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Income Taxation and Labor Supply: An Experiment on Couple's Work Effort*

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Abstract

Complementary to microsimulation studies focusing on the impact of labor supply as a choice of hours worked we shed light on another variable that survey data are not capable of taking into account: the choice of work effort. Our aim is to investigate the effect of individual and joint taxation on partners' labor supply within an experimental setting. 116 participants (58 real couples) perform under a piece rate compensation on real effort tasks in two stages. The couple's income is taxed jointly for one stage and individually for the other. Surprisingly, our data reveal that the tax system does not influence behavior of our participants. While the tax effect fades from the spotlight, other effects come to the fore: We demonstrate that satisfaction with income opportunities and gender identity dominate the effects from tax in a couple-context.

JEL-Codes: H31, D13, C93, J16

Keywords: real effort experiment, labor supply, household decision making, taxation of couples, gender, identity economics

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1 Introduction

Widespread criticism toward joint taxation of couples exists throughout the academic literature. It focuses on disincentives for the labor supply of secondary earners (mostly women), in that it imposes higher marginal tax rates on their wages. While most of the European countries abolished joint taxation of couples in favor of individual taxation since the mid-seventies, few countries still adhere to systems of joint taxation (Dingeldey, 2002). As microsimulation studies have already shown, a change from joint to individual taxation would improve married women’s labor market participation (Steiner & Wrohlich, 2004; Bach et al., 2011; Beninger et al., 2007; LaLumia, 2008). In fact, these studies based on panel data focus on labor supply as a choice of hours worked, not capable of taking into account another choice variable: the choice of work effort, which “describes many short-run labor supply decisions” (Dickinson, 1999).¹

Acknowledging work effort, our aim is to investigate the role of individual taxation and joint taxation on couple’s labor supply within an experimental setting with referring to the German “Income Splitting”. In our framed field experiment (Harrison & List, 2004) established heterosexual cohabiting and married couples perform under piece rate on real effort tasks (solving mazes) within a given time with work effort (number of solved mazes) serving as our proxy for labor supply. The couple’s income is taxed jointly for one stage and individually for the other. There are two types of mazes differing in complexity level (hard, easy) with corresponding wages (high, low) and thus determining who is the primary earner (hard mazes with higher piece rate wage) and the secondary earner (easy mazes with lower piece rate wage) within the couple. We vary the assignments of primary and secondary earner by gender across the sessions. Thereby, we contrast situations of male and female breadwinners and their responses to different tax regimes. Prior to performing on this compensated task, each couple has to decide which partner fulfills one compulsory and uncompensated task that is easy but reduces working time for one of them. This task serves as our proxy for housework and provides insights into the allocation of household chores within the couple.

Our experiment contributes to the literature in two ways: First, our experimental data allows us to depict the impact of individual and joint taxation on work effort, which has not been investigated yet. Second, we shed light on “adherence to social groups” postulated by Alm (2011) by assigning the roles of primary and secondary earner within a heterosexual couple randomly for the time of the experiment. Thus, we are able to investigate gender differences in behavioral responses within these roles, that are presumably driven by social norms of men and women within a romantic couple.

Our findings yield important insights into two aspects: Although we found support from inferential statistics for negative effects from joint taxation as opposed to individual taxation on men’s work effort and not on women’s work effort we cannot confirm these findings with results from a regression analysis that controls for the heterogeneity of the non-standard subject pool. Instead, we show that there are other factors beyond purely economic incentives, that drive the behavior of the individuals within the couple. Dissatisfaction with the assigned role affects male secondary earners effort positively and women’s effort negatively. Men’s behavioral prescription to be the breadwinner seems to be stronger than the effect from dissatisfaction that should lead to a decrease of work effort. Women’s behavioral prescription to avoid being the breadwinner does not exclude

¹Although Dickinson (1999) admits that caution is required when generalizing work effort to more traditional measures of labor supply, Doerrenberg & Duncan (2012) conclude that work effort is a good proxy for labor supply.

the effect from dissatisfaction and thus leads them to be less productive. Comparing male and female secondary earners' effort, we can show that men who are satisfied are less productive than female secondary earners, but once they indicate that they would have changed the role if they could, they struggle to solve as many mazes as they could. Another interesting finding is that also being married results in an increase in male's work effort while women decrease their work effort.

The literature review on the tax treatment of the family, behavioral responses to taxes and gender identities in Section 2 is followed by a presentation of the theoretical background in Section 3 and the description of the experiment in Section 4. In Section 5 we present our results, followed by a discussion in Section 6 and concluding remarks in the final section.

2 Review of the Literature

As far as we know, no experimental study focusing on the impact of different tax systems on labor supply of couples is available. However there is a rewarding stand of empirical literature using survey data that refers to the tax treatment of the family and questions how tax rates and wages affect individual labor supply.

Since women's labor supply elasticity is larger than men's in most of the developed countries (Bargain et al., 2011; Blau & Kahn, 2007), it is not surprising that joint taxation which implies a higher marginal tax rate for (mostly female) secondary earners, results in disincentive effects for women's labor supply. There is a range of empirical studies based on the German Socio-Economic Panel (GSOEP) detecting these disincentive effects for secondary earners when comparing joint taxation to a situation of individual taxation.² According to a microsimulation study of Steiner & Wrohlich (2004) a change from joint taxation to individual taxation would increase married women's labor supply. On the contrary, husbands reduce their hours worked, as well as their participation rate, but their labor supply effects are much smaller than the effects for women. Bach et al. (2011) confirm these findings with a more recent database and do not only contrast joint and individual taxation but also take individual taxation with maintenance deduction into account. Their results indicate that only pure individual taxation leads to a considerable increase in married women's labor market participation. Beninger et al. (2007) illustrate that married women's labor supply is actually under-predicted because of using the common unitary approach of economic household models instead of the collective framework to represent the decision of the household: The prediction of changes in labor supply follows the same direction but with different magnitudes (Beninger et al., 2007).

Swenson (1988) was the first to examine labor supply responses to changes in tax rates experimentally. Subjects were asked to press keys on a computer within a fixed time and were paid on a piece-rate base. His results and a replication of the study by Sillamaa (1999) show that subjects decrease their work effort with increasing taxes.

Other real effort experiments investigate the impact of horizontal wage differentials on subject's effort. Gächter & Thöni (2010) show that horizontal wage comparison plays a role in worker's effort decision: Paying one worker less than the other leads to decreasing effort of the low income worker relatively to be paid equally. They refer to the "fair wage-effort hypothesis" by Akerlof & Yellen (1990) and state that fairness considerations play a role. Greiner et al. (2010) support these findings by examining the role of wage transparency on workers' effort. Under private information,

²See LaLumia (2008) for results of a natural experiment in the United States and Crossley & Jeon (2007) for Canada. Both show that similar disincentive effects occur.

no significant differences between effort adjustment after wage changes could be detected. When information about one’s own and peer’s wage is public, high income workers increase their effort in quality and quantity while low income workers increase the number of solved tasks but with a decrease in quality.

The study of Liebig et al. (2010) that uses GSOEP data shows that men evaluate their personal income as unfair when wife’s income is relatively higher, whereas women’s fairness perception is not affected by income differences. They conclude that if men earn less money than their female partners they cannot fulfill society’s expectation toward him of being the male breadwinner next to a female housekeeper.

Bertrand et al. (2013) examine the causes and consequences of income differences within couples in US and Canada. Following the concept of Identity Economics by Akerlof & Kranton (2000), they show that gender identity and the behavioral prescription of ‘a man should earn more than his wife’ and furthermore wife’s aversion earning more than the husband to have an impact on marriage satisfaction, division of housework and women’s labor force participation.

To our knowledge, the investigation of gender differences in behavioral responses that could be driven by social norms has not been focused in real effort experiments yet.

3 Theory and Hypotheses

Firstly, we shed light on the question how different tax systems, namely individual and joint taxation, affect work effort. And second, can we identify gender differences in behavioral responses that presumably are driven by social norms and gendered prescribed behavior?

3.1 Experiment’s Taxsystem and Behavioral Responses to Taxes

In our experiment subject’s piece-rate wage is taxed individually (I) in one stage and jointly (J) in the other. In both cases net wage is $w = w_g - \tau(w_g, E)$ with an exemption (E) and a progressive tax rate(τ). While in individual taxation both partners can gain from the exemption, in joint taxation both partner’s exemption is assigned only to the primary earner (PE). Secondary earner’s (SE) income then is taxed beginning with the first maze. Thus, our tax scheme is designed as individual taxation in both cases, but with differences in basic allowances that lead to different marginal tax rates (Table 1).

The idea of assigning the tax allowance to one partner of the couple is based on the income tax class combination III and V in Germany.³ The one with tax class III receives basic and lump-sum allowances while the one with tax class V can make no use of it. Following Stöwhase (2009), the tax class combination III/V can be regarded as the early realization of the “possibility of (...) income splitting” which normally occurs at the end of the year in the annual assessment of the income tax. Hence, we assume people to have a preference for actual income instead of a year-end lump sum (Stöwhase, 2009).

³The tax class combinations III/V and IV/IV are two possible tax class combinations for married couples in Germany. Tax class combination IV/IV treats spouses as if they were taxed separately.

Table 1: Net Wages

	Individual Taxation	Joint Taxation
Secondary Earner	$w_I^{SE} = w_g^{SE} - \tau(w_g^{SE} - E)$	$w_J^{SE} = w_g^{SE} - \tau(w_g^{SE})$
Primary Earner	$w_I^{PE} = w_g^{PE} - \tau(w_g^{PE} - E)$	$w_J^{PE} = w_g^{PE} - \tau(w_g^{PE} - 2E)$

Following the Intensity Model of Dickinson (1999) we assume that utility is a function of consumption (c), productive hours of work (h_w), and hours of on-the-job-leisure (h_l) with $U_c > 0, U_{h_l} > 0, U_{h_w} < 0$. Hours of work can be denoted with $h = h_l + h_w$. Since we fix hours of work in our experiment, subject's choice variable is h_w : The time participants spend on working on the compensated task within a given time. Subject's budget constraint $F + w_t^r h_w = pc$ is then determined by a fixed show up fee (F), piece-rate wage (w_t^r) conditional on tax system $t \in [I, J]$ and role $r \in [SE, PE]$, and productive hours of work (h_w).

Given that $U_{h_w} < 0$, we assume a positive substitution effect, an increase in work effort, when net wage increases due to a lower marginal tax rate.⁴ We expect secondary earners to solve more mazes when they are taxed individually than jointly. Primary earners by contrast face a reduction in marginal tax rate and a rise in net wage when taxed jointly. We therefore assume their effort to be higher in case of joint taxation than in case of individual taxation.

Since women's labor supply elasticity is empirically proven to be larger than men's in most of the developed countries (Bargain et al., 2011; Blau & Kahn, 2007), one might assume to find gender differences in behavioral responses to taxes also in our experimental setting. Can we support these findings when investigating the choice of work effort or work intensities instead of the choice of hours worked as a measure of labor supply?

3.2 The Effects of Identity, Behavioral Prescriptions and (Dis)satisfaction

We refer to two strands in the literature that lead partly to two opposing expectations towards the effects on work effort.

The first chain of reasoning builds on findings from a pioneering study by Akerlof & Kranton (2000) that made apparent that social identity could indeed be incorporated into the standard economics approach and could thus be able to explain social differences and also gender differences. Akerlof & Kranton (2000) introduced the concept of "identity", originally developed in social psychology, into economics. They expanded the utility function by a non-pecuniary term representing social identity. This term made it possible to reflect the possibility of people belonging to social categories having appropriate behavioral prescriptions in mind. Akerlof & Kranton show theoretically that individuals make choices concerning monetary incentives and also self-identity. They define identity as one's sense of belonging to a social category and argue that people derive utility from complying with social norms, a behavioral prescription for the social category, and disutility from deviating from this socially desired behavior. Individuals' choices thus depend on self-identity, beyond purely economic incentives.

As in one application of the model the two relevant social categories for our paper are 'man' and 'woman'. Additionally, we assume a concrete behavioral prescription that 'a man should earn

⁴Income effects could be either positive or negative depending on subject's budget constraint, which we are not able to observe in our experiment (Sillamaa, 1999).

more than his wife' (Bertrand et al., 2013) exists. If deviating from this behavioral prescription is costly, we assume gender differences in work effort to occur: Men struggle to solve as many mazes as they could to fulfill the prescribed behavior of a male breadwinner. On the opposite, women reduce effort in solving mazes in order to avoid earning a higher income than their male partners, to fulfill their prescribed behavior.

The second strand in the literature studies the importance of wage comparisons for work effort choices. Following this chain of reasoning fairness considerations might explain why people reduce or increase work effort. Referring to the 'fair wage-effort hypothesis' by Akerlof & Yellen (1990) and the findings of Gächter & Thöni (2010) and Greiner et al. (2010) we can assume effects driven by fairness perceptions to occur: People who perceive an income situation as unfair reduce their work effort. Thus, we assume our participants to reduce work effort, when they are not satisfied with their personal income opportunities compared to their partner's income opportunities and therefore with the role of being the primary or secondary earner in the couple, they are assigned to.

Table 2 summarizes the effects we therefore expect for work effort to occur gender specifically. For men who are unsatisfied with their relative wage we expect either a decrease when following findings from identity economics or an increase in work effort when following the fairness effect. For women who are satisfied with their relative wage we expect the same opposing effects with inverse signs.

Table 2: Behavioral Prescriptions and (Dis)satisfaction

	Male Behavior	Female Behavior
Dissatisfaction	↓↑	↓↓
Satisfaction	↑↑	↑↓

When we assume male secondary earners to evaluate their personal situation as unsatisfying because their wife's income opportunities are higher, as Liebig et al. (2010) state, these two effects work against each other: Men evaluate their situation as unfair, thus reduce effort but at the same time, they should increase their effort to comply with the social norm and fulfill the prescribed behavior. The same is true for women, who are possibly satisfied with their income opportunities as a secondary earner: Satisfaction should lead them to an increase in effort while social norm tells them to avoid earning a higher income than their partners.

4 Description of the experiment

Cohabiting, heterosexual couples who lived together for at least one year in the area of Frankfurt (Oder), Germany, were invited to participate in our experiment.⁵ According to Harrison & List (2004) we conducted a "framed field experiment" with non-standard subjects participating in a lab experiment with field context. Different from GÜth et al. (2004) who invited standard subjects (students) but in line with others conducting real couple experiments (Bateman & Munro, 2005, 2009; Palma et al., 2008)⁶, we used non-standard couples, because our research question

⁵We recruited subjects by distributing postcards, publishing a call for participation in the local press (newspaper and radio) and visiting parent's evenings in kindergardens and schools.

⁶We pass on naming more work, because it is not relevant for our context. For further information see <http://www3.grips.ac.jp/~munro/couples.htm#household> for a profound collection of couple experiments.

obviously requires the couple's context. All experimental sessions were carried out in the same room at the European University Viadrina in Frankfurt (Oder) in evenings and on weekends in Summer/Autumn 2012.⁷

4.1 Experimental protocol

After arriving at the classroom, participants were seated pairwise with partition screens separating couples from each other to prevent interaction and produce privacy. Subjects only knew that they take part in a scientific study that consists of two stages in which they can accumulate income by solving tasks (additional to a show-up fee of 2.50 €) but only one of the two stages (random selection) will be relevant for payoff. Immediately before each stage, subjects were informed about the type of the task. All instructions were handed out and read aloud.⁸

In both stages each partner's compensated task was to solve mazes⁹ (paper and pencil) within a period of 15 minutes. One part of each couple was assigned to solve easy level mazes with a lower piece rate wage (0.50 €) and the other one solved hard level mazes with a higher piece rate wage (1.50 €). Following Gneezy et al. (2003), Gupta et al. (2005), and Schmitt (2013) we assume maze tasks to be gender neutral.

Couples income was taxed individually in one and jointly in the other stage. While under individual taxation both partners can gain from a basic allowance of 4.50 €, under joint taxation both partners basic allowance of 9 € is assigned to the primary earner. The tax description sheets, which were handed out at the beginning of each stage, included an effort-income-table and a short explanation of the tax system. Following Fochmann & Weimann (2011) who emphasize, that complex tax environments may cause biases we kept our experimental tax environment and the instructions as simple as possible: We firstly made use of a tax function that is piecewise linear and progressive with increasing marginal tax rates (20%, 40%, 60%, 80%, 90%, 95%), secondly we represented net wages instead of a tax rate (Sillamaa, 1999), and thirdly we illustrated the tax burden per unit graphically in a pie chart (Fochmann & Weimann, 2011). In order to detail the tax system, a written tax description clarified that "Both partner's income is taxed to the same degree" in case of individual taxation. In the joint taxation condition, we stated that "Both partner's income is taxed to a different degree. The tax burden of the one with the lower piece rate wage is higher and the tax burden of the one with the higher piece rate wage is lower". To make sure that subjects became acquainted with both tax sheets and both income opportunities, they had to answer control questions concerning their own and their partners potential income.

Additionally to the compensated task, one partner had to fulfill an uncompensated and compulsory task¹⁰, that is easy but reduces time for the compensated maze task from 15 to 12 minutes. The couple had to decide who takes over this task prior to following performing part.

To allow for on-the-job leisure (Dickinson, 1999), we arranged a selection of magazines, a daily newspaper, sweets and drinks on each couple's desk.

After having performed in two stages, participants were asked to fill out a post-experimental questionnaire that contained questions on individual socio-demographic characteristics, couple's

⁷We offered professional childcare possibilities during the experiment by cooperating with Viadrina Family representatives and local kindergarden teachers.

⁸Instructions are translated and can be found in the Appendix.

⁹We used a collection of mazes from the web: <http://www.onebillionmazes.com>. "Easy" refers to mazes of a low difficulty level, "hard" to mazes of a slightly higher difficulty level.

¹⁰In one stage subjects connected dots (paper and pencil) that should become a picture. In the other stage subjects were asked to decode numerical series into words by substituting the numbers with letters, using an encryption table, which assigned a number to each letter of the alphabet, similar to Erkal et al. (2009).

information, individual attitudes toward perceived fairness of their potential income and attitudes toward gender roles. To avoid communication and interaction while filling out the questionnaire we seated the partners apart.

At the end, both partners received their accumulated income and their show-up fee in another room. To determine their payoff, one of them had to draw a ball from an urn with red and yellow balls that represented the potential income of each round.

4.2 Experimental Design

In our within-between-subjects design, we assigned types of mazes to create different roles within each couple for the duration of the experiment. The one who solves harder mazes at a higher piece rate wage is the primary earner (PE) and the other partner who is solving easier mazes at a lower piece rate wage is the secondary earner (SE).¹¹ In experimental groups 1.1. and 2.1. couples consisted of a male primary and a female secondary earner; in the other experimental group (2.1. and 2.2.) we created couples with a female primary and a male secondary earner.

To control for range effects or biases like boredom or learning that could occur when solving the same task in both stages, we varied the order of the tax conditions in the second treatment. We take the caution advice of Charness et al. (2012) seriously, who advocate that varying the order “might not be enough to remedy the problem”, but this problem is limited to preference based experiments. Since subjects are asked to perform, as in our experiment, a systematic bias seems to be unlikely (Charness et al., 2012).

Figure 1: Experimental Design

	Treatment 1		Treatment 2	
	Group 1.1 male PE & female SE	Group 1.2 female PE & male SE	Group 2.1 male PE & female SE	Group 2.2 female PE & male SE
Stage 1	individual taxation		joint taxation	
Stage 2	joint taxation		individual taxation	
	post-experimental questionnaire, urn decision			

5 Results

We conducted 24 sessions with 116 participants (58 couples). Each session took about one hour and the average payment was 27.24 € per couple. Sample descriptives are presented in Table 3. The majority of couples is married and most of them have children. Female partners are slightly younger than male partners. Except one women who is from Poland, all other participants are born in Germany or the former GDR. Participant’s highest educational attainment differs between men and women: while a larger share of men have a university degree or a vocational education without A-level, the share of women having a vocational education with A-level is higher than men’s. Men are more often employed in full time, while the share of part time employment is higher for women.

¹¹Tasks with two difficulty levels justify different wages and avoid discriminatory feelings for one of them.

Table 3: Sample Descriptives

	Pooled (Std. Dev.)	Men (Std. Dev.)	Women (Std. Dev.)	P-value for gender differences
Age	44.09 (15.90)	45.48 (16.12)	42.71 (15.69)	0.35
Married	0.74	0.74	0.74	1.00
Living together since	18.24 (15.84)	18.47 (15.99)	18.02 (15.83)	0.88
Children	0.70	0.72	0.67	0.54
Highest educational attainment	2.20 (0.91)	2.30 (0.89)	2.09 (0.93)	0.22
Voc. edu. without A-level	0.31	0.29	0.33	
Voc. edu. with A-level	0.16	0.13	0.20	
University degree	0.52	0.59	0.45	
Full time employment	0.49	0.57	0.41	0.1
Part time employment	0.11	0.05	0.17	0.04
Marginal employment	0,09	0,10	0,69	0.51
Personal gross income	3.28 (1.23)	3.40 (1.21)	3.16 (1.24)	0.31
N	116	58	58	

'Age' denotes mean age in years, 'married' denotes the share of couples who are married, 'living together since' denotes mean years of living together, children denotes the share of participants who have one or more children. 'Highest educational attainments' denotes mean of the highest educational attainment (0=none,1=Vocational Education without A-level, 2=Vocational Education with A-level and University degree=3). Voc. Edu without A-level, Voc. edu. with A-level, and University degree denote the share of participants having this qualification. 'Full time employment' and 'part time employment' denote the share of participants with this employment status. Others are either in pension, unemployed, in maternity leave, in education programs or work in marginal employment. Gross domestic income denotes mean subjects personal gross income (1=0-500, 2=5001-1000, 3=1001-2000, 4=2001-3000, 5=>3001).

5.1 Inferential Statistics

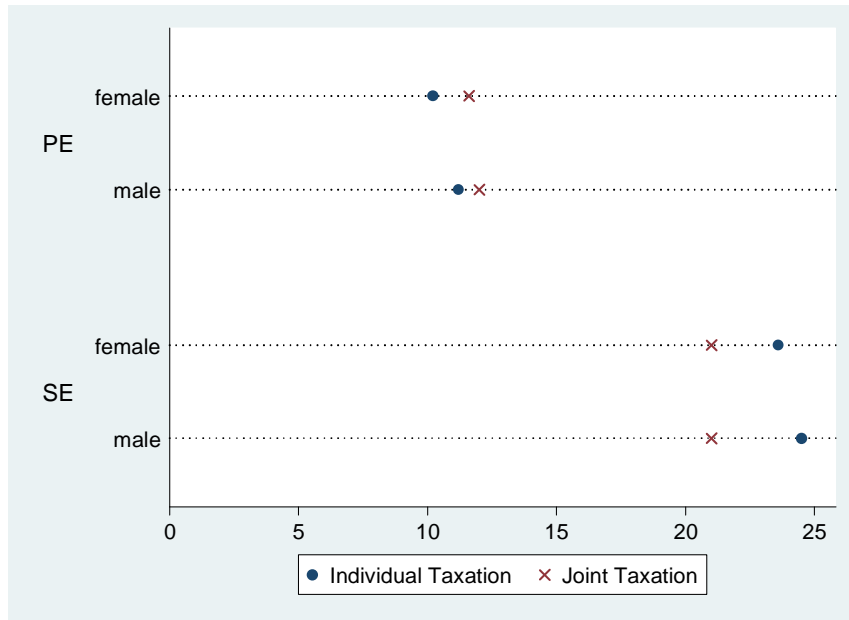
When investigating work effort, we focus on leveled work effort. Leveled effort represents the number of solved mazes, the output of productive hours of work, and assumes that each participant's working time is fixed at 12 minutes, no matter if he or she takes the uncompensated task. Secondary earners solve on average 23.66 mazes ($SD = 9.30$) and primary earner 12.16 mazes ($SD = 5.42$). When not differentiating between tax systems no gender difference in effort levels can be detected: Female primary earners ($Mn = 12.25$, $SD = 6.39$) do not solve a significantly different number of mazes ($p=0.87$, t-test) than male primary earners ($Mn = 12.07$, $SD = 4.29$). The same is true for secondary earners (t-test, ($p=0.98$)): Women's effort ($Mn = 23.68$, $SD = 10.15$) does not differ significantly from men's effort ($Mn = 23.63$, $SD = 8.44$).

Figure 2 gives an overview of the work intensities (median) by role, tax condition, and sex. Again, we cannot detect gender differences conditional on the tax system. Male secondary earn-

ers' effort ($Mdn_{mSE}^I = 24.5$, $Mdn_{mSE}^J = 21$) does not differ significantly from women's effort ($Mdn_{fSE}^I = 23.6$, $Mdn_{fSE}^J = 21$) in case of individual ($p=0.52$, MW, two-sided) or joint taxation ($p=0.85$, MW, two-sided). Additionally, we cannot detect gender differences between male ($Mdn_{mPE}^I = 11.2$, $Mdn_{mPE}^J = 12$) and female primary earners ($Mdn_{fPE}^I = 10.2$, $Mdn_{fPE}^J = 11.6$) in individual ($p=0.71$, MW, two-sided) or joint taxation ($p=0.52$, MW, two-sided).

Comparing effort between the two tax systems by gender leads us to find tax effects but only for male secondary earners. Their effort differs significantly between the two tax systems: male secondary earners' effort is higher under individual than under joint taxation ($p=0.026$, WSR, one-sided). For all other experimental groups, male primary earners' ($p=0.40$, WSR, two-sided), female primary earners' ($p=0.84$, WSR, two-sided), and female secondary earners' ($p=0.67$, WSR, two-sided) work effort does not differ significantly between the two tax systems. Thus, male secondary earners might be more susceptible to changes in the tax scheme and consequently show a larger labor supply elasticity in terms of work effort.

Figure 2: Work Effort by Role, Tax and Sex (Median)



In order to investigate subjects' satisfaction with the assigned role we asked the participants "Would you have liked to change the mazes (and hence the payment) with your partner?". This represents a good overall measure for satisfaction with the assigned role and the corresponding income opportunities. Satisfaction with the assigned role should lead them to state 'No', dissatisfaction should be expressed by a willingness to change the role. We detect a significant (Pearson $\chi(1)=4.6077$, $p=0.032$) relationship between the role and the desire for the willingness to change unconditionally on gender: Secondary earners want to change their role more frequently. Differentiating between gender, this relationship is only significant for men: While male primary earners want to keep their roles, male secondary earners show a higher desire to change the assigned role (Fisher's Exact Test, $p = 0.009$, one-sided). Interestingly, we cannot detect this relationship for women (Fisher's Exact Test, one-sided, $p=0.500$).

The compulsory and uncompensated task works as our proxy for housework within the ex-

periment. The majority of couples chooses the secondary earner to take over this task (Pearson $\text{Chi}(1)=52.0714$, $p=0.000$). Furthermore, the allocation of the uncompensated task is more equal in case of individual taxation compared to joint taxation (Pearson $\text{Chi}(1)=7.8637$, $p=0.005$).

5.2 Regression Results

Table 4 give estimation results for work effort conditionally on the assigned role of primary and secondary earners. Again, we focus on leveled effort, the output of productive hours of work, and assume that each participant's working time is fixed at 12 minutes. To address the relatively large heterogeneity of our sample appropriately, we have to control for several characteristics that could influence the slope of learning curves. We also account for the influence of their personal tax experiences and other socio-demographic characteristics.

The results of the regression analysis (see Table 4) show that we cannot identify a tax effect, when we control for individual's characteristics. The tax system does not influence the level of effort significantly, neither for secondary earners nor for primary earners. While the tax effect fades from the spotlight, effects from (dis)satisfaction and behavioral prescriptions emerge:

Willingness to change the role affects work effort for secondary earners significantly, but for men and women in different directions. We assume that if a person indicates the wish to change the role is an expression of being unsatisfied with the assigned role. We can show that willingness to change the role affects male secondary earners positively. Additionally, they even show more effort than change willing female secondary earners. Both genders are dissatisfied when they are in the role of a secondary earner, but the behavioral prescription of being the breadwinner only leads male secondary earners to increase effort. Here, the identity effects seems to be stronger than the effect from dissatisfaction: Male secondary earners struggle to solve as many mazes as they could to fulfill the prescribed role of a male breadwinner.

On the contrary, female secondary earners who are willing to change the role decrease work effort. We can see the effect of dissatisfaction, a decrease in work effort, and female's behavioral prescription does not exclude this kind of reluctant performance behavior. But if female secondary earners are not willing to change the role and thus are apparently satisfied with their role assignment, they are even more productive the corresponding group of male secondary earners. While this group of secondary earner men who are unwilling to change is less productive compared to the group of female secondary earners, once they want to change the role they struggle to solve as many mazes as they could.

Additionally, another satisfaction or fairness variable shows the same interaction effect with gender: The fairness perception of their personal net piece rate in each round compared to their partner's net piece rate in the same round. Although both genders perceive the situation as unfair, we can detect gender differences. While women's effort is affected negatively when they perceive the situation as unfair, men's effort is affected slightly positively. Again, the identity effects for male secondary earners seems to be stronger than the effect from fairness perception.

For both, secondary and primary earners, we can find significant effects from being married. Married men solve more mazes than male cohabiters and married women are less productive than female cohabiters. And these effects are the same for primary and secondary earners. Possibly, behavioral prescriptions are stronger for married couples than for cohabiters.

Table 4: OLS Regressions on Work Effort for Primary and Secondary Earners

	SE Coef.	PE Coef.
Joint	-0.412 (0.618)	-0.202 (0.295)
Male	-7.642*** (2.781)	-4.405*** (1.382)
Joint * Male	0.116 (0.763)	0.473 (0.438)
Stage 2	-0.181 (0.428)	-0.894*** (0.246)
Joint * Stage 2	0.971 (0.809)	0.422 (0.441)
Male * Stage 2	0.328 (0.566)	0.710* (0.405)
Joint * Male * Stage 2	-1.080 (0.985)	-0.595 (0.648)
Willingness to Change	-9.272*** (2.948)	2.237 (4.854)
Willingness to Change * Male	12.550*** (3.639)	-0.474 (1.600)
Attitudes toward Gender Roles	-0.810* (0.419)	-0.530*** (0.181)
Willingness to Change * Attitudes toward Gender Roles	2.174*** (0.606)	-0.420 (0.863)
Male * Attitudes toward Gender Roles	1.294** (0.581)	0.476* (0.263)
Willingness to Change * Male * Attitudes toward Gender Roles	-2.706*** (0.756)	
Married	-1.686*** (0.483)	-0.811** (0.333)
Married * Male	1.771*** (0.550)	1.925*** (0.327)
Fairness	-0.913** (0.396)	-0.101 (0.205)
Fairness * Male	0.927* (0.516)	0.465 (0.302)
Uncompensated Task	0.013 (0.250)	-0.099 (0.167)
East	-1.114** (0.449)	-0.213 (0.230)
Age	-0.042*** (0.011)	-0.057*** (0.009)
Highest Educational Attainment	-0.150 (0.131)	0.425*** (0.114)
Personal Gross Income	0.214 (0.147)	0.037 (0.063)
Income Statement	-0.386 (0.365)	-0.572* (0.315)
Constant	12.814*** (2.179)	7.585*** (0.933)
Observations	103	99
R-squared	0.649	0.801

Note: Robust standard errors in parentheses

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

6 Discussion

Starting from (microsimulation) studies investigating the effect of individual and joint taxation on couple's labor supply in terms of hours worked, we firstly shed light on the question how these tax schemes affect couple's labor supply in terms of effort (work intensities). Additionally, we focus on factors that lay beyond purely economic incentives: The effect from satisfaction with income opportunities, fairness perceptions and gender identities. Therefore, we conducted a real effort experiment, where real couples perform under a piece rate compensation on real effort tasks (solving mazes) in two stages (individual and joint taxation) with the number of solved mazes, the work effort, serving as our proxy for labor supply.

While women do not respond to changes in tax schemes, results from inferential statistics show, that male secondary earners are more susceptible to changes in the tax scheme and are less productive in the situation of joint taxation compared to the situation of individual taxation. These findings could delimit the assumption of a higher labor supply elasticity of women to labor supply elasticity in terms of hours worked. When taking labor supply in terms of work effort into account, our results indicate a stronger behavioral response for men. Furthermore, these findings could challenge the concept of a Gender-Based-Taxation (Alesina et al., 2011). According to this concept, men should face a generally higher tax rate due to their lower labor supply elasticity in terms of hours worked. Following our findings, this could lead to a loss of work effort, when men are in the position of a secondary earner.

What seemed to be clear after inferential statistics, does not hold when we control for individual characteristics in the regression analysis: The tax does not affect work effort significantly, neither for primary nor for secondary earners. We are not able to show effects from individual and joint taxation on couples labor supply in terms of work effort. Possibly the arrangement of a couple experiment was not suitable for investigating gender differences in responses to tax systems and the effect of tax perception. Possibly the 'noise' in the experimental setting coming from this special subject group, which is a non-standard subject pool, with a large heterogeneity of individuals and of couples could lead the tax effect to take a backseat. Since we are interested in two taxation alternatives that apply to couples in the real world, we invited couples instead of students. In fact, it would be very interesting to compare our results with results from an experiment with stranger student couples to avoid effects from too much 'noise'.

Another possible reason could be the monetary incentive difference between joint and individual taxation system that might be too weak. If one is interested in investigating gender differences toward tax' impact on work effort, one should conduct an experiment with a clear cut setting without the couple perspective. In any case, a larger sample size would improve results.

Our findings yield important insights into aspects that are beyond purely economic incentives and drive the behavior of the individuals within a couple. First, there are effects coming from dissatisfaction and fairness perceptions, which other real effort experiments already showed. Second, the norm of 'a man earning more than his wife' (Bertrand et al., 2013) leads to strong effects in our experimental results. Besides empirical quantitative findings¹² that could lead to this assumption, we can also report a qualitatively observation during our experiment, which we are not able to quantify: During the experiment we recognized that subjects behavior was different, when

¹²While most of German men are working full time, women's working hours differ strongly: On the one hand, 20% of all women in the labor force work less than 20 hours and two-thirds of all workers in (tax free) marginal employment called *Mini-Job* are female. On the other hand, at least 17% of all couples consist of two full-time working adults (OECD, 2012).

we assigned potentially atypical roles (female primary and male secondary earner). The couples frequently asked, whether anything went wrong when they recognized their role from reading the instructions. Or if the assignment was truly random. Some women asked, if they might change the role and some men asked, if they could help their female partner. In fact, one couple cheated by changing the mazes when the supervisor was out of sight (we dropped this observation). Remarkably, this kind of behavior did not appear in the other experimental group with couples consisting of male primary earners and female secondary earners.

The interaction of these two effects can be supported by our regression analysis: We can show, that the willingness to change the role affects male secondary earners positively while women's effort is negatively affected by the willingness to change. The same is true for fairness perception concerning one's own net piece-rate compared to the partner's net piece rate in the same round. Men's behavioral prescription to be the breadwinner seems to be stronger than the effect from dissatisfaction that should have led them to decrease work effort. Women's behavioral prescription to avoid being the breadwinner does not exclude the effect from dissatisfaction or fairness perception and end up in being less productive. Comparing male and female secondary earners effort, we can show that men who are unwilling to change are less productive than female secondary earners, but once they want to change the role they struggle to solve as many mazes as they could. Following our assumptions, this finding of satisfied men being less productive than satisfied women, seems to be strange. Also in this context, the behavioral prescription should have worked. One possible explanation is that these women, who are satisfied to be the secondary earner within the couple do not perceive the 'risk' earning more than their male partners. Hence, the satisfaction effect is stronger for these women.

We interpret the effect from marriage (married men solve more mazes than male cohabiters and married women are less productive than female cohabiters) as a 'clear' identity effect. We assume social norms and thus behavioral prescriptions to be stronger for married than for unmarried couples because the case of marriage is very special in Germany. Article 6 of the Basic Law for the Federal Republic of Germany states that 'Marriage and the family shall enjoy the special protection of the state' and many other regulations and norms refer to this basic law. Interestingly, these effects even succeed when we control for age, education, their personal income as a proxy for their labor market participation, and attitudes towards gender roles.

Caution is required when transferring experimental results to the real world. When conducting real effort experiments subjects' task has to be "annoying and somewhat painful" (Doerrenberg & Duncan, 2012). Our data slightly indicates, that this assumption is only true for secondary earners, where we can find more and stronger effects apart from learning. Nevertheless, neglecting a tax incentive effect on labor supply of secondary earners within a couple in the real world would be wrong. We increased external validity by inviting couples instead of students. This is what in the end should have enable us to show tax effects.

But instead we were able to confirm the idea of identity economics - that there are some factors close to sociology and social psychology that lay beyond pure economic incentives, that drive the behavior of individuals. This seems to be the case, especially in the heterosexual couple or family context, where we can assume a gender identity being more present. Regarding this, we follow the idea of Katz (1997) that models of household decision making should be open to the idea of social gender norms 'to predict a significant proportion of collective and individual behavior without doing quite as much violence to lived reality (...) and thus to inform policy in meaningful ways'. Possibly the neoclassical concept of identity economics can help.

7 Conclusion

We shed light on the question how tax schemes affect couple's labor supply in terms of effort (work intensities). Additionally, we focus on factors that lay beyond purely economic incentives: The effect from satisfaction with income opportunities, fairness perceptions and gender identities. Therefore, we conducted a real effort experiment, where real couples perform under a piece rate compensation on real effort tasks (solving mazes) in two stages (individual and joint taxation) with the number of solved mazes, the work effort, serving as our proxy for labor supply.

What seemed to be clear at a first instance, that secondary earner men's effort is smaller in case of joint taxation than in case of individual taxation while we cannot find differences for all other experimental groups and the interpretation that therefore men show a larger labor supply elasticity in terms of work effort, did not hold when we controlled for individual characteristics in the regression analysis. The different tax systems do not affect work effort statistically significant. But we show that there are other factors beyond purely economic incentives, that drive the behavior of the individuals within the couple.

We show that dissatisfaction with the assigned role, expressed by a willingness to change the role, affects male secondary earners effort positively while women's effort is negatively affected. These directions in the effects are also true for fairness perceptions of one's own net piece rate compared to the partner's net piece rate in the same round. This can be explained by an interaction of a gender identity effect and an effect from dissatisfaction. Men's behavioral prescription to be the breadwinner seems to be stronger than the effect from dissatisfaction that should lead to a decrease of work effort. Women's behavioral prescription to avoid being the breadwinner does not exclude the effect from dissatisfaction or fairness perception and thus leads them to be less productive. Comparing male and female secondary earners' effort, we can show that men who are satisfied are less productive than female secondary earners, but once they indicate that they would have changed the role if they could, they struggle to solve as many mazes as they could.

Interestingly, marriage affects work effort significantly, even when we control for age, education, personal income and attitudes towards gender roles: Married men solve more mazes than male cohabiters while married women are less productive than female cohabiters. Presumably, the institution of marriage with an exceptional position in Germany leads to stronger behavioral prescriptions for men and women within our experiment.

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8 Appendix

8.1 Instructions

Main Instructions

Welcome and thank you for participation!

You are an important part of our study which we are conducting with 250 people from the area of Frankfurt (Oder). You are participating as a couple because we are interested in how you two together make decisions. The study consists of two rounds and a questionnaire. In both rounds you will make decisions and solve tasks. Your decisions and the performance on these tasks determine your income. At the end you will receive the income of one round, which will be chosen randomly. The questionnaire is important for our analysis. Therefore, we please you to complete it carefully. After filling out the questionnaire, you receive a voucher from the supervisor that entitles you to collect your payoff in the next room.

It is essential that you read the instructions carefully. In case of any doubts or insecurities please address your questions to the supervisor. Please indicate your concern by hand rising. We will come to your seat in order to not to disturb the other participants. Your anonymity is assured during all times. As participant you will receive a code number that is written in the upper right corner of any paper.

Stage Instructions

Task Your task is to solve mazes printed on paper within a period of 15 minutes. The aim of the paper-and-pencil game is to draw a route through the maze from the start to the end without being hindered by dead ends. The maze is solved after having drawn a continuous line from the starting point (S) to the finishing point (F). The inner and outer frames of the maze should not be touched or crossed by the pencil line. There are easier and harder mazes. You will have to solve the easier (harder) mazes. Your partner's task will be to solve the harder (easier) ones. Every maze that is solved correctly yields to earnings as follows: Your salary for each easy (hard) maze is 0.50(1.50) euros. 1.50 (0.50) euros are earned for every harder (easier) maze.

Tax In order to create a drawn-from-life situation, your income is taxed. Your net income (salary minus taxes) on each solved maze depends on the total amount of solved mazes and the tax rate. The more mazes you solve, the higher your income, and also the higher the tax burden. In other words, the tax burden is progressive. The table shows how the tax affects your accumulated income and also

- your net wage per solved maze,
- your tax burden per solved maze,
- your total net salary.

That way you always know your expected earning when you decided to solve the next maze. In brief, we introduce you to the tax sheet. If you have any doubts or insecurities during the session please do not hesitate to address them to the supervisor.

For your amusement, we arranged a selection of magazines, drinks and sweets.

Tax Description and Effort-Income Table

Decision on Unpaid Task

Before you can start, you are asked to decide jointly, if you by yourself or your partner by him/herself will solve an unpaid task. This task is not difficult at all and no special previous knowledge is required. Whoever you decide on will have to solve the task by him/herself alone. The solving takes 3 minutes. It thereby shortens the available total time on solving the mazes by 3 minutes. After finishing this task, also this person can start to solve the paid task and thus generate income.

Please check the box if you are the person solving this mandatory task.

8.2 Tax Scheme

Table 5: Tax Schedule

Income Bracket	Individual Taxation	Joint Taxation	
	SE & PE	SE	PE
0-4.50 €	0%	20%	0%
4.51 - 9.00 €	20%	40%	0%
9.01 - 13.50 €	40%	60%	20%
13.51 - 18.00 €	60%	80%	40%
18.01 - 22.50 €	80%	90%	60%
22.51 - 27.00 €	90%	95%	80%
27.01 - 31.51 €	95%	95%	90%
> 31,51 €	95%	95%	95%

This table represents the tax scheme that underlies the experimental design. Subjects received a colored table with pie charts indicating the increase in the tax burden per unit.