pre-reform years can make us confident that individuals with differing treatment intensity had no different trends in labor market outcomes before the reform. In Section 5, we will show that we indeed cannot find any economically significant estimates for the pre-reform period.

## 5 Empirical Results

In this section, we present and discuss our empirical results. We begin by presenting the static and event study Diff-in-Diff estimates. Subsequently, we explore potential heterogeneities

---

[32]There was no public debate about the implications of the reform on withholding taxes and a search in Google Trends for relevant key words shows no signs of public discussion.

[33]Typically, couples pick their withholding tax schedule at their marriage and do not adapt the withholding tax schedule thereafter.

[34]$\text{Log Income}_{i,t} = \sum_{t=2006}^{2016} \beta_t \left[\text{Treatment Intensity}_{w,2010} * \mathbb{1}\left(\text{Year}_t\right)\right] + \alpha_{c,2009} \times \theta_t + \gamma X_{c,t} + \eta_i + \theta_t + \epsilon_{i,t}$

of the treatment effect. Lastly, we investigate whether the observed treatment effects are primarily driven by changes in the marginal tax rate or average tax rate.

**Static Diff-in-Diff.**  First, we present the results of the static diff-in-diff estimation as laid out in Equation 1. Table 4 displays regression results by gender with and without additional cell fixed effects. All regressions include individual fixed effects and control for potentially time-varying characteristics of the couple.

For women, we find significant positive estimates for the elasticity of labor income with respect to the withholding tax rate. The first column shows that without cell fixed effects the estimated elasticity for women is around 0.112. When including cell fixed effects in our preferred specification in the second column, this estimate is reduced to around 0.099. Both estimates are significant at the 1 % level. These results imply that a one percent higher marginal net-of-withholding tax rate results in an around 0.1 percent higher labor income after the reform. More intuitively, the results indicate that a woman whose marginal withholding tax rate was reduced from 30 % to 23 %, so whose marginal net-of-withholding tax rate increased by 10 percent from 70 % to 77 %, increased her labor income by 1 percent after the reform.

Table 4: Static Diff-in-Diff Results

|  | Women | | Men | |
|---|---|---|---|---|
|  | (1) | (2) | (3) | (4) |
| DiD Estimate | 0.112*** | 0.099*** | 0.011 | 0.007 |
|  | (0.020) | (0.020) | (0.011) | (0.011) |
| Cell FE |  | ✓ |  | ✓ |
| N | 121,429 | 121,429 | 121,429 | 121,429 |
| Adj. R-Squared | 0.334 | 0.374 | 0.301 | 0.317 |

*Notes:* The table displays the results of the static diff-in-diff estimation as laid out in Equation 1. All regressions include individual fixed effects and control for potentially time-varying characteristics of the couple. Cell fixed effects control for binned own and spousal pre-reform labor income interacted with dummies for parenthood, residence in East Germany, and years. Results using the unbalanced estimation sample can be found in Table E.1. Standard errors are clustered on the individual level. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

As shown in columns (3) and (4), we do not find any significant effects for men, neither with nor without cell fixed effects. The lack of a reaction of men does not come as a surprise as they

are not directly affected by the withholding tax cut of their spouse. The treatment intensity, which measures the change in the marginal net-of-withholding tax rate of the female spouse, could therefore only indirectly affect the labor supply of the male spouse through possible spillover effects within the couple. We find no evidence for this.
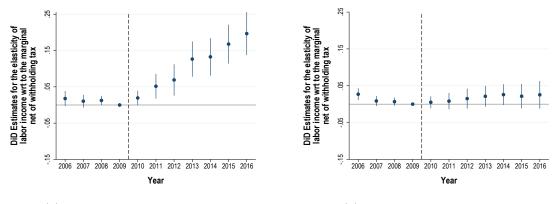
We explore the robustness of our results to using the unbalanced estimation sample in Table E.1. Columns (1) and (2) show that with the unbalanced sample, the estimated elasticity for women is still statistically significant, but with around 0.05 substantially smaller than in the balanced sample. This could be caused by sample attrition. As the treatment effect estimate increases over time (see Figure 6), the static diff-in-diff estimate becomes smaller for the unbalanced sample relative to the balanced sample if observations leave the sample over time. For men, we see in column (4) that there are again no significant effects when controlling for cell fixed effects.

**Event Study Diff-in-Diff.** We explore the dynamics of the treatment effect in Figure 6, which graphically displays the estimates for the dynamic version of Equation 1 controlling for cell fixed effects.

For women, we see in Figure 6a that the treatment effect is increasing over time. Variation of the size of the treatment effect over time can be expected due to our assumptions about how taxpayers learn about their taxes. As we argue that employees use the information on withholding taxes from their monthly payslip to learn about their income taxes, we expect a lagged response to the reform as this learning process takes time. This lagged response is in line with Shapiro and Slemrod (1995), who find that one month after a much-debated cut in withholding taxes only a third of the respondents self-report that they noticed the change in withholding taxes. Further, even when taxpayers recognize a change in their withholding taxes on their monthly payslip, it might take them a few months to be sure that that change is indeed permanent. We would not expect them to react on apparently transient shocks.

Additionally, there could be a lagged response as adapting one's working hours usually takes time. Women who want to increase their working hours have to negotiate this with their employer or find a new employer that offers higher working hours. We also think that a substantial part of the treatment effect realizes when women obtain an offer from their employer

to increase their working hours and then evaluate their marginal gains from doing so using the now lower withholding taxes as their reference point.

The event study Diff-in-Diff results for men are displayed in Figure 6b. We find, in line with the static Diff-in-Diff results, no significant treatment effects in the post-reform period.



(a) Effect on Female Log Income     (b) Effect on Male Log Income

Figure 6: Event Study Diff-in-Diff Estimates

*Notes:* The figure plots the estimates for the elasticity of labor income with respect to the withholding tax estimated based on the dynamic version of Equation 1 for women and men using the balanced sample. The dependent variable is the log income of the individual, and the independent variable is the treatment intensity. Treatment intensity is defined as the percent change in the marginal net-of-withholding-tax rate of the woman induced by the reform of the withholding tax in 2010. All regressions include individual fixed effects and control for potentially time-varying characteristics of the couple. Cell fixed effects control for binned own and spousal pre-reform labor income interacted with dummies for parenthood, residence in East Germany, and years. Confidence intervals are plotted at the 95 % level and based on heteroscedasticity-robust standard errors. Note that the sample excludes households, where at least one member experienced a drop in income by more than 25 % from one year to the next before 2010 to ensure that no individuals directly hit by the financial crises are part of the sample. This explains the smaller standard errors before the reform. The underlying regression coefficients can be found in in columns (2) and (4) of Table E.2.

As discussed in Section 4, one implication of the parallel trend assumption is that we should see no economically significant pre-reform effects of the treatment intensity. In fact, the pre-reform estimates for women in Figure 6a are not statistically significantly different from zero at the 5 % level and also economically insignificant and small compared to the post-reform estimates. For men, we see a similar pattern in Figure 6b. With the exception of 2006, there are no statistically significant effects before the reform. This finding of economically non-significant pre-reform effects therefore gives us additional confidence in the validity of the common trends assumption.

We, again, explore the robustness of our results to using the unbalanced estimation sample in Figure E.1. As before, we see a similar pattern of lagged treatment effects. For women, the treatment effects become significant after 2012 and we even find small significant effects for men after 2013. Regarding pre-reform treatment effects, we see for women slightly larger effects than in the balanced sample, but which are still economically insignificant compared to the post-reform period. For men, there are no statistically significant pre-reform treatment effects.

**Heterogeneity of Treatment Effect.** In the following, we investigate the heterogeneity of the treatment effect by observable characteristics. We start by looking at the effects for women in column (1) of Figure 5. In Panel A, we look at heterogeneities across regions. We find significant effects only for couples in former West Germany and no effects for couples in former East Germany. The reason for that could be that women in East Germany generally work more and therefore have less potential to increase their working hours. Another explanation could be that the more progressive norms towards female labor market participation in East Germany dominate incentives stemming from the withholding tax system. Moving to Panel B, we explore potential differences based on the level of pre-reform commuting days. We create a dummy variable indicating high commuting if the female spouse commuted more than 200 days before the reform. We use commuting days as a proxy for working hours to gauge the woman's potential to increase her working hours.[35] We, however, find no significant differences in the treatment effect based on pre-reform commuting days. In Panel C, we examine differences between parents and non-parents. We define couples as parents if they have at least one child below the age of 18 living in the household. We find significant effects for both parents and non-parents, with slightly larger effects observable for parents. Focusing solely on parents and distinguishing by the age of the youngest child in Panel D, we discover that the treatment effect is highly significant for parents with the youngest child older than 6 years. Conversely, the effect is non-significant for parents with the youngest child below 6 years old, although this result is primarily driven by the presence of large standard errors. The

---

[35]While there is no information on working hours in the administrative tax records, commuting days are recorded for individuals that deduct their commuting costs from the income tax.

limited number of parents with the youngest child below 6 years old in our sample contributes to these substantial standard errors.[36]

Table 5: Heterogeneity Analysis: Static Diff-in-Diff Results

| | Women (1) | Men (2) |
|---|---|---|
| *Panel A: East vs. West Germany* | | |
| West | 0.110*** | 0.007 |
| | (0.021) | (0.012) |
| East | 0.002 | 0.011 |
| | (0.050) | (0.035) |
| *Panel B: Level of Pre-Reform Commuting* | | |
| Low Commuting | 0.093*** | 0.006 |
| | (0.024) | (0.015) |
| High Commuting | 0.099*** | 0.000 |
| | (0.034) | (0.016) |
| *Panel C: Parent vs. Non-Parent* | | |
| Non-Parent | 0.084*** | 0.019 |
| | (0.030) | (0.020) |
| Parent | 0.104*** | -0.005 |
| | (0.026) | (0.013) |
| *Panel D: Age of Youngest Child* | | |
| Youngest Child below 6 | 0.066 | 0.019 |
| | (0.242) | (0.069) |
| Youngest Child betw 6 and 18 | 0.105*** | -0.006 |
| | (0.025) | (0.014) |
| N | 121,429 | 121,429 |
| Adj. R-Squared | 0.362 | 0.311 |

*Notes:* The table displays the results of the static diff-in-diff estimation as laid out in Equation 1, allowing for treatment heterogeneity by observable characteristics and using the balanced sample. All regressions include individual fixed effects and control for potentially time-varying characteristics of the couple. Panel A includes cell fixed effects controlling for binned own and spousal pre-reform labor income interacted with dummies for parenthood and years. Panel B includes cell fixed effects controlling for binned own and spousal pre-reform labor income interacted with dummies for parenthood, residence in East Germany, and years. Panel C and D include cell fixed effects controlling for binned own and spousal pre-reform labor income interacted with years. Results using the unbalanced estimation sample can be found in Table E.4. Standard errors are clustered on the individual level. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

---

[36]It is worth noting that our analysis only includes dual-earner couples and therefore excludes couples where one partner solely provides childcare.

For men, we find in column (2) of Table 5 that no significant effects are detectable across subgroups. Finally, looking at the results using the unbalanced sample in Table E.4, we observe very similar patterns as for our main sample.

**Marginal vs. Average Tax Rate.**    We conclude the empirical results by examining whether our estimated elasticity of labor income with respect to the marginal net-of-withholding tax rate can be partially attributed to a reaction to changes in the *average* net-of-withholding tax rate. Typically, existing literature estimating behavioral reactions of income w.r.t to the income tax assumes that income effects are small. In this case, households would primarily consider the marginal tax rate when reoptimizing their behavior following an income tax reform. As a result, previous studies investigating behavioral reactions to income tax reform have focused primarily on the effects of the marginal tax rate (Saez, Slemrod, and Giertz, 2012). However, even if income effects were small, households might still react to variations in the average withholding tax rate. They might consciously employ "schmeduling" techniques, such as ironing, where they assume that their average tax rate provides information about their marginal tax rate (Rees-Jones and Taubinsky, 2020). [37]

We therefore repeat our analysis and compare our estimates from the static Diff-in-Diff with and without additionally controlling for the change in the average withholding tax rate.

---

[37]Furthermore, the design of the average withholding tax is also highly relevant for the optimal design of withholding tax schedules, as discussed in Section 6.

Table 6: Static Diff-in-Diff Results controlling for Average Tax Rate

|  | Women | | Men | |
|---|---|---|---|---|
|  | (1) | (2) | (3) | (4) |
| Marginal WT Rate | 0.099*** | 0.098*** | 0.007 | 0.009 |
|  | (0.020) | (0.020) | (0.011) | (0.011) |
| Average WT Rate |  | 0.006 |  | -0.005** |
|  |  | (0.004) |  | (0.002) |
| Cell FE | ✓ | ✓ | ✓ | ✓ |
| N | 121,429 | 120,379 | 121,429 | 120,379 |
| Adj. R-Squared | 0.374 | 0.375 | 0.317 | 0.316 |

*Notes:* The table displays the results of the static diff-in-diff estimation as laid out in Equation 1 while additionally including the change in the average net-of-withholding tax rate as an independent variable. The estimation is performed using the balanced sample. All regressions include individual fixed effects and control for potentially time-varying characteristics of the couple. Cell fixed effects control for binned own and spousal pre-reform labor income interacted with dummies for parenthood, residence in East Germany, and years. Results using the unbalanced estimation sample can be found in Table E.5. Standard errors are clustered on the individual level. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Columns (1) and (2) of Table 6 show that, when using cell fixed effects, the estimate for the elasticity with respect to the marginal net-of-withholding tax rate for women does not change significantly when additionally controlling for the average net-of-withholding tax rate.

For men, however, we see in columns (3) and (4) that the coefficient for the average net-of-withholding tax rate is indeed significant. The higher the change in the average net-of-withholding tax rate of the female spouse, i.e., the lower her average withholding tax rate, the lower the post-reform income of the man. This could be understood as suggestive evidence that the average, rather than the marginal, withholding tax rate of wives can affect the labor supply of their husbands. Intuitively, this makes sense because a husband's (perceived) labor incentive is not directly affected by the marginal (withholding) tax rate of his wife, whereas a change in his wife's average (withholding) tax rate impacts the (perceived) joint household budget. Through income effects, a (perceived) increase of this household budget due to an increase in the average net-of-withholding tax rate of the wife can lead to a decreased male labor supply.

Looking at the results when using the unbalanced sample in Table E.5, we find that the average net-of-withholding tax rate explains part of our observed effects for women. This

would imply that policymakers should also partially consider the average withholding tax rate when designing withholding tax systems.

We discuss the implications of our empirical results for the design of withholding tax systems in the next section.

# 6    Policy Implications

The relationship between labor supply and withholding taxes holds important implications for welfare. Consequently, understanding the trade-offs involved in designing optimal withholding tax systems becomes essential for policymakers. Subsection 6.1 shortly summarizes the general considerations faced by governments when determining the appropriate level of withholding taxes. Thereafter, in Subsection 6.2 we investigate the trade-offs faced by countries when designing withholding taxes for couples specifically. Couples are particularly interesting because in all countries with joint taxation, the income tax rate of almost all couples is different from the income tax rate of unmarried individuals. Accordingly, in most countries with joint taxation the withholding tax schedule for married individuals is different to the withholding tax schedule of unmarried individuals. Surprisingly, however, between countries the underlying concept of the schedules for married individuals differs substantially. These differences are informative about the diverse set of objectives policy makers try to achieve by setting withholding taxes and reflect differing political objectives of policy makers.

## 6.1    Optimal Level of Withholding

Economists have generally expressed a positive view of the impact of high withholding taxes. For example, Thaler (1994, p. 191) states:

> ...most taxpayers like refunds, so raising **withholding taxes improves the government's cash flow** and **makes taxpayers happy**, an unusual parlay. On top of that, however, there is evidence that people **save more from lump-sum payments** (...), so increasing the withholding rate should also increase the saving rate. **A free lunch!**

This view of governments being able to influence consumption and savings decisions of their citizens at no cost, no matter which of the two they want to increase, has been supported by various research contributions.[38] Shapiro and Slemrod (1995) run a survey and document that almost half of their sample planned to increase consumption as a reaction to a federal US tax reform in 1992 that decreased withholding taxes without changing the eventual tax liabilities. Feldman (2010) confirms that finding by showing that this reform decreased contributions to retirement savings accounts, likely through the channel of an increase in consumption. The behavioral reaction is particularly surprising as the US withholding tax system allows households to adapt their withholding taxes.[39] Households could have changed their withholding tax rate at any time to better reflect their income tax rate which would have allowed them to increase consumption during the year.[40]

Interestingly, despite the ability to adjust withholding taxes, most US households continue to be overwithheld so that approximately 30 % of the withheld taxes are paid back as a tax refund (see Gelman et al., 2022; Rees-Jones, 2018). This observation suggests that households see a benefit in being subject to overwithholding. Consequently, there are numerous attempts in the literature to rationalize why households are subject to overwithholding even though they could avoid it. It has been shown that active overwithholding decisions could be a tool of households to deal with limited self-control (Neumark, 1995; Thaler, 1994) and income uncertainty (Gelman et al., 2022; Highfill, Thorson, and Weber, 1998). However, another possible explanation is insufficient awareness. Indeed, Jones (2012) shows that the lack of withholding tax adjustments by taxpayers to reduce the high level of overwithholding can largely be explained by inertia.

In contrast to the existing literature, we find that withholding taxes can come at a cost with regards to labor supply. However, our results do not imply that withholding taxes should mirror income taxes as closely as possible. Instead, governments face a trade-off. On the one hand, withholding tax are associated with more savings, less consumption, liquidity for the government and higher tax compliance. On the other hand, we document that higher levels of withholding taxes are associated with a reduction in labor supply. This implies that

---

[38]Moreover, research has indeed shown that taxpayers like getting tax refunds and thus change tax filing behavior discontinuously at the point of exact withholding (Engström et al., 2015; Rees-Jones, 2018).

[39]Adapting the withholding tax can come at a cost, as underwithheld households have to pay an interest on the underwithheld amount.

[40]Messacar (2018) also finds that in Canada withholding tax rates impact saving decisions.

governments should pick the level of optimal withholding carefully, and spend effort on the optimal design of withholding taxes.

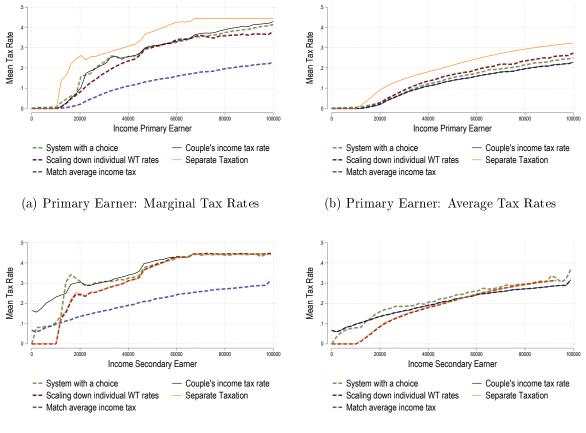## 6.2 Implementation of Withholding Taxes for Married Couples

In countries with joint taxation, married couples typically pay lower income taxes than single households with the same income structure. Hence, when countries levy the same withholding taxes for married and single individuals, couples are typically mechanically overwithheld because the marriage bonus induced by joint taxation is not taken into account. When governments decide to reduce overwithholding of married couples, they can do so through different adaptations of the withholding tax system. However, it is important to be aware of the following dilemma: Typically, proponents of joint taxation systems view households as one unit and therefore do not want to influence labor supply decisions within the household with any tax incentives. Consequently, governments are also impartial about how the joint taxation benefits are distributed within the household. However, this changes when governments try to account for joint taxation benefits in the withholding tax system. As the withholding tax is an individual tax, they have to decide what the individual marginal and average withholding tax rates are that each spouse faces and thereby have to make a decision on how the joint taxation benefit is divided among spouses.

Interestingly, different countries have come up with different solutions for this problem. In the following, we evaluate some of the most common solutions by looking at how they affect the marginal and average withholding tax rate of the primary and secondary earner. Doing so we also evaluate the degree to which the individual withholding tax rates differ from the couple's income tax rates as large differences could deceive individuals about their labor supply incentives. We will illustrate the effects of the different solutions empirically using a 10 % sample of the German tax records in 2010.

**Joint taxation.** Before discussing the effects of the different withholding tax systems, we first want to highlight again the effects of joint taxation on the income tax rates of both primary and secondary earners. In Figure 7, the orange line plots the individual income tax rates under separate taxation and the black line the couple's income tax rates under joint

taxation. Notably, joint taxation results in higher marginal and average tax rates than under separate taxation for secondary earners, while the opposite is true for primary earners.

**System with a choice.** We start the discussion of the different withholding tax systems with the implications of the prevailing system in Germany, the *system with a choice* which we have already presented in detail in Section 2.2. It allows couples to reduce their over-withholding by choosing a different withholding tax schedule for each spouse. The system is calibrated such that there is minimal deception in marginal withholding tax rates if couples assign the secondary earner to the unfavorable withholding tax class when the gross income share of the secondary earner is around 30 % or lower. In the administrative tax records, we see that on average couples choose the withholding tax schedules such that the mean marginal withholding tax rate fits the couple's mean marginal income tax rate, i.e., there is minimal deception in marginal tax rates. We illustrate this in Figures 7a and 7c which show that the mean marginal withholding tax rate approximately fits the mean marginal income tax rate of the couple for both primary and secondary earners. Moreover, we see in Figures 7b and 7d that the *system with a choice* also leads to average withholding tax rates that approximately fit the couple's average income tax rate. This implies that both primary and secondary earners pay a share in withholding taxes roughly equivalent to their gross-income share. However, it is important to note that we are solely examining the mean tax rates. In the appendix, Figure B.1 illustrates that while the *system with the choice* fits well for the majority of the households many households experience significant differences between their withholding tax rates and the couple's income tax rates. This is the case as the available withholding tax schedules are not suitable for all income constellations. Moreover, not all households choose the withholding tax schedule that minimizes their withholding tax payments.

(a) Primary Earner: Marginal Tax Rates      (b) Primary Earner: Average Tax Rates

(c) Secondary Earner: Marginal Tax Rates      (d) Secondary Earner: Average Tax Rates

Figure 7: Average and Marginal Withholding Tax Rates in different WT regimes for married couples

*Notes:* The figures display the mean marginal and average withholding tax rates induced by different withholding tax systems. Additionally, the couple's mean income tax rates and the mean income tax rates under separate taxation are displayed. We display the tax rates separately for primary earners in Panel A and B and for secondary earners in Panel C and D. All calculations are based on a 10 % sample of German administrative tax records from the year 2010, using the German tax code (RDC of the Federal Statistical Office and Statistical Offices of the Federal States, 2010). With "primary earner" we denote the individual in the household with higher labor income and with "secondary earner" we denote the individual in the household with lower labor income. When interpreting the figures it is important to keep in mind that along the x-axis individuals have partners with different income. Typically, individuals with higher income also have a partner with higher income. Moreover, in contrast to the remainder of the paper, the figures also include couples where only one partner has wage income. Hence, the panels for the primary earner include more households than the panels for the secondary earner. To ease the interpretation of the figures, we ignore all non-standard deductions.

**Alternative withholding tax systems.** We contrast the *system with a choice* with other solutions to decrease overwithholding that adjust the withholding tax rates of both spouses based on past household incomes. In practice, three different implementations have emerged. In the first approach, individual withholding tax rates for both spouses are scaled down by

a common factor, ensuring that the paid withholding taxes equal the expected income tax payments. In the second approach, the government calculates the expected, effective average income tax rate paid by the couple and then sets this rate as a common withholding tax rate. In the third approach, the withholding tax is set to exactly mirror the expected income tax for married couples.[41] In all three systems, given no income changes, can entirely eradicate overwithholding caused by joint taxation savings. However, they differ in the impact they have on the marginal and average withholding tax rates for both spouses.[42]

**Scaling down withholding tax rates.**   For the withholding tax system that scales down the individual withholding tax rate, Figure 7a shows that for primary earners the marginal withholding tax rate is in general relatively close to the couple's marginal withholding tax.[43] Only in some income ranges the marginal withholding tax rate is lower than the couple's marginal income tax rate and thereby deceiving the primary earner about the marginal tax rate. Moreover, we see that the marginal withholding tax rate is also much lower than the marginal income tax rate under separate taxation. This is driven by the fact that many primary earners have a spouse that earns very little or no income which leads to large joint taxation benefits and a substantial down-scaling of the tax rate.

For secondary earners in Figure 7c we see that the marginal withholding tax rates are much lower than the couple's marginal withholding tax rate. As a consequence, secondary earners are largely deceived about the marginal tax rate. Interestingly, the marginal withholding tax rates are very close to the marginal income tax rates under separate taxation. This is the case as couples in which the secondary earner earns income have, on average, lower joint taxation benefits and therefore no substantial down-scaling of the tax rate.

---

[41]In 2010, approach (1) was introduced in Germany under the name *schedule with a factor* ("IV mit Faktor") as an additional option for married couples. However, only around 40,000 couples (less than 0.5 % of all income-tax-paying couples) utilized this approach in 2018 (*Kleine Anfrage Bundestag* 2019). In the German coalition agreement of 2021 (*German Coalition Agreement* 2021) the parties agreed to abolish the *system with a choice* and to universally apply the *schedule with a factor*. The second approach was introduced in France in 2019, while the third is not used in any country.

[42]To better understand the differences in withholding tax payments between these systems, we provide calculations in the appendix in Table B.1, illustrating a scenario where the male partner earns 50,000 €, and the female partner earns 20,000 €.

[43]We are looking only at the *short-term* marginal tax rate here. As income increases, the joint taxation benefit changes and as a consequence also the scaling factor in the following year. We illustrate the *long-term* marginal tax rates in Figure B.2.

Figures 7b and 7d plot the effect on average withholding tax rates. The withholding tax system exhibits a notable shift in the withholding tax burden from secondary to primary earners, driven by the following phenomena: For secondary earners, the average income tax rate is higher than the average tax rate applicable in separate taxation due to their higher-earning partners. Consequently, when secondary earners pay a withholding tax based on separate taxation rates, their withholding tax decreases significantly. The factor further reinforces this effect, widening the gap even more compared to the average tax rate in joint taxation. This phenomenon flips only in the rare case of secondary earners earning more than around 70,000 €. On the other hand, primary earners benefit from joint taxation as it reduces their average income tax rate compared to separate taxation. However, we see that scaling down the tax rate from separate taxation still exceeds the average tax rate induced by joint taxation.[44] The consequence of these effects is that secondary earners end up paying average withholding taxes lower than the couple's average income tax, while primary earners pay average withholding taxes higher than the couple's average income tax. In other words, secondary earners contribute a lower share of withholding taxes relative to their gross income, whereas primary earners contribute a higher share than their gross income.

**Matching average income taxes.** For the withholding tax system which sets the marginal and average withholding tax rate to the couple's average income tax rate we see a different pattern. Figures 7a and 7c show that the marginal withholding tax rates implied by this approach are substantially lower than the marginal income tax rate of the couple for both primary and secondary earners.[45] Both primary and secondary earners are therefore deceived in marginal tax rates. By design, the average withholding tax rate matches the average income tax rate of the couple. Both partners therefore end up paying a share of withholding taxes that matches their gross-income share.

**Conclusion.** Taken together, our analysis illustrates that the design of withholding tax schedules for married couples is nontrivial. We show that the *system with a choice* leads, on

---

[44]In Figure 7, the gap between "separate taxation" and "scaling down individual WT rates" is larger for primary earners than for secondary earners due to the inclusion of couples with only one wage-earner, who generally benefit the most from joint taxation.

[45]We are looking only at the *short-term* marginal tax rate here. As the household income increases, the average income tax rate increases and as a consequence also the withholding tax rate in the following year. We illustrate the *long-term* marginal tax rates in Figure B.2.

average, to minimal deception in marginal tax rates as the marginal withholding tax rates for both primary and secondary earners are approximately equal to the couple's marginal income tax rate. For average tax rates, we see a similar pattern as the average withholding tax rates also approximately fit the couple's average income tax rate. We then contrast this system with two other approaches. For approach (1) which scales down individual withholding tax rate by a common factor we find empirically that it leads to very low deception in marginal tax rates for primary earners, while there is a high deception for secondary earners which face marginal withholding tax rates much lower than the couple's marginal income tax rate. For average tax rates, we see that primary earners pay more withholding taxes than the couple's average income tax rate, while the secondary earners pay less than the couple's average income tax rate. In contrast, approach (2) which sets the withholding tax rates to the couple's average income tax rate leads to large deception in marginal tax rates for both primary and secondary earners. For average tax rates, we, however, see that by construction the average withholding tax rates coincide with the couple's average income tax rate.

The remaining question is now which approach should be preferred by policymakers. The answer to this depends on the preferences of the policymaker. If the policymaker does not want to deceive individuals and wants them to optimize along the couple's income tax rates, the *system with a choice* appears to be a good approach. However, given the results of our study, we expect this approach to generate negative labor supply incentives for secondary earners. This is the case because the *system with a choice* translates the high marginal income tax rates of the secondary earner which stem from the joint taxation benefits into high marginal withholding tax rates. In contrast, policymakers interested in high labor supply incentives for secondary earners should consider deceiving them about the marginal tax rates by choosing one of the two approaches which adjusts the withholding tax rates by the joint taxation benefit.

# 7 Conclusion

In this study, we show that withholding taxes can affect labor income. For married women in Germany, we estimate an elasticity of labor income with respect to the marginal net-of-

withholding tax rate of about 0.1 using a static Diff-in-Diff approach. Estimating an event study Diff-in-Diff, we find that the treatment effect increases monotonically over time.

Our estimate can be compared to estimates from the literature on the elasticity of taxable income (ETI). As Neisser (2021) shows in a meta-analysis, estimates for the ETI with respect to the income tax range from about 0.2 to about 0.8. This means that our findings are in line with our expectations. On the one hand, motivated by our survey findings, we expect some effect due to individuals' lack of understanding and inattentiveness to the tax system that might make them use their withholding tax burden as proxy for their income tax burden. On the other hand, individuals' reactions should be somewhat less strong than their reactions to income taxes because, in absence of liquidity constraints, fully-informed households should not react to withholding taxes.

The fact that individuals react to withholding taxes implies that governments should be careful when designing withholding tax schedules. Typically, taxpayers receive large paybacks when filing income tax returns as the withholding tax does not take into account special deductions. For example, in the US, nearly a third of the amount of all personal income tax payments is returned as tax refunds (Gelman et al., 2022). According to the Federal Statistical Office of Germany, about 88 % of all taxpayers filing their income taxes in Germany received tax refunds for the tax year of 2018 which amounted to 1,072 € per person on average. Our results suggest that these large paybacks go hand in hand with taxpayers overestimating their actual income tax burden, as their withholding tax is much higher than the actual income tax. Hence, governments should redesign their withholding tax systems to better reflect the actual income taxes.

A common source of overwithholding are joint taxation benefits of married couples. We investigate how different withholding tax systems that account for joint taxation benefits affect the marginal and average withholding tax rates of primary and secondary earners. We show that as soon as countries try to reduce overwithholding they have to decide what the individual marginal and average withholding tax rates are that each spouse faces and thereby have to make a decision on how the joint taxation benefit is divided among spouses. We show that different implementations result in significantly different withholding tax rates for primary and secondary earners. Given our empirical results, countries can therefore affect the

labor market participation of secondary earners by choosing between different withholding tax systems.

# References

Abeler, Johannes and Simon Jäger (2015). "Complex Tax Incentives". In: *American Economic Journal: Economic Policy* 7.3, pp. 1–28. ISSN: 1945-7731, 1945-774X. DOI: 10.1257/pol.20130137.

Bagchi, Sutirtha and Libor Dušek (2021). "The effects of introducing withholding and third-party reporting on tax collections: Evidence from the U.S. state personal income tax". In: *Journal of Public Economics* 204, p. 104537. ISSN: 00472727. DOI: 10.1016/j.jpubeco.2021.104537.

Becker, Johannes, Jonas Fooken, and Melanie Steinhoff (2019). "Behavioral Effects of Withholding Taxes on Labor Supply*". In: *The Scandinavian Journal of Economics* 121.4, pp. 1417–1440. ISSN: 0347-0520, 1467-9442. DOI: 10.1111/sjoe.12345.

Bertrand, Marianne, Emir Kamenica, and Jessica Pan (2015). "Gender Identity and Relative Income within Households*". In: *The Quarterly Journal of Economics* 130.2, pp. 571–614. ISSN: 0033-5533, 1531-4650. DOI: 10.1093/qje/qjv001.

Bick, Alexander and Nicola Fuchs-Schündeln (2017). "Quantifying the Disincentive Effects of Joint Taxation on Married Women's Labor Supply". In: *American Economic Review* 107.5, pp. 100–104. ISSN: 0002-8282. DOI: 10.1257/aer.p20171063.

— (2018). "Taxation and Labour Supply of Married Couples across Countries: A Macroeconomic Analysis". In: *The Review of Economic Studies* 85.3, pp. 1543–1576. ISSN: 0034-6527, 1467-937X. DOI: 10.1093/restud/rdx057.

Boelmann, Barbara, Anna Christina Raute, and Uta Schönberg (2021). "Wind of Change? Cultural Determinants of Maternal Labor Supply". In: *CESifo Working Paper* 9094.

Buettner, Thiess, Katharina Erbe, and Veronika Grimm (2019). "Tax planning of married couples and intra-household income inequality". In: *Journal of Public Economics* 179, p. 104048. ISSN: 00472727. DOI: 10.1016/j.jpubeco.2019.104048.

Campa, Pamela and Michel Serafinelli (2019). "Politico-Economic Regimes and Attitudes: Female Workers under State Socialism". In: *The Review of Economics and Statistics* 101.2, pp. 233–248. ISSN: 0034-6535. DOI: 10.1162/rest_a_00772.

Carbonnier, Clément, Clément Malgouyres, Loriane Py, and Camille Urvoy (2022). "Who benefits from tax incentives? The heterogeneous wage incidence of a tax credit". In: *Journal of Public Economics* 206, p. 104577. ISSN: 00472727. DOI: 10.1016/j.jpubeco.2021.104577.

Chetty, Raj, John N. Friedman, and Emmanuel Saez (2013). "Using Differences in Knowledge Across Neighborhoods to Uncover the Impacts of the EITC on Earnings". In: *The American*

*Economic Review* 103.7. Publisher: American Economic Association, pp. 2683–2721. ISSN: 0002-8282.

Chetty, Raj, Adam Looney, and Kory Kroft (2009). "Salience and Taxation: Theory and Evidence". In: *American Economic Review* 99.4, pp. 1145–1177. ISSN: 0002-8282. DOI: `10.1257/aer.99.4.1145`.

Engström, Per, Katarina Nordblom, Henry Ohlsson, and Annika Persson (2015). "Tax Compliance and Loss Aversion". In: *American Economic Journal: Economic Policy* 7.4, pp. 132–164. ISSN: 1945-7731, 1945-774X. DOI: `10.1257/pol.20130134`.

Enrick, Norbert Lloyd (1963). "A Pilot Study of Income Tax Consciousness". In: *National Tax Journal* 16.2. Publisher: National Tax Association, pp. 169–173. ISSN: 0028-0283.

— (1964). "A Further Study of Income Tax Consciousness". In: *National Tax Journal* 17.3. Publisher: National Tax Association, pp. 319–321. ISSN: 0028-0283.

Feldman, Naomi E. (2010). "Mental Accounting Effects of Income Tax Shifting". In: *Review of Economics and Statistics* 92.1, pp. 70–86. ISSN: 0034-6535, 1530-9142. DOI: `10.1162/rest.2009.11892`.

Feldman, Naomi E. and Bradley J. Ruffle (2015). "The Impact of Including, Adding, and Subtracting a Tax on Demand". In: *American Economic Journal: Economic Policy* 7.1, pp. 95–118. ISSN: 1945-7731, 1945-774X. DOI: `10.1257/pol.20130101`.

Fujii, Edwin T. and Clifford B. Hawley (1988). "On the Accuracy of Tax Perceptions". In: *The Review of Economics and Statistics* 70.2. Publisher: The MIT Press, pp. 344–347. ISSN: 0034-6535. DOI: `10.2307/1928321`.

Gelman, Michael, Shachar Kariv, Matthew D. Shapiro, and Dan Silverman (2022). "Rational Illiquidity and Consumption: Theory and Evidence from Income Tax Withholding and Refunds". In: *American Economic Review* 112.9, pp. 2959–2991. ISSN: 0002-8282. DOI: `10.1257/aer.20191385`.

Gideon, Michael (2017). "Do Individuals Perceive Income Tax Rates Correctly?" In: *Public Finance Review* 45.1. Publisher: SAGE Publications Inc, pp. 97–117. ISSN: 1091-1421. DOI: `10.1177/1091142115615670`.

Gruber, Jon and Emmanuel Saez (2002). "The elasticity of taxable income: evidence and implications". In: *Journal of Public Economics*, p. 32.

Hauck, Tobias and Luisa Wallossek (2023). "Optional (Non-)Filing and Effective Taxation". In: *Mimeo*.

Highfill, Jannett, Douglas Thorson, and William V. Weber (1998). "Tax Overwithholding as a Response To Uncertainty". In: *Public Finance Review* 26.4, pp. 376–391. ISSN: 1091-1421, 1552-7530. DOI: `10.1177/109114219802600405`.

Jones, Damon (2012). "Inertia and Overwithholding: Explaining the Prevalence of Income Tax Refunds". In: *American Economic Journal: Economic Policy* 4.1, pp. 158–185. ISSN: 1945-7731, 1945-774X. DOI: `10.1257/pol.4.1.158`.

*Kleine Anfrage Bundestag* (2019). *Kleine Anfrage Drucksache 19/12857: Ehegattensplitting und Gleichstellung im deutschen Steuersystem*.

Kleven, Henrik, Camille Landais, Johanna Posch, Andreas Steinhauer, and Josef Zweimüller (2019). "Child Penalties across Countries: Evidence and Explanations". In: *AEA Papers and Proceedings* 109, pp. 122–126. ISSN: 2574-0768, 2574-0776. DOI: 10.1257/pandp.20191078.

*German Coalition Agreement* (2021). *Koalitionsvertrag zwischen SPD, Bündnis 90/Die Grünen und FDP*.

LaLumia, Sara (2008). "The effects of joint taxation of married couples on labor supply and non-wage income". In: *Journal of Public Economics* 92.7, pp. 1698–1719. ISSN: 00472727. DOI: 10.1016/j.jpubeco.2008.01.009.

Lardeux, Raphael (2022). "Behavioral Cross-Influence of a Shadow Tax Bracket: Evidence from Bunching Where Income Tax Liabilities Start". In: *SSRN Electronic Journal*. ISSN: 1556-5068. DOI: 10.2139/ssrn.4093635.

Liebmann, Jeffrey B. and Richard J. Zeckhauser (2004). "Schmeduling". In: *Working Paper*.

Messacar, Derek (2018). "The effect of tax withholding on pre-retirement savings withdrawals: evidence from Canada". In: *Journal of Pension Economics and Finance* 17.4, pp. 534–553. ISSN: 1474-7472, 1475-3022. DOI: 10.1017/S1474747217000269.

Neisser, Carina (2021). "The Elasticity of Taxable Income: A Meta-Regression Analysis". In: *The Economic Journal* 131.640, pp. 3365–3391. ISSN: 0013-0133, 1468-0297. DOI: 10.1093/ej/ueab038.

Neumark, David (1995). "Are Rising Earnings Profiles a Forced-Saving Mechanism?" In: *The Economic Journal* 105.428. Publisher: [Royal Economic Society, Wiley], pp. 95–106. ISSN: 00130133, 14680297. DOI: 10.2307/2235321.

RDC of the Federal Statistical Office and Statistical Offices of the Federal States (2010). *Lohn- und Einkommenssteuerstatistik 2010, Scientific Use File*. DOI: 10.21242/73111.2010.00.00.3.1.0.

— (2018). *Taxpayer-Panel 2001-2018, GWAP*. DOI: 10.21242/73111.2018.00.01.2.1.1.

Rees-Jones, Alex (2018). "Quantifying Loss-Averse Tax Manipulation". In: *The Review of Economic Studies* 85.2, pp. 1251–1278. ISSN: 0034-6527, 1467-937X. DOI: 10.1093/restud/rdx038.

Rees-Jones, Alex and Dmitry Taubinsky (2020). "Measuring "Schmeduling"". In: *The Review of Economic Studies* 87.5, pp. 2399–2438. ISSN: 0034-6527, 1467-937X. DOI: 10.1093/restud/rdz045.

Saez, Emmanuel, Joel Slemrod, and Seth H Giertz (2012). "The Elasticity of Taxable Income with Respect to Marginal Tax Rates: A Critical Review". In: *Journal of Economic Literature* 50.1, pp. 3–50. ISSN: 0022-0515. DOI: 10.1257/jel.50.1.3.

Selin, Håkan (2014). "The rise in female employment and the role of tax incentives. An empirical analysis of the Swedish individual tax reform of 1971". In: *International Tax and*

*Public Finance* 21.5, pp. 894–922. ISSN: 0927-5940, 1573-6970. DOI: 10.1007/s10797-013-9283-y.

Shapiro, Matthew D. and Joel Slemrod (1995). "Consumer Response to the Timing of Income: Evidence from a Change in Tax Withholding". In: *The American Economic Review* 85.1. Publisher: American Economic Association, pp. 274–283. ISSN: 0002-8282.

Slemrod, Joel (2019). "Tax Compliance and Enforcement". In: *Journal of Economic Literature* 57.4, pp. 904–954. ISSN: 0022-0515. DOI: 10.1257/jel.20181437.

Spangenberg, Ulrike, Giesela Färber, and Corinna Späth (2020). "Mittelbare Diskriminierung im Lohnsteuerverfahren. Auswirkungen der Lohnsteuerklassen auf Nettoeinkommen und Lohnersatzleistungen". In: *Working Paper Forschungsförderung*. Vol. 190. Hans-Böckler-Stiftung.

Thaler, Richard H (1994). "Psychology and savings policies". In: *The American Economic Review* 84.2. Publisher: JSTOR, pp. 186–192. ISSN: 0002-8282.

Wagstaff, Joseph Van (1965). "Income Tax Consciousness under Withholding". In: *Southern Economic Journal* 32.1, p. 73. ISSN: 00384038. DOI: 10.2307/1054985.

# Appendix A    Empirical Strategy

In our empirical strategy, we control for binned own and spousal pre-reform labor income interacted with dummies for parenthood and residence in East Germany by adding couple-level fixed effects to our regression. We motivate the underlying reason for this in the following.

To begin, controlling for own pre-reform labor income is necessary as the treatment intensity does not only vary across withholding tax classes, but also across labor income. This is illustrated in the lower part of Figure A.1, which displays the percent changes in the annual withholding taxes induced by the reform. As we only want to use the variation in treatment intensity caused by the different choice of withholding tax classes, it is important to control for own pre-reform income.

Moreover, there are also reasons why it is important to additionally control for spousal pre-reform labor income. First, controlling for joint household income enables us to compare women that face the same income tax burden on the couple level but different changes in their withholding tax burden. Second, controlling for the relative within-household labor income allows us to control for the economic importance of own labor income and a couple's labor market related gender norms. Gender norms of the within-household division of labor
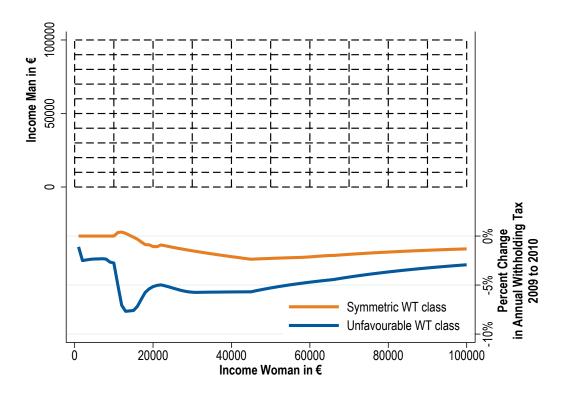
Figure A.1: Illustration of Income Cell Approach

*Notes:* This figure illustrates the idea behind using income cell fixed effects. The lower part of the figure displays the percent change in withholding taxes induced by the reform in 2010. It is therefore a relative representation of Figure 5. The upper part of the figure illustrates the income cell approach. We create bins for the income of women and men, interact them with each other and interact the resulting income cells with our sample years. By adding these interacted cells to our regression equation, we only exploit variation in the treatment within the cells.

arguably play a large role in explaining labor market decisions of spouses as well as their choice of withholding tax schedule.[46]

In order to address these above-outlined channels, we follow an empirical approach brought forward recently by Carbonnier et al. (2022) that is based on dividing observations into cells to exploit variation in treatment within each cell. In our preferred specification, we classify each individual into one of 400 cells based on own and spousal pre-reform labor income in 2009 and dummies indicating parenthood and residence in East Germany. We include the dummies to make sure that we account for the most relevant predictors of the withholding

---

[46] As we show in Figure C.3, our survey reveals that couples in the men-favoring schedule hold more traditional gender norms than those in the symmetric schedule. Comparing only couples with a similar within-household division of labor income could mitigate this problem because, as we show in Table 2, this division is correlated with the choice of withholding tax schedule.

tax class choice as shown in Figure 3. Doing so we ensure that the compared individuals are more similar in observable characteristics. The cells are created by interacting evenly spaced bins of 10,000 € of both own and partner income. Each of the 100 cells is then interacted with dummies for parenthood and residence in East Germany. By adding the resulting couple-level cell fixed effects interacted with years as controls we only use the variation in treatment intensity within each cell. We thus compare women with similar own and spousal pre-reform income characteristics and thereby also similar couple-level gender norms. The remaining variation in treatment that we are exploiting then only comes from the different choices of withholding tax schedules.

We illustrate how the cell approach helps to tackle endogeneity concerns in Figure A.1. Along the x-axis, the cells help to control for own pre-reform labor income so that differences in treatment intensity are only induced by the choice of withholding tax schedule, not by the income level. Along the y-axis, differences in relative within-household labor income and indirectly thus also gender norms are accounted for. Two women with the same own labor income but different withholding tax classes can still be very different with regards to other relevant factors such as the economic importance of own labor income and the couples' gender norms. Using the cell approach therefore ensures comparing more similar couples.

Given the arguments brought forward so far, though, controlling for both own and spousal income separately would be sufficient. However, not only relative within-household labor income but also absolute household labor income might play a role. Couples with higher absolute labor income might tend to choose other withholding tax schedules but also react differently to changes in the net-of-withholding-tax rate. Thus, the bin approach controls for differences in absolute household labor income along the diagonal of the upper part of Figure A.1.
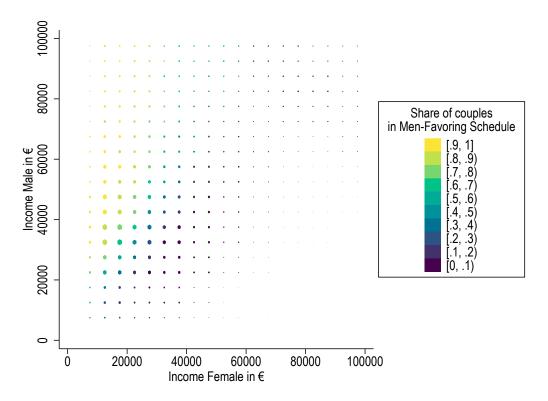
Figure A.2: Heatplot: Number of Observations and Share of Couples in Men-favoring Schedule

*Notes:* The figure displays the number of observations and the exploited treatment variation by income cells. Each dot represents observations that lie in an interval of 5,000 € woman and man income. For example, the cell at the top right corner contains women and men with an income between 95,000 € and 100,000 €. Incomes below 5000 € are not displayed as they are not part of our analysis. The size of each bin represents the number of observations in our sample. The larger the dot size, the more observations are in the respective cell. The color displays the share of couples in each cell who are in the men-favoring withholding tax schedule at the time of the reform. It measures how much variation between the two withholding tax classes can be exploited for each cell.

The variation that we can exploit by the bin approach is illustrated in Figure A.2. It shows for each of the income cells the share of couples who are treated in a binary sense, i.e., the share of couples being in the men-favoring withholding tax schedule at the time of the reform conditional on being in the being in the men-favoring or symmetric withholding tax schedule. The size of each bin represents the number of observations, meaning that bins with larger dots contain a larger share of the observations in our sample. The plot shows that for the largest shares of couples the husband earns between 20,000 € and 50,000 € and the wife between 10,000 € and 40,000 € and that within those bins there is a considerable amount of variation in the choice of withholding tax schedules.

# Appendix B   Policy Implication

Table B.1: Different withholding tax systems

|  | System with a choice | | | |
|---|---|---|---|---|
|  | Men-favoring | Symmetric | Matching | Scaling |
| Withholding Tax Women | 3,100 € | 800 € | 2,400 € | 700 € |
| Withholding Tax Men | 4,100 € | 8,500 € | 6,000 € | 7,700 € |
| Sum Withholding Taxes | 7,200 € | 9,300 € | 8,400 € | 8,400 € |

*Notes:* The table illustrates the distribution of the withholding tax burden within a couple in the three analyzed withholding tax systems. In the example, the woman earns 20,000 €, her husband 50,000 €. All taxes are calculated based on the German tax system 2010 and the taxes are rounded to the nearest 100 €. The income tax burden of the couple sums up to 8,400 €.

(a) Primary Earner: Average Tax Rates

(b) Primary Earner: Marginal Tax Rates

(c) Secondary Earner: Average Tax Rates

(d) Secondary Earner: Marginal Tax Rates
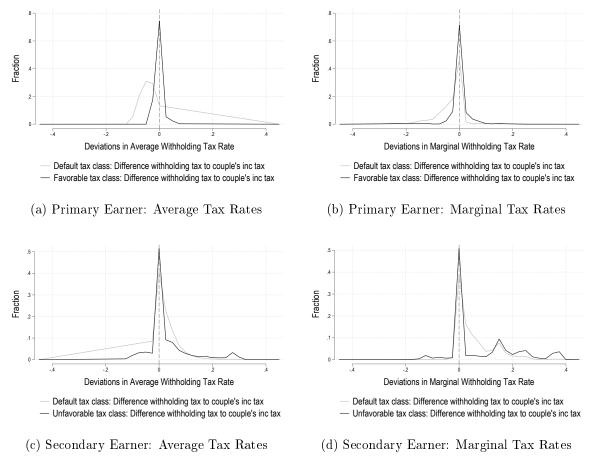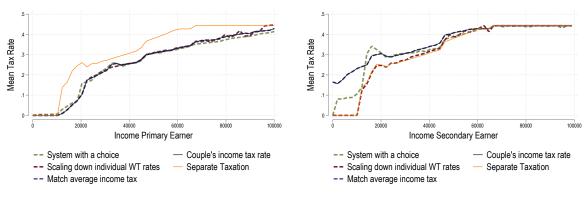
Figure B.1: Deviations in Average and Marginal Withholding Tax Rates

*Notes:* The figures display the deviations in marginal and average withholding tax rates from the couple's income tax rates. The deviations are shown separately for individuals that chose the default withholding tax class and for individuals that chose the favorable/unfavorable withholding tax class. We display the deviations in tax rates separately for primary earners in Panel A and B and for secondary earners in Panel C and D. All calculations are based on a 10 % sample of German administrative tax records from the year 2010, using the German tax code (RDC of the Federal Statistical Office and Statistical Offices of the Federal States, 2010). With "primary earner" we denote the individual in the household with higher labor income and with "secondary earner" we denote the individual in the household with lower labor income. To ease the interpretation of the figures, we ignore all non-standard deductions.

(a) Primary Earner: Marginal Tax Rates    (b) Secondary Earner: Marginal Tax Rates

Figure B.2: Marginal Withholding Tax Rates in different WT regimes for married couples

*Notes:* The figures display the *long-term* mean marginal withholding tax rates induced by different withholding tax systems. Additionally, the couple's mean income tax rates and the mean income tax rates under separate taxation are displayed. We display the tax rates separately for primary earners in Panel A and for secondary earners in Panel B. All calculations are based on a 10,% sample of German administrative tax records from the year 2010, using the German tax code (RDC of the Federal Statistical Office and Statistical Offices of the Federal States, 2010). With "primary earner" we denote the individual in the household with higher labor income and with "secondary earner" we denote the individual in the household with lower labor income. When interpreting the figures it is important to keep in mind that along the x-axis individuals have partners with different income. Typically, individuals with higher income also have a partner with higher income. Moreover, in contrast to the remainder of the paper, the figures also include couples where only one partner has wage income. Hence, the panels for the primary earner include more households than the panels for the secondary earner. To ease the interpretation of the figures, we ignore all non-standard deductions.
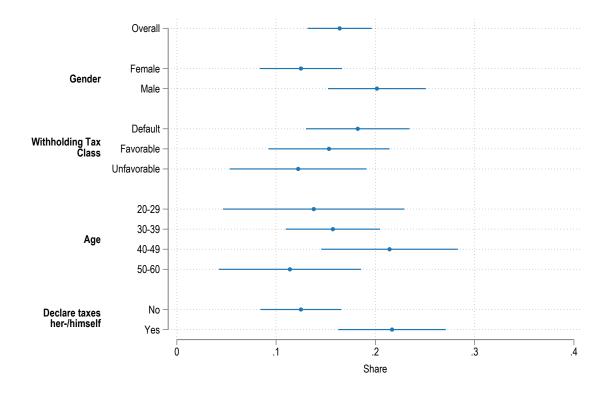
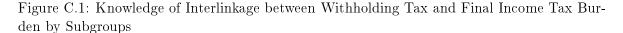# Appendix C   Survey

## C.1   Implementation

We pre-registered our survey with the Open Science Foundation and subsequently ran it on the micro job platform Clickworker between December 2022 and April 2023. We prescreened the participants so that they all speak German, are between 20 and 60 years old, married, and employed. We remove respondents from our sample who fail at least one of two attention checks.[47]  Furthermore, we restrict the sample to respondents with employed spouses. This makes sure that we can elicit information on wage transfers from and between both spouses and makes the sample more comparable to the sample for our main analysis with observational data.[48]  Our final sample then consists of 506 respondents (258 men, 248 women).

---

[47] The attention checks can be found in the questions A2 and D15 in Appendix C.4.

[48] We also exclude respondents from our analysis who are in a same-sex marriage, where one of the two partners is non-binary or when the gender is not stated. This is for two reasons: First, there is an option for

## C.2  Survey Figures



Figure C.1: Knowledge of Interlinkage between Withholding Tax and Final Income Tax Burden by Subgroups

*Notes:* The figure plots the overall and subgroup-specific shares of surveyed individuals who correctly identify that the choice of withholding tax class does not impact the final income tax burden given an example of the labor incomes of two spouses (one spouse earning 60,000 € per year, the other one 30,000 €). See Question D7 in Appendix C.4 for the exact wording of the question.

spouses in a same-sex marriage to keep that marriage secret from their employers by choosing withholding tax class I instead of III, IV, or V. This might then influence their knowledge of withholding taxes in an unforeseeable way. Second, same-sex couples were not yet allowed to benefit from joint taxation and were thus not allowed to choose their withholding tax classes at the time of the 2010 reform.
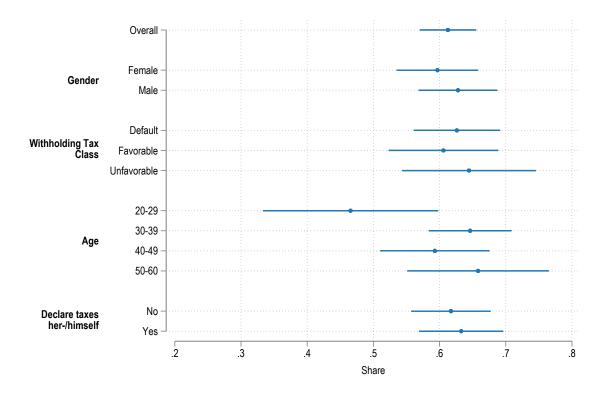
Figure C.2: Knowledge of Interlinkage between Withholding Tax Classes and Monthly Payslip

*Notes:* The figure plots the overall and subgroup-specific shares of surveyed individuals who correctly identify that and in which way the choice of withholding tax classes impacts the monthly net wage received from one's employer. Respondents are classified as being knowledgeable if they both answer correctly what happens qualitatively with respect to monthly wage transfers from their employers when changing from the default withholding tax class to (1) the favorable withholding tax class and (2) the unfavorable withholding tax class. See Question D10 in Appendix C.4 for the exact wording of the question.
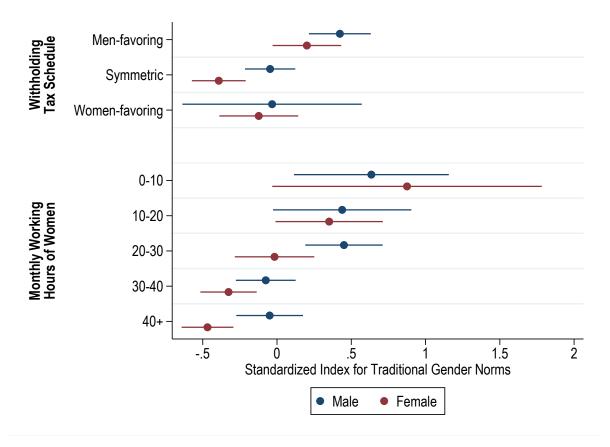
Figure C.3: Gender Norms Index by Gender

*Notes:* The figure plots standardized index values for gender norms by gender for different withholding schedules and bins of monthly working hours of the wife. A higher value of the gender norms index is associated with more traditional gender norms, i.e., a desired larger role for husbands than for wives with regards to decision-making in the household and market work.

## C.3  Detailed Survey Analysis

To investigate the organization of household finances, we broadly classify couples into three groups with respect to their usage of bank accounts and the destinations of the wage payments from their monthly payslips: (i) Couples without a shared bank account, (ii) couples with a shared bank account who get both their wages directly transferred to that account, and (iii) couples with a shared bank account where both spouses get their wages directly transferred to their own bank account. These categorizations are of particular relevance for couples that picked the men-favoring or women-favoring schedule because in these schedules the intra-household distribution of labor income is distorted as the withholding tax burden is partly shifted from one spouse to the other. As we focus on couples in the men-favoring schedule in

our main analysis with administrative data, we also concentrate on these here. Furthermore, we investigate onto which bank account tax refunds are transferred as they might be used to counter the distortion of the distribution of labor income.

If a couple does not have a shared bank account, it is very likely that the distortion of the relative intra-household distribution of labor income remains largely unchanged as this couple is less likely to have established a compensatory sharing rule. We find that 47 % of the respondents in the men-favoring schedule do not have a shared bank account.[49] Strikingly, of those without a shared bank account, 81 % of the couples in the men-favoring withholding tax schedule let their tax refunds be transferred to the husband's bank account. This compares to 65 % of the couples in the symmetric schedule. Thus, it can be concluded that the distortions of the intra-household distribution of labor income induced by the shifting of the withholding tax burden from husbands to wives in the men-favoring withholding tax schedule are not only not diminished by the distribution of tax refunds but even aggravated.

On the other hand, 32 % of all couples in the men-favoring withholding tax schedule have a shared bank account on which both spouses get their wages directly transferred to.[50] For these households, the above-described distortion of the relative intra-household distribution of labor income appears rather unproblematic.[51] This is particularly the case because we find that almost all of these couples get their tax refund onto the shared bank account and none onto the husband's bank account. When all of a couple's labor income including any tax refund is transferred to a shared account, the choice of the men-favoring schedule likely does not directly impact the consumption opportunities of women, as they can probably use the money on the shared bank account for their private consumption. However, the bargaining power within the household might still be impacted if the transfer of the withholding tax burden, induced by the men-favoring schedule, is not understood and the shifted labor income is thus mentally attributed to the husband instead of the wife.

---

[49] When considering couples irrespective of their withholding tax schedules, 45 % of the respondents state to not have a shared bank account.

[50] This compares to about 21 % of the couples in the symmetric withholding tax schedule. This indicates that couples in the men-favoring withholding tax schedule use shared bank accounts as a device to compensate to a limited extent.

[51] This also applies to another 3 % of the couples in the men-favoring schedule where the husband's wage income gets directly transferred to either his wife's account or the shared account and the wife's wage income gets directly transferred to her own account.

For the 16 % of the couples in the men-favoring withholding tax schedule that have a shared bank account but receive their wage incomes to each spouse's personal bank account, it is less clear if households are compensated for the redistributive effect of the men-favoring withholding tax schedule.[52] In these cases, the money from the respective personal bank account can be seen as typically designated for the account holder's individual consumption while both partners transfer a share of their personal income to the shared bank account. We further examine in an exploratory fashion whether women are in these cases compensated for the higher withholding taxes they have to pay. Couples that take into account the redistributional consequences of the men-favoring schedule should have established a transfer rule that requires the husband to transfer a larger part of his income to the shared bank account than his wife.

We find that only 38 % of all couples in the men-favoring schedule that have a shared bank account but receive their wage incomes to each spouse's personal bank account make use of such a transfer rule. This means that even among couples in the men-favoring schedule with a shared bank account, 21 % do not seem to account for the distortion effects of being in the men-favoring schedule. Thus, we can monitor a counteracting strategy for only 42 % of all couples in the men-favoring schedule (those with a shared bank account who either already get their wages directly transferred accordingly or do compensatory payments from the husband to the wife afterward).

## C.4 Survey Questions

This section documents the survey questions. Section C.4.1 includes the original questions in German. Depending on the answer to question A1a, the gender of the interviewed, and A1b, the gender of the partner, the personal pronouns were adapted in all questions and explaining texts. Section C.4.2 provides a translation into English.

### C.4.1 German Version

Guten Tag!

---

[52]This applies even more to another 2 % of the couples in the men-favoring schedule where the husband's wage income gets directly transferred to his own account while the wife's wage income gets directly transferred to either the husband's account or the shared account.

Wir sind Forscher an den Universitäten Bonn und Göteborg und bedanken uns schon jetzt herzlich für Ihre Teilnahme an unserer Umfrage und Ihre damit verbundene Unterstützung unserer Forschung! Ihre Antworten in der Umfrage haben keine Auswirkung auf Ihre persönliche Auszahlung. Wir möchten Sie deshalb darum bitten, alle Fragen ohne Hilfsmittel (Internetrecherche, etc.) zu beantworten.

Wer ist verantwortlich für die Studie?

Kontaktdaten

Welchen Zwecken dient die Studie?

Zweck der Studie ist die Untersuchung ökonomischen Verhaltens. Wie bei ökonomischen Studien üblich, erfolgt daher vorab keine umfassende Aufklärung über den Forschungshintergrund.

Was geschieht mit meinen Daten?

Alle beteiligten Mitarbeiter und Wissenschaftler arbeiten selbstverständlich nach den Vorschriften der Datenschutz-Grundverordnung, dem Bundesdatenschutzgesetz und den einschlägigen Landesdatenschutzgesetzen. Die Daten werden auf einem Server der Universität Bonn innerhalb der EU gespeichert. Ihre Daten werden nach erfolgter Auszahlung anonymisiert und anschließend statistisch ausgewertet. Aus den Ergebnissen lassen sich anschließend keine Rückschlüsse auf Sie ziehen.

Welche Rechte habe ich?

Sie haben das Recht, Auskunft über die zu Ihrer Person gespeicherten Daten zu erhalten (Art. 15 DS-GVO). Sollten unrichtige personenbezogene Daten verarbeitet werden, steht Ihnen ein Recht auf Berichtigung zu (Art. 16 DS-GVO). Liegen die gesetzlichen Voraussetzungen vor, so können Sie die Löschung oder Einschränkung der Verarbeitung verlangen sowie Widerspruch gegen die Verarbeitung einlegen (Art. 17, 18 und 21 DS-GVO). Sie haben das Recht, sich mit einer Beschwerde an die zuständige Aufsichtsbehörde für Datenschutz zu wenden. Die hier erklärte Einwilligung können Sie jederzeit mit Wirkung für die Zukunft widerrufen. Sofern Ihre Daten bereits anonymisiert wurden, können Ihnen diese aber nicht mehr zugeordnet werden. Wir können Ihre Angaben also nicht aus dem Ergebnis „herausrechnen".

Einwilligungserklärung

Hiermit willige ich in die Verarbeitung meiner personenbezogenen Daten für das Forschungsvorhaben ein. Die Einwilligung kann ich jederzeit widerrufen. Ich habe die Hinweise zur Verwendung meiner Daten und zu meinen Rechten in der Datenschutzerklärung zur Kenntnis genommen.

Ich bin einverstanden. (Ja, Nein)

*Page Break*

Screening

**S1** Haben Sie momentan Einkommen aus Lohnarbeit? (Ja, Nein)

**S2** Sind Sie verheiratet? (Ja, Nein)

*Page Break*

**A1a** Was ist Ihr Geschlecht? (Weiblich, Männlich, Divers)

**A1b** Was ist das Geschlecht Ihres Ehepartners/Ihrer Ehepartnerin? (Weiblich, Männlich, Divers, Ich habe keinen Ehepartner/keine Ehepartnerin, Keine Angabe)

*Page Break*

**A2** Die nächste Frage betrifft folgendes Problem: In Umfragen wie unserer gibt es manchmal Teilnehmerinnen und Teilnehmer, die die Fragestellungen nicht sorgfältig durchlesen, sondern sich nur schnell durch die Umfrage klicken. Dies führt zu vielen zufälligen Antworten, die die Qualität der Forschungsvorhaben beeinträchtigen. Bitte wählen Sie "Sehr stark interessiert" und "Überhaupt nicht interessiert" als Ihre Antwort auf die kommende Frage, um uns zu zeigen, dass Sie unsere Fragen sorgfältig lesen. Gegeben dieser Information, wie interessiert sind Sie am Thema Steuern?

(Überhaupt nicht interessiert, Fast gar nicht interessiert, Etwas interessiert, Stark interessiert, Sehr stark interessiert)

*Page Break*

**A3** Stellen Sie sich vor, dass Ihr Arbeitgeber Ihnen eine freie Wahl Ihrer wöchentlichen Arbeitsstunden anbietet: Wie würden Sie sich entscheiden? (Ich würde meine Arbeitsstunden erhöhen, Ich würde meine Arbeitsstunden verringern, Ich würde meine Arbeitsstunden unverändert lassen, Weiß nicht)

*Page Break*

**D4** Was ist Ihre momentane Lohnsteuerklasse? (1, 2, 3, 4, 4 mit Faktor, 5, 6, Weiß nicht)

**D5** Wer hat über die Steuerklasse entschieden? (Ich, Mein Ehepartner, Mein Ehepartner und ich zusammen, Ein Steuerberater/Eine Steuerberaterin, Eine andere Person, Niemand, Weiß nicht)

*Page Break*

**D _Text** Wir wollen nun mehr über Ihr generelles Verständnis der Steuerklassen herausfinden, es geht also in den folgenden Fragen nicht um Ihre eigene Steuerklasse.

*Page Break*

**D6** Existieren die folgenden Steuerklassenkombinationen (Ihr Ehepartner erstgenannt, Sie zweitgenannt)? (Ja, Nein, Weiß nicht)

(4/4, 5/4 , 3/5 , 5/5 , 4/1 , 3/3 , 4/5 , 5/3 , 1/4)

**Wenn D4 == "4 mit Faktor":**

(4/4, 5/4 , 3/5 , 5/5 , 4/1 , 3/3 , 4/5 , 5/3 , 1/4, 4 mit Faktor/3, 4 mit Faktor/4 mit Faktor, 3/4 mit Faktor, 5/4 mit Faktor, 4 mit Faktor/5)

*Page Break*

**D7** Stellen Sie sich vor, dass Sie 60.000 € und Ihr Ehepartner 30.000 € brutto pro Jahr verdienen und dass Sie eine gemeinsame Steuererklärung machen. Bei welcher Steuerklassenkombination tragen Sie als Paar zusammen die geringste jährliche finale Steuerlast (entspricht der Einkommensteuer)? Alle drei genannten Steuerklassenkombinationen existieren.

(Ich in Steuerklasse 5 und mein Partner in Steuerklasse 3, Ich in Steuerklasse 4 und mein Partner in Steuerklasse 4, Ich in Steuerklasse 3 und mein Partner in Steuerklasse 5, Egal, Weiß nicht)

*Page Break*

**D8** Nehmen Sie nun an, Sie wären in Steuerklasse 4. Was stimmt? Wenn Sie nun von 4 in 3 wechseln, dann bekommen Sie persönlich monatlich...

(...mehr netto von Ihrem Arbeitgeber, ...weniger netto von Ihrem Arbeitgeber, ...gleich viel netto von Ihrem Arbeitgeber, Weiß nicht)

*Page Break*

**D9** Nehmen Sie nun an, Sie wären in Steuerklasse 4. Was stimmt? Wenn Sie nun von 4 in 5 wechseln, dann bekommen Sie persönlich monatlich...

(...mehr netto von Ihrem Arbeitgeber, ...weniger netto von Ihrem Arbeitgeber, ...gleich viel netto von Ihrem Arbeitgeber, Weiß nicht)

*Page Break*

**D10** Bitte nehmen Sie sich ausreichend Zeit, um die folgende Information zu verstehen. In der Tabelle sehen Sie beispielhaft die Lohnsteuer abhängig von den Steuerklassen für ein Paar, bei dem beide Partner brutto 3500 € monatlich verdienen.

| | Monatliche Lohnsteuer Partner A | Monatliche Lohnsteuer Partner B |
|---|---|---|
| Partner A in Steuerklasse 3<br>Partner B in Steuerklasse 5 | 350 € | 1 000 € |
| Partner A in Steuerklasse 4<br>Partner B in Steuerklasse 4 | 700 € | 700 € |
| Partner A in Steuerklasse 5<br>Partner B in Steuerklasse 3 | 1 000 € | 350 € |

Sie können sehen, dass die Wahl der Steuerklassen die zu zahlende Lohnsteuer stark beeinflusst. Sind beide Partner in der Steuerklasse 4, so zahlen beide Partner jeweils 700 € Lohnsteuern. Ist ein Partner stattdessen in Steuerklasse 3, so zahlt sie/er 350 € Lohnsteuern. In Steuerklasse 5 werden 1000 € Lohnsteuern fällig. Wie Sie sehen: Ihre individuell gezahlte Lohnsteuer hängt stark von der gewählten Steuerklasse ab. Aber auch die Lohnsteuer Ihres Partners wird stark durch die Steuerklassenwahl beeinflusst. Waren Ihnen die folgenden Informationen schon bekannt? Bitte antworten Sie ehrlich. Denken Sie daran, dass Ihre Auszahlung in dieser Umfrage nicht von Ihren Antworten auf die Fragen abhängt. (Ja, Nein, Ich verstehe die Aussage nicht)

(Ich wusste, dass die Wahl der Steuerklasse die eigene Lohnsteuer beeinflusst, Ich wusste, dass die Wahl der Steuerklasse die Lohnsteuer meines Partners beeinflusst, Ich wusste, dass es Steuerklassenkombinationen gibt, bei der einer der beiden Partner deutlich mehr und der andere Partner deutlich weniger Lohnsteuern zahlt – selbst wenn beide Partner gleich viel verdienen)

*Page Break*

**D11** Bitte nehmen Sie sich ausreichend Zeit, um auch die folgende Information zu verstehen. Die finale Steuerlast eines Paares wird durch die Einkommensteuer bestimmt. In der Tabelle

können Sie sehen, dass Steuerklassen keine Auswirkungen auf die Einkommensteuer, und somit auf die finale Steuerlast eines Ehepaares, haben. Nur die Lohnsteuer wird durch die Steuerklassenwahl beeinflusst:

| | Monatliche Lohnsteuer Partner A | Monatliche Lohnsteuer Partner B | Gemeinsame jährliche Einkommensteuerlast |
|---|---|---|---|
| Partner A in Steuerklasse 3 Partner B in Steuerklasse 5 | 350 € | 1 000 € | 16 300 € |
| Partner A in Steuerklasse 4 Partner B in Steuerklasse 4 | 700 € | 700 € | 16 300 € |
| Partner A in Steuerklasse 5 Partner B in Steuerklasse 3 | 1 000 € | 350 € | 16 300 € |

Die monatlich von Ihnen als Paar gezahlte Lohnsteuer wird am Jahresende mit der Einkommensteuer verrechnet. Wenn also Ihre gezahlte Lohnsteuer höher ist als die zu zahlende Einkommensteuer, bekommen Sie am Jahresende eine Steuerrückzahlung. Und, andersherum, wenn Sie mehr Einkommensteuer zahlen müssen als Sie Lohnsteuer gezahlt haben, müssen Sie eine Steuernachzahlung leisten. Für das Paar in dem Beispiel bedeutet dies, dass es unabhängig von der gewählten Steuerklasse jährlich immer 16 300 € Einkommensteuern zahlt. Steuerklassen haben also keine Auswirkungen auf die finale Steuerlast eines Ehepaares, sondern nur auf die Lohnsteuer. Waren Ihnen die folgenden Informationen schon bekannt? Bitte antworten Sie ehrlich. Denken Sie daran, dass Ihre Auszahlung in dieser Umfrage nicht von Ihren Antworten auf die Fragen abhängt. (Ja, Nein, Ich verstehe die Aussage nicht)

(Ich wusste, dass die gezahlte Lohnsteuer nicht die finale Steuerlast beeinflusst, Ich wusste, dass die Steuerklassenwahl nicht die finale Steuerlast beeinflusst)

*Page Break*

**D12** Stellen Sie sich vor, dass Sie 40.000 € und Ihr Ehepartner 70.000 € brutto pro Jahr verdienen und dass Sie eine gemeinsame Steuererklärung machen. Bei welcher Steuerklassenkombination tragen Sie als Paar zusammen die geringste jährliche finale Steuerlast (entspricht der Einkommensteuer)? Alle drei genannten Steuerklassenkombinationen existieren.

(Ich in Steuerklasse 5 und mein Partner in Steuerklasse 3, Ich in Steuerklasse 4 und mein Partner in Steuerklasse 4, Ich in Steuerklasse 3 und mein Partner in Steuerklasse 5, Egal, Weiß nicht)

*Page Break*

**D13a** Steuerklassen haben also keine Auswirkungen auf die finale Steuerlast eines Ehepaares, nur auf die Lohnsteuer. Stellen Sie sich mit diesem Wissen nun vor, dass Ihr Arbeitgeber Ihnen eine freie Wahl Ihrer wöchentlichen Arbeitsstunden anbietet: Wie würden Sie sich entscheiden?

(Ich würde meine Arbeitsstunden erhöhen, Ich würde meine Arbeitsstunden verringern, Ich würde meine Arbeitsstunden unverändert lassen, Weiß nicht)

**D13b** Steuerklassen haben keine Auswirkungen auf die finale Steuerlast eines Ehepaares, nur auf die Lohnsteuer. Stellen Sie sich mit diesem Wissen nun vor, dass Ihr Arbeitgeber Ihnen in der Vergangenheit eine freie Wahl Ihrer wöchentlichen Arbeitsstunden angeboten hätte. Wie hätten Sie sich entschieden?

(Ich hätte meine Arbeitsstunden erhöht, Ich hätte meine Arbeitsstunden verringert, Ich hätte meine Arbeitsstunden unverändert gelassen, Weiß nicht)

**D13c** Steuerklassen haben keine Auswirkungen auf die finale Steuerlast eines Ehepaares, nur auf die Lohnsteuer. Wie wirkt sich dieses Wissen auf Ihre bevorzugte Steuerklassenwahl aus?

(Ich würde meine Steuerklasse gerne ändern, Ich würde meine Steuerklasse gerne beibehalten, Weiß nicht)

**D14** Beeinflussen Steuerklassen folgende staatliche Leistungen? (Ja, Nein, Weiß nicht)

(Rente, Arbeitslosengeld II/Hartz IV, Arbeitslosengeld I, Elterngeld, Wohngeld, Kurzarbeitergeld)

*Page Break*

**D15** Die nächste Frage betrifft folgendes Problem: In Umfragen wie unserer gibt es manchmal Teilnehmerinnen und Teilnehmer, die die Fragestellungen nicht sorgfältig durchlesen, sondern sich nur schnell durch die Umfrage klicken. Dies führt zu vielen zufälligen Antworten, die die Qualität der Forschungsvorhaben beeinträchtigen. Bitte wählen Sie "Fast gar nicht interessiert" und "Stark interessiert" als Ihre Antwort auf die kommende Frage, um uns zu zeigen, dass Sie unsere Fragen sorgfältig lesen. Gegeben dieser Information, wie interessiert sind Sie am Thema Steuern?

(Überhaupt nicht interessiert, Fast gar nicht interessiert, Etwas interessiert, Stark interessiert, Sehr stark interessiert)

*Page Break*

**D16a** Haben Sie als Ehepaar ein gemeinsames Bankkonto? (Ja, Nein, Weiß nicht)

**D16b** Wohin überweist Ihr Arbeitgeber Ihren monatlichen Lohn? (Auf mein persönliches Bankkonto, Auf das Bankkonto meines Ehepartners, Auf ein Bankkonto, das ich mit meinem Ehepartner teile, Weiß nicht)

**D16c** Wohin überweist der Arbeitgeber Ihres Ehepartners den monatlichen Lohn? (Auf mein persönliches Bankkonto, Auf das Bankkonto meines Ehepartners, Auf ein Bankkonto, das ich mit meinem Ehepartner teile, Mein Ehepartner ist selbstständig oder arbeitet nicht, Weiß nicht)

*Page Break*

**If D16a == Ja And D16b == Auf mein persönliches Bankkonto**

**D16d** Wie viel Prozent Ihres monatlich von Ihrem Arbeitgeber überwiesenen Lohneinkommens transferieren Sie auf das gemeinsame Konto? (0 % - 20 %, 20 % - 40 %, 40 % - 60 %, 60 % - 80 %, 80 % - 100 %, Weiß nicht)

**If D16a == Ja And D16b == Auf das Bankkonto meines Ehepartners**

**D16e** Wie viel Prozent seines monatlich von seinem Arbeitgeber überwiesenen Lohneinkommens transferiert Ihr Ehepartner auf das gemeinsame Konto? (0 % - 20 %, 20 % - 40 %, 40 % - 60 %, 60 % - 80 %, 80 % - 100 %, Weiß nicht)

**If D16a == Ja**

**D16f** Haben Sie noch besondere Absprachen für Ihr gemeinsames Konto getroffen? Falls ja, erklären Sie bitte noch genauer, wie Sie Ihr gemeinsames Konto verwalten. Falls Sie keine besonderen Absprachen getroffen haben, lassen Sie das Freifeld gerne einfach frei.

*Page Break*

**D17a** Geben Sie und Ihr Partner üblicherweise eine Steuererklärung ab? (Ja. Mein Partner und ich veranlagen gemeinsam, Ja. Mein Partner und ich veranlagen getrennt, Ja. Aber ich weiß nicht, ob wir getrennt oder gemeinsam veranlagen, Nein, Weiß nicht)

*Page Break*

**If D17a == Ja:**

**D17b** Wie machen Sie und Ihr Partner üblicherweise Ihre Steuererklärung? Mehrere Ja-Antworten sind möglich. (Ja, Nein, Weiß nicht)

(Ich mache die Steuererklärung überwiegend alleine, Mein Ehepartner macht die Steuererklärung überwiegend alleine, Wir machen die Steuererklärung gemeinsam, Wir nutzen die Hilfe einer Steuerberaterin/eines Steuerberaters, Wir nutzen die Hilfe eines Steuerprogramms wie etwa WISO, Wir nutzen die Hilfe anderer Personen)

*Page Break*

**If D17a == Ja:**

**D17c** Auf welches Bankkonto werden potentielle Steuererstattungen überwiesen? (Mein Konto, Das Konto meines Ehepartners, Ein gemeinsames Konto, Weiß nicht)

*Page Break*

**If D17a == Nein**

**D17d** Warum geben Sie keine Steuererklärung ab? Mehrere Ja-Antworten sind möglich. (Ja, Nein) (Es ist mir zu viel Arbeit, Ich weiß nicht, wie man das macht, Es lohnt sich für mich kaum, Ich habe Angst, dass ich Steuern nachzahlen muss)

*Page Break*

**D18** Auf einer Skala von 1 bis 7, wie sehr stimmen Sie den folgenden Aussagen zu? 7 bedeutet, dass Sie der entsprechenden Aussage voll zustimmen. 1 bedeutet, dass Sie der entsprechenden Aussage überhaupt nicht zustimmen. (1 Stimme überhaupt nicht zu, 2, 3, 4, 5, 6, 7 Stimme voll zu)

(Der Ehemann sollte zu Hause das letzte Wort haben., Am besten ist es, wenn der Ehemann und die Ehefrau beide gleich viel erwerbstätig sind und sich beide in gleichem Maße um Haushalt und Familie kümmern., Männer sollten sich stärker um die finanzielle Absicherung der Familie kümmern als Frauen.)

*Page Break*

**D19** Wie alt sind Sie? (Jünger als 20, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-60, 61 oder älter)

**D20** Was ist Ihr höchster schulischer/akademischer Bildungsabschluss? (Ohne allgemeinen Schulabschluss, Hauptschulabschluss, Mittlere Reife, Fachhochschul- oder Hochschulreife (Abitur), Bachelor, Master/Diplom/Staatsexamen, Promotion)

**D21** Haben Sie mindestens ein minderjähriges Kind? (Ja, Nein, Keine Angabe)

*Page Break*

**D22** Haben Sie häufiger das Gefühl, dass das Geld vor der Überweisung des nächsten Gehalts knapp wird? (Ja, Nein, Diese Frage möchte ich nicht beantworten)

*Page Break*

**D23** Wie hoch ist Ihr Bruttoeinkommen aus Lohnarbeit pro Jahr? Für die Beantwortung dieser Frage können Sie gerne in Ihren Unterlagen nachschauen.

(Ich habe kein Lohneinkommen, 1 € - 10.000 €, 10.001 € - 20.000 €, 20.001 € - 30.000 €, 30.001 € - 40.000 €, 40.001 € - 50.000 €, 50.001 € - 60.000 €, 60.001 € - 70.000 €, 70.001 € - 80.000 €, 80.001 € - 90.000 €, 90.001 € - 100.000 €, 100.001 € - 110.000 €, 110.001 € - 120.000 €, Über 120.000 €, Weiß nicht / Keine Angabe)

**D24a** Wie hoch ist das Bruttoeinkommen Ihres Ehepartners aus Lohnarbeit pro Jahr? Für die Beantwortung dieser Frage können Sie gerne in Ihren Unterlagen nachschauen oder Ihren Ehepartner fragen.

(Mein Ehepartner arbeitet nicht, Mein Ehepartner ist selbstständig, 1 € - 10.000 €, 10.001 € - 20.000 €, 20.001 € - 30.000 €, 30.001 € - 40.000 €, 40.001 € - 50.000 €, 50.001 € - 60.000 €, 60.001 € - 70.000 €, 70.001 € - 80.000 €, 80.001 € - 90.000 €, 90.001 € - 100.000 €, 100.001 € - 110.000 €, 110.001 € - 120.000 €, Über 120.000 €, Weiß nicht / Keine Angabe)

**If D24a == Mein Ehepartner ist selbstständig**

**D24b** Wie viel verdient Ihr Ehepartner in selbstständiger Arbeit pro Jahr brutto? Für die Beantwortung dieser Frage können Sie gerne in Ihren Unterlagen nachschauen oder Ihren Ehepartner fragen.

(1 € - 10.000 €, 10.001 € - 20.000 €, 20.001 € - 30.000 €, 30.001 € - 40.000 €, 40.001 € - 50.000 €, 50.001 € - 60.000 €, 60.001 € - 70.000 €, 70.001 € - 80.000 €, 80.001 € - 90.000 €, 90.001 € - 100.000 €, 100.001 € - 110.000 €, 110.001 € - 120.000 €, Über 120.000 €, Weiß nicht / Keine Angabe)

**D25** Wie hoch ist Ihre durchschnittliche wöchentliche Arbeitszeit in Stunden?

**D26** Wie hoch ist die durchschnittliche wöchentliche Arbeitszeit Ihres Ehepartners in Stunden?

*Page Break*

**A27** Haben Sie irgendwelche Anmerkungen zur Umfrage oder zu dem Thema Lohnsteuerklassen?

### C.4.2 English Version

Hello and welcome!

We are researchers at the Universities of Bonn and Gothenburg and would like to thank you in advance for taking part in our survey and for thereby supporting our research! Your responses to the survey will not affect your personal payout. We would therefore like to ask you to answer all questions without using any tools (internet research, etc.).

Who is responsible for the study?

Contact details

What is the purpose of the study?

The purpose of the study is to examine economic behavior. As is usual with economic studies, there is no comprehensive explanation of the research background beforehand.

What happens to my data?

Of course, all employees and scientists involved work in accordance with the provisions of the General Data Protection Regulation, the Federal Data Protection Act and the relevant state data protection laws. The data is stored on a server of the University of Bonn within the EU. Your data will be anonymized after the payment has been made and then statistically evaluated. No conclusions can be drawn about you from the results.

What rights do I have?

You have the right to receive information about the data stored about you (Art. 15 DS-GVO). If incorrect personal data is processed, you have the right to rectification (Art. 16 DS-GVO).

If the legal requirements are met, you can request the deletion or restriction of processing and object to the processing (Art. 17, 18 and 21 DS-GVO). You have the right to lodge a complaint with the competent supervisory authority for data protection. You can revoke the consent given here at any time with effect for the future. However, if your data has already been anonymized, it can no longer be assigned to you. We can therefore not "remove" your information from the result.

Declaration of consent

I hereby consent to the processing of my personal data for the research project. I can revoke my consent at any time. I have taken note of the information on the use of my data and my rights in the data protection declaration.

I agree. (Yes, No)

*Page break*

Screening

**S1** Do you currently have wage income? (Yes, No)

**S2** Are you married? (Yes, No)

*Page break*

**A1a** What is your gender? (Female, Male, Diverse)

**A1b** What is the gender of your spouse? (Female, Male, Diverse, I have no spouse, No answer)

*Page break*

**A2** The next question concerns the following problem: In surveys like ours, there are sometimes participants who do not read the questions carefully, but just click through the survey quickly. This leads to a lot of random answers, which affects the quality of the research projects. Please choose "Very interested" and "Not at all interested" as your answer to the upcoming question to show us that you are reading our questions carefully. Given this information, how interested are you in taxes?

(Not at all interested, Slightly interested, Somewhat interested, Interested, Very interested)

*Page break*

**A3** Imagine that your employer offered you a free choice of your weekly working hours: How would you decide? (I would increase my hours, I would decrease my hours, I would keep my hours the same, Don't know)

*Page break*

**D4** What is your current withholding tax class? (1, 2, 3, 4, 4 with factor, 5, 6, don't know)

**D5** Who decided the withholding tax class? (Me, My Spouse, My Spouse and I Together, An Accountant, Another Person, Nobody, Don't Know)

*Page break*

**E_Text** We now want to find out more about your general understanding of withholding tax classes, so the following questions are not about your own withholding tax class.

*Page break*

**D6** Do the following withholding tax class combinations exist (your spouse named first, you named second)? (yes, no, don't know)

(4/4, 5/4, 3/5, 5/5, 4/1, 3/3, 4/5, 5/3, 1/4)

**If D4 == "4 with factor":**

(4/4, 5/4 , 3/5 , 5/5 , 4/1 , 3/3 , 4/5 , 5/3 , 1/4, 4 with factor/3, 4 with factor/4 with factor , 3/4 with factor, 5/4 with factor, 4 with factor/5)

*Page break*

**D7** Imagine that you earn €60,000 and your spouse €30,000 gross per year and that you file a joint tax return. In which withholding tax class combination do you as a couple bear the lowest final annual tax burden (corresponds to income tax)? All three withholding tax class combinations mentioned exist.

(I in withholding tax class 5 and my partner in withholding tax class 3, I in withholding tax class 4 and my partner in withholding tax class 4, I in withholding tax class 3 and my partner in withholding tax class 5, doesn't matter, don't know)

*Page break*

**D8** Now suppose you were in withholding tax class 4. Which is correct? If you now switch from 4 to 3, you will personally receive monthly...

(...more net from your employer, ...less net from your employer, ...same amount net from your employer, don't know)

*Page break*

**D9** Now suppose you were in withholding tax class 4. Which is correct? If you now switch from 4 to 5, you will personally receive monthly...

(...more net from your employer, ...less net from your employer, ...same amount net from your employer, don't know)

*Page break*

**D10** Please take enough time to understand the following information. The table shows an example of the payroll tax depending on the withholding tax classes for a couple where both partners earn a gross monthly income of €3,500.

| | Monatliche Lohnsteuer Partner A | Monatliche Lohnsteuer Partner B |
|---|---|---|
| **Partner A in Steuerklasse 3** **Partner B in Steuerklasse 5** | 350 € | 1 000 € |
| **Partner A in Steuerklasse 4** **Partner B in Steuerklasse 4** | 700 € | 700 € |
| **Partner A in Steuerklasse 5** **Partner B in Steuerklasse 3** | 1 000 € | 350 € |

You can see that the choice of withholding tax class greatly affects the payroll tax you pay. If both partners are in withholding tax class 4, both partners each pay €700 in payroll tax. If a partner is in withholding tax class 3 instead, she/he pays €350 in payroll tax. In withholding tax class 5, €1,000 in payroll tax is due. As you can see, the payroll tax you pay depends heavily on the withholding tax class you choose. But your partner's payroll tax is also strongly influenced by the choice of withholding tax class. Did you already know the following information? Please answer honestly. Remember that your payout in this survey is not dependent on your answers to the questions. (Yes, No, I don't understand the statement)

(I knew that the choice of withholding tax class affects my own payroll tax, I knew that the choice of withholding tax class influences my partner's payroll tax, I knew that there are withholding tax class combinations where one of the two partners pays significantly more and the other partner significantly less pays payroll taxes – even if both partners earn the same amount)

**D11** Please take enough time to understand the following information. The final tax burden of a couple is determined by the income tax. In the table you can see that withholding tax classes have no effect on the income tax and therefore on the final tax burden of a married couple. Only the payroll tax is affected by the withholding tax class selection:

| | Monatliche Lohnsteuer Partner A | Monatliche Lohnsteuer Partner B | Gemeinsame jährliche Einkommensteuerlast |
|---|---|---|---|
| Partner A in Steuerklasse 3 Partner B in Steuerklasse 5 | 350 € | 1 000 € | 16 300 € |
| Partner A in Steuerklasse 4 Partner B in Steuerklasse 4 | 700 € | 700 € | 16 300 € |
| Partner A in Steuerklasse 5 Partner B in Steuerklasse 3 | 1 000 € | 350 € | 16 300 € |

The payroll tax you pay monthly as a couple is offset against the income tax at the end of the year. So if your paid payroll tax is higher than the income tax to be paid, you will receive a tax refund at the end of the year. And, vice versa, if you have to pay more income tax than you paid payroll tax, you have to make an additional tax payment. For the couple in the example, this means that they always pay €16,300 in income tax annually, regardless of the withholding tax class they choose. withholding Tax classes therefore have no effect on the final tax burden of a married couple, but only on the payroll tax. Did you already know the following information? Please answer honestly. Remember that your payout in this survey is not dependent on your answers to the questions. (Yes, No, I don't understand the statement)

(I knew that the payroll tax paid does not affect the final tax burden, I knew that the choice of withholding tax classes does not affect the final tax burden)

**D12** Imagine that you earn €40,000 and your spouse €70,000 gross per year and that you file a joint tax return. In which withholding tax class combination do you as a couple bear the lowest final annual tax burden (corresponds to income tax)? All three withholding tax class combinations mentioned exist.

(me in withholding tax class 5 and my partner in withholding tax class 3, me in withholding tax class 4 and my partner in withholding tax class 4, me in withholding tax class 3 and my partner in withholding tax class 5, whatever, don't know)

**D13a** Withholding Tax classes therefore have no effect on the final tax burden of a married couple, only on the payroll tax. Now, knowing this, imagine that your employer offered you a free choice of your weekly working hours: How would you decide?

(I would increase my hours, I would decrease my hours, I would keep my hours the same, Don't know)

**D13b** Withholding tax classes have no effect on the final tax burden of a married couple, only on the payroll tax. Now, knowing this, imagine that in the past your employer would have offered you a free choice of your weekly work hours. How would you have decided?

(I would have increased my hours, I would have decreased my hours, I would have left my hours unchanged, Don't know)

**D13c** Withholding tax classes have no effect on a married couple's final tax burden, only on the payroll tax. How does this knowledge affect your preferred withholding tax class choice?

(I would like to change my withholding tax class, I would like to keep my withholding tax class, Don't know)

**D14** Do withholding tax classes affect the following government benefits? (yes, no, don't know)

(Pension, unemployment benefit II/Hartz IV, unemployment benefit I, parental benefit, housing benefit, short-time work benefit)

**D15** The next question concerns the following problem: In surveys like ours, there are sometimes participants who do not read the questions carefully, but just click through the survey quickly. This leads to a lot of random answers, which affects the quality of the research projects. Please choose "Slightly interested" and "Very interested" as your answer to the next question to show us that you are reading our questions carefully. Given this information, how interested are you in taxes?

(Not at all interested, Slightly interested, Somewhat interested, Interested, Very interested)

**D16a** As a married couple, do you have a joint bank account? (yes, no, don't know)

**D16b** Where does your employer transfer your monthly wages to? (To my personal bank account, To my spouse's bank account, To a bank account I share with my spouse, Don't know)

**D16c** Where does your spouse's employer transfer the monthly salary to? (To my personal bank account, To my spouse's bank account, To a bank account I share with my spouse, My spouse is self-employed or does not work, Don't know)

*Page break*

**If D16a == Yes And D16b == To my personal bank account**

**D16d** What percentage of your monthly wage income transferred from your employer do you transfer to the joint account? (0% - 20%, 20% - 40%, 40% - 60%, 60% - 80%, 80% - 100%, Don't know)

**If D16a == Yes And D16b == To my spouse's bank account**

**D16e** What percentage of his/her monthly wages transferred from his/her employer does your spouse transfer to the joint account? (0% - 20%, 20% - 40%, 40% - 60%, 60% - 80%, 80% - 100%, Don't know)

**If D16a == Yes**

**D16f** Have you made any special arrangements for your joint account? If so, please explain in more detail how you manage your joint account. If you have not made any special arrangements, please feel free to leave the free field empty.

*Page break*

**D17a** Do you and your partner usually file a tax return? (Yes. My partner and I file taxes jointly, Yes. My partner and I file taxes separately, Yes. But I don't know if we file our taxes separately or jointly, No, Don't know)

*Page break*

**If D17a == Yes:**

**D17b** How do you and your partner usually file your tax return? Several yes answers are possible. (yes, no, don't know)

(I mostly file the tax return alone, my spouse mostly files the tax return alone, we file the tax return together, we use the help of a tax consultant, we use the help of a tax program such as WISO, we use the help of other people)

*Page break*

**If D17a == Yes:**

**D17c** To which bank account are potential tax refunds transferred? (My Account, My Spouse's Account, A Joint Account, Don't Know)

*Page break*

**If D17a == No**

**D17d** Why don't you file a tax return? Several yes answers are possible. (Yes, No) (It's too much work for me, I don't know how to do it, It's hardly worth it for me, I'm afraid I'll have to pay more taxes)

*Page break*

**D18** On a scale from 1 to 7, how much do you agree with the following statements? 7 means that you fully agree with the corresponding statement. 1 means that you completely disagree with the corresponding statement. (1 Strongly Disagree, 2, 3, 4, 5, 6, 7 Strongly Agree)

(The husband should have the last word at home., It is best if the husband and wife both work an equal amount and both take care of the household and family equally., Men should take more care of the financial security of the family than women.)

*Page break*

**D19** How old are you? (Under 20, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-60, 61 or older)

**D20** What is your highest school/academic qualification? (Without general school leaving certificate, secondary school leaving certificate, higher secondary school leaving certificate or higher education entrance qualification (Abitur), bachelor, master/diploma/state examination, doctorate)

**D21** Do you have at least one minor child? (Yes, No, Not specified)

*Page break*

**D22** Do you often have the feeling that money is running out before you receive your next salary? (Yes, No, I don't want to answer this question)

*Page break*

**D23** What is your gross income from wage labor per year? You are welcome to consult your documents to answer this question.

(I have no wage income, €1 - €10,000, €10,001 - €20,000, €20,001 - €30,000, €30,001 - €40,000, €40,001 - €50,000, €50,001 - €60,000, €60,001 - €70,000, - €80,000, €80,001 - €90,000, €90,001 - €100,000, €100,001 - €110,000, €110,001 - €120,000, over €120,000, don't know / no answer)

**D24a** What is your spouse's gross income from wage labor per year? To answer this question, you are welcome to consult your records or ask your spouse.

(My spouse does not work, My spouse is self-employed, €1 - €10,000, €10,001 - €20,000, €20,001 - €30,000, €30,001 - €40,000, €40,001 - €50,000, €50,001 - €60,000, €60,001 - €70,000, €70,001 - €80,000, €80,001 - €90,000, €90,001 - €100,000, €100,001 - €110,000, €110,001 - €120,000, over €120,000, don't know / no answer)

**If D24a == My spouse is self-employed**

**D24b** How much does your spouse earn gross per year in self-employment? To answer this question, you are welcome to consult your records or ask your spouse.

(€1 - €10,000, €10,001 - €20,000, €20,001 - €30,000, €30,001 - €40,000, €40,001 - €50,000, €50,001 - €60,000, €60,001 - €70,000, €70,001 - €70,001.1 € - 90,000 €, €90,001 - €100,000, €100,001 - €110,000, €110,001 - €120,000, Over €120,000, Don't know / no answer)
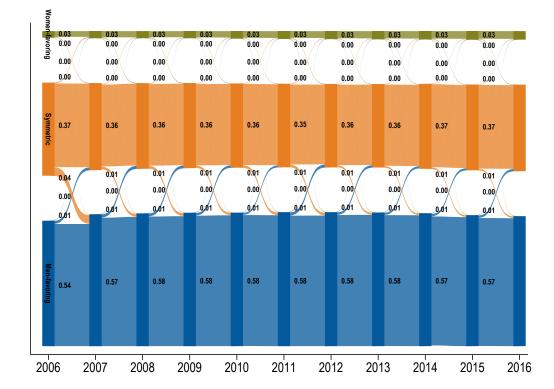
*Page break*

**D25** What are your average weekly working hours?

**D26** What are the average weekly working hours of your spouse?

*Page break*

**A27** Do you have any comments on the survey or on the subject of withholding tax classes?

# Appendix D    Additional Descriptive Statistics



Figure D.1: Changes in the Choice of Withholding Tax Classes over Time

*Notes:* The figure displays the share of couples in the three different withholding tax schedules and the transitions between the different withholding tax schedules over time. The graph uses information on all couples in the 5 % sample of the TPP, and no sample restrictions are applied. The figure shows that the choice of withholding tax schedules is relatively stable over time. Only a few couples change between withholding tax schedules and they typically stick with their choice of withholding tax schedules. Note that we only consider direct transitions between withholding tax schedules. We do not include cases where couples do not file their taxes in a specific year and later reenter the dataset with a different withholding tax schedule. The difference in the shares to Figure 4 stems from the changed data composition. While this figure has no sample restrictions, the right side of Figure 4 documents the share only for couples where both spouses are working.

Table D.1: Descriptive Statistics for the Year 2009

|  | Men-Favoring | Symmetric |
|---|---|---|
| Income Wife | 19949.01 | 33411.34 |
|  | (8909.25) | (13820.28) |
| Income Husband | 49192.86 | 39399.81 |
|  | (17347.79) | (15881.09) |
| Female Income Share | 0.29 | 0.46 |
|  | (0.09) | (0.11) |
| Age Wife | 46.9 | 47.1 |
|  | (5.83) | (6.44) |
| Age Husband | 49.16 | 49.11 |
|  | (5.98) | (6.41) |
| Eastern Germany | 0.07 | 0.34 |
|  | (0.26) | (0.47) |
| Has a Child | 0.53 | 0.24 |
|  | (0.5) | (0.43) |
| Number of Children | 1.21 | 0.64 |
|  | (0.94) | (0.82) |
| Catholic Wife | 0.39 | 0.22 |
|  | (0.49) | (0.42) |
| Catholic Husband | 0.37 | 0.2 |
|  | (0.48) | (0.4) |
| Public Servant Wife | 0.12 | 0.14 |
|  | (0.32) | (0.34) |
| Public Servant Husband | 0.22 | 0.18 |
|  | (0.42) | (0.38) |
| N | 11366 | 11867 |

*Notes:* The table displays descriptive statistics for the year 2009 for the unbalanced panel for couples who picked either the men-favoring or symmetric withholding tax schedule. They are calculated based on the sample restrictions outlined in Section 3.2. Specifically, we focus on households with dual earners in 2009, in which both partners have received no unemployment benefits and short-time work compensations in 2009, are between 20 and 60 years old in 2009, have no income from self-employment of more than 1,000 € in 2009 and whose incomes were stable between 2006 and 2009, i.e., the income for both household members fluctuated by less than 25 % from one year to the other.

Table D.2: Determinants of the Choice of Withholding Tax Schedules

|  | Choice of Men-Favoring Schedule |
|---|---|
| Eastern Germany | −0.221***<br>(0.011) |
| Female Income Share | −0.017***<br>(0.001) |
| Income Wife (1000 Euro) | −0.005***<br>(0.001) |
| Income Husband (1000 Euro) | −0.0<br>(0.00) |
| Has a Child | 0.113***<br>(0.011) |
| Number of Children | 0.058***<br>(0.006) |
| Catholic Wife | 0.005<br>(0.01) |
| Catholic Husband | 0.027***<br>(0.01) |
| Public Servant Wife | 0.031***<br>(0.012) |
| Public Servant Husband | 0.008<br>(0.01) |
| Age Wife | 0.003**<br>(0.001) |
| Age Husband | 0.005***<br>(0.001) |
| Commuting Days Wife (100 days) | −0.005<br>(0.004) |
| Commuting Days Husband (100 days) | −0.0<br>(0.004) |
| Commuting Distance Wife (100 km) | 0.009<br>(0.027) |
| Commuting Distance Husband (100 km) | 0.012<br>(0.017) |
| Constant | 0.891***<br>(0.054) |
| N | 11039.0 |
| Adj. $R^2$ | 0.51 |

*Notes:* The table displays which characteristics of a couple are predictive for the choice of the men-favoring schedule instead of the symmetric schedule. The coefficients stem from the regression of a dummy indicating the men-favoring schedule on various characteristics of couples in the year 2009, just before the withholding tax reform, using the balanced sample. Heteroscedasticity-robust standard errors are displayed in brackets.
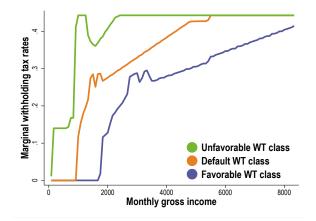
Figure D.2: Marginal Withholding Tax Rates 2009

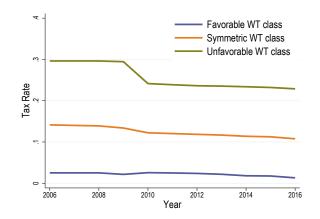*Notes:* The figure plots the marginal withholding tax rates by withholding tax class in 2009.



Figure D.3: Development of the Average Withholding Tax Rate

*Notes:* The figure plots the size of withholding tax payments depending on the withholding tax class for the period from 2006 to 2016. It illustrates for an income of 25,000 € that there were no other major reforms changing withholding tax payments except for the 2010 reform that we study in this paper. The same holds true for all other incomes.

# Appendix E  Additional Regression Results

Table E.1: Static Diff-in-Diff Results

|  | Women | | Men | |
|---|---|---|---|---|
|  | (1) | (2) | (3) | (4) |
| DiD Estimate | 0.055*** | 0.048** | 0.026** | 0.016 |
|  | (0.020) | (0.020) | (0.012) | (0.013) |
| Cell FE |  | ✓ |  | ✓ |
| N | 212,547 | 212,547 | 212,547 | 212,547 |
| Adj. R-Squared | 0.090 | 0.117 | 0.073 | 0.089 |

*Notes:* The table displays the results of the static diff-in-diff estimation as laid out in Equation 1 using the unbalanced sample. All regressions include individual fixed effects and control for potentially time-varying characteristics of the couple. Cell fixed effects control for binned own and spousal pre-reform labor income interacted with dummies for parenthood, residence in East Germany, and years. Results using the balanced estimation sample can be found in Table 4. Standard errors are clustered on the individual level. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.



(a) Effect on Female Log Income
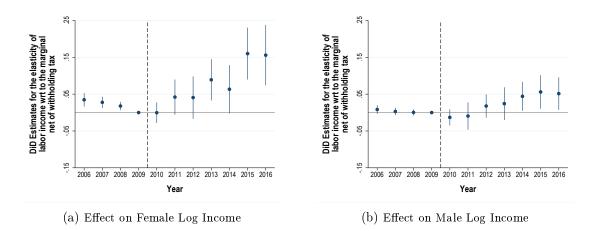


(b) Effect on Male Log Income

Figure E.1: Event Study Diff-in-Diff Estimates

*Notes:* The figure plots the estimates for the elasticity of labor income with respect to the withholding tax estimated based on the dynamic version of Equation 1 for women and men using the unbalanced sample. The dependent variable is the log income of the individual, and the independent variable is the treatment intensity. Treatment intensity is defined as the percent change in the marginal net-of-withholding-tax rate of the woman induced by the reform of the withholding tax in 2010. All regressions include individual fixed effects and control for potentially time-varying characteristics of the couple. Cell fixed effects control for binned own and spousal pre-reform labor income interacted with dummies for parenthood, residence in East Germany, and years. Confidence intervals are plotted at the 95 % level and based on heteroscedasticity-robust standard errors. Note that the sample excludes households, where at least one member experienced a drop in income by more than 25 % from one year to the next before 2010 to ensure that no individuals directly hit by the financial crises are part of the sample. This explains the smaller standard errors before the reform. The underlying regression coefficients can be found in in columns (2) and (4) of Table E.3.

Table E.2: Event Study Diff-in-Diff Results

|  | Women | | Men | |
|---|---|---|---|---|
|  | (1) | (2) | (3) | (4) |
| 2006 | 0.026** | 0.018 | 0.024*** | 0.027*** |
|  | (0.011) | (0.011) | (0.008) | (0.008) |
| 2007 | 0.016* | 0.010 | 0.007 | 0.009 |
|  | (0.009) | (0.009) | (0.007) | (0.007) |
| 2008 | 0.011* | 0.013* | 0.007 | 0.007 |
|  | (0.006) | (0.007) | (0.005) | (0.006) |
| 2009 | . | . | . | . |
|  | (.) | (.) | (.) | (.) |
| 2010 | 0.025** | 0.019* | 0.009 | 0.005 |
|  | (0.010) | (0.010) | (0.008) | (0.008) |
| 2011 | 0.058*** | 0.052*** | 0.012 | 0.008 |
|  | (0.017) | (0.017) | (0.011) | (0.011) |
| 2012 | 0.085*** | 0.069*** | 0.018 | 0.015 |
|  | (0.022) | (0.022) | (0.013) | (0.014) |
| 2013 | 0.143*** | 0.127*** | 0.025* | 0.021 |
|  | (0.025) | (0.025) | (0.014) | (0.015) |
| 2014 | 0.156*** | 0.133*** | 0.030** | 0.026* |
|  | (0.027) | (0.026) | (0.014) | (0.014) |
| 2015 | 0.190*** | 0.168*** | 0.027* | 0.022 |
|  | (0.028) | (0.027) | (0.016) | (0.017) |
| 2016 | 0.223*** | 0.197*** | 0.025 | 0.025 |
|  | (0.030) | (0.030) | (0.018) | (0.019) |
| Cell FE | | ✓ | | ✓ |
| N | 121,429 | 121,429 | 121,429 | 121,429 |
| Adj. R-Squared | 0.336 | 0.375 | 0.301 | 0.317 |

*Notes:* The table displays the estimates for the elasticity of labor income with respect to the withholding tax estimated based on the dynamic version of Equation 1 for women and men using the balanced sample. The dependent variable is the log income of the individual, and the independent variable is the treatment intensity. Treatment intensity is defined as the percent change in the marginal net-of-withholding-tax rate of the woman induced by the reform of the withholding tax in 2010. All regressions include individual fixed effects and control for potentially time-varying characteristics of the couple. Cell fixed effects control for binned own and spousal pre-reform labor income interacted with dummies for parenthood, residence in East Germany, and years. Note that the sample excludes households, where at least one member experienced a drop in income by more than 25 % from one year to the next before 2010 to ensure that no individuals directly hit by the financial crises are part of the sample. This explains the smaller standard errors before the reform. Standard errors are clustered on the individual level. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table E.3: Event Study Diff-in-Diff Results

| | Women | | Men | |
| --- | --- | --- | --- | --- |
| | (1) | (2) | (3) | (4) |
| 2006 | 0.051*** | 0.035*** | 0.011* | 0.008 |
| | (0.009) | (0.009) | (0.006) | (0.006) |
| 2007 | 0.036*** | 0.028*** | 0.005 | 0.003 |
| | (0.008) | (0.008) | (0.005) | (0.005) |
| 2008 | 0.018*** | 0.018*** | 0.002 | 0.000 |
| | (0.006) | (0.006) | (0.004) | (0.004) |
| 2009 | . | . | . | . |
| | (.) | (.) | (.) | (.) |
| 2010 | 0.001 | -0.000 | -0.004 | -0.013 |
| | (0.014) | (0.014) | (0.011) | (0.011) |
| 2011 | 0.041* | 0.042* | 0.002 | -0.009 |
| | (0.023) | (0.024) | (0.019) | (0.019) |
| 2012 | 0.054* | 0.041 | 0.026 | 0.018 |
| | (0.029) | (0.029) | (0.016) | (0.016) |
| 2013 | 0.108*** | 0.089*** | 0.033 | 0.024 |
| | (0.028) | (0.029) | (0.021) | (0.023) |
| 2014 | 0.097*** | 0.063* | 0.056*** | 0.044** |
| | (0.034) | (0.033) | (0.019) | (0.020) |
| 2015 | 0.184*** | 0.160*** | 0.076*** | 0.056** |
| | (0.036) | (0.036) | (0.021) | (0.023) |
| 2016 | 0.176*** | 0.156*** | 0.069*** | 0.051** |
| | (0.041) | (0.042) | (0.022) | (0.023) |
| Cell FE | | ✓ | | ✓ |
| N | 212,547 | 212,547 | 212,547 | 212,547 |
| Adj. R-Squared | 0.090 | 0.117 | 0.073 | 0.089 |

*Notes:* The table displays the estimates for the elasticity of labor income with respect to the withholding tax estimated based on the dynamic version of Equation 1 for women and men using the unbalanced sample. The dependent variable is the log income of the individual, and the independent variable is the treatment intensity. Treatment intensity is defined as the percent change in the marginal net-of-withholding-tax rate of the woman induced by the reform of the withholding tax in 2010. All regressions include individual fixed effects and control for potentially time-varying characteristics of the couple. Cell fixed effects control for binned own and spousal pre-reform labor income interacted with dummies for parenthood, residence in East Germany, and years. Note that the sample excludes households, where at least one member experienced a drop in income by more than 25 % from one year to the next before 2010 to ensure that no individuals directly hit by the financial crises are part of the sample. This explains the smaller standard errors before the reform. Standard errors are clustered on the individual level. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table E.4: Heterogeneity Analysis: Static Diff-in-Diff Results

| | Women (1) | Men (2) |
|---|---|---|
| *Panel A: East vs. West Germany* | | |
| West | 0.058*** | 0.015 |
| | (0.021) | (0.013) |
| East | -0.032 | 0.030 |
| | (0.053) | (0.036) |
| *Panel B: Level of Pre-Reform Commuting* | | |
| Low Commuting | 0.047** | 0.011 |
| | (0.023) | (0.016) |
| High Commuting | 0.038 | 0.013 |
| | (0.036) | (0.021) |
| *Panel C: Parent vs. Non-Parent* | | |
| Non-Parent | 0.034 | 0.031 |
| | (0.027) | (0.019) |
| Parent | 0.059** | -0.003 |
| | (0.027) | (0.017) |
| *Panel D: Age of Youngest Child* | | |
| Youngest Child below 6 | 0.107 | 0.036 |
| | (0.250) | (0.071) |
| Youngest Child betw. 6 and 18 | 0.058** | -0.004 |
| | (0.027) | (0.017) |
| N | 212,547 | 212,547 |
| Adj. R-Squared | 0.105 | 0.084 |

*Notes:* The table displays the results of the static diff-in-diff estimation as laid out in Equation 1, allowing for treatment heterogeneity by observable characteristics and using the unbalanced sample. All regressions include individual fixed effects and control for potentially time-varying characteristics of the couple. Panel A includes cell fixed effects controlling for binned own and spousal pre-reform labor income interacted with dummies for parenthood, and years. Panel B includes cell fixed effects controlling for binned own and spousal pre-reform labor income interacted with dummies for parenthood, residence in East Germany, and years. Panel C and C include cell fixed effects controlling for binned own and spousal pre-reform labor income interacted with years. Results using the balanced estimation sample can be found in Table 5. Standard errors are clustered on the individual level. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table E.5: Static Diff-in-Diff Results controlling for Average Tax Rate

|  | Women | | Men | |
|---|---|---|---|---|
|  | (1) | (2) | (3) | (4) |
| Marginal WT Rate | 0.048** | 0.038** | 0.016 | 0.017 |
|  | (0.020) | (0.019) | (0.013) | (0.013) |
| Average WT Rate |  | 0.008** |  | -0.009*** |
|  |  | (0.004) |  | (0.003) |
| Cell FE | ✓ | ✓ | ✓ | ✓ |
| N | 212,547 | 210,108 | 212,547 | 210,108 |
| Adj. R-Squared | 0.117 | 0.151 | 0.089 | 0.091 |

*Notes:* The table displays the results of the static diff-in-diff estimation as laid out in Equation 1 while additionally including the change in the average net-of-withholding tax rate as an independent variable. The estimation is performed using the unbalanced sample. All regressions include individual fixed effects and control for potentially time-varying characteristics of the couple. Cell fixed effects control for binned own and spousal pre-reform labor income interacted with dummies for parenthood, residence in East Germany, and years. Results using the balanced estimation sample can be found in Table 6. Standard errors are clustered on the individual level. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.