What's Yours is Mine: Joint vs. Private Consumption and Taxation with Home Production

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Abstract

This paper investigates the labor disincentive effects of joint taxation. First, we use labor supply of same sex couples before and after federal recognition of same sex marriage as a natural experiment to study the effects of switching from individually filing taxes to being able to file jointly. We find that the ability to file taxes jointly had small effects on hours worked and employment by both primary and secondary earners. We then apply a standard model of household labor supply to data on same sex couples. This model predicts a labor supply response for secondary earners that is over three times larger than what is observed in the data. To investigate further, we modify the standard model to include private consumption and heterogeneous home production time. Our model is able to match the small response in labor supply from changing tax regimes while also being consistent with relatively low labor supply by secondary earners. Finally, we study a counterfactual switch from joint to individual taxation for heterosexual married couples. While the standard model predicts a 3 percent increase in female labor supply, our full model with private consumption and home production predicts an increase of only 0.1 percent. Overall, we find that switching from joint to individual taxation has smaller effects on married households' labor supply compared to the literature. Nevertheless, switching from joint to individual taxation is still welfare improving as it reduces intra-household inequality in private consumption.

Keywords: family labor supply, joint taxation, couples, same sex, gender, home production

JEL Codes: H31, J12, J22, H20, E60

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1 Introduction

This paper studies the effects of joint income taxation on the labor supply of primary and secondary earners. Because joint taxation puts higher effective marginal tax rates on secondary earners, an existing literature has attempted to quantify how joint taxation affects the labor supply and welfare of households with two potential earners. Previous studies of joint taxation have suggested that moving between individual and joint taxation might have large effects on household labor supply (Bick and Fuchs-Schündeln, 2017, 2018; Borella, De Nardi and Yang, 2019; Bronson and Mazzocco; Guner, Kaygusuz and Ventura, 2012; Keane, 2011; Wu and Krueger, 2021). However, we find empirical evidence that this effect is small in the United States and we build a structural model to rationalize this finding.

We evaluate the labor supply of same sex couples four years before and after the federal recognition of same sex marriage, and thus access to joint taxation. To file taxes jointly in the United States, couples are required to be legally married. Therefore we can use recognition of same sex marriage as a natural experiment for shifting couples from individual to joint income taxation within a single country and on similar populations.[1] We use data from the American Consumer Survey (ACS) which contains information on same sex couples, including information on marital status, income, education, hours worked, number of children, and more (Ruggles, Flood, Foster, Goeken, Pacas, Schouweiler and Sobek, 2021). We separate members of same sex couples into primary and secondary earners based on their yearly income and produce aggregate labor supply statistics for each state and year.[2] We find statistically and economically insignificant differences in labor supply between unmarried same sex couples before recognition and married same sex couples after recognition. Qualitatively, hours move in the correct direction when switching from individual to joint taxation: primary earner hours increase and secondary earner hours decrease. However,

[1] Cross country comparisons may confound gender norms and institutional differences with effects of the tax system.

[2] The ACS is a repeated cross section. We consider yearly aggregate statistics because we cannot track individual households across years.

quantitatively, this small labor response in labor supply is inconsistent from findings in the existing literature.

To contrast our empirical findings with the literature, we use a standard model of family labor supply and estimate it with our data on same sex couples.[3] In this model, household members choose individual labor supply but share consumption equally. Labor income of the household is subject to either a tax based on individual income of each member or based on the combined income of the household. We estimate the model to match labor and income data from same sex couples in the American Consumer Survey (ACS) and take standard parameters for labor supply elasticity and tax progressivity from the literature (Ruggles et al., 2021). We find that switching from individual to joint tax systems decreases the labor supply of secondary earners by 3.6 percent and increases the labor supply of primary earners by 2.3 percent. These responses are much larger than in the data, where the labor supply of secondary earners decreases by only 1.5 percent and the labor supply of primary earners increases by only 0.1 percent.

Accordingly, we modify the baseline model in order to better match our empirical findings for same sex couples by adding two ingredients: private consumption and home production time that are both dependent on relative income within the household. As in the baseline, some of the consumption is pooled and invariant to an individual's relative income within the household. In our full model, some consumption is split according to relative income and we call this private consumption.[4] We estimate the shares of pooled and private consumption using expenditure data from the Panel Study of Income Dynamics (PSID), but let the income shares determine how private consumption is split between individuals (PSID, 2021). This allows us to capture some intra-household consumption inquality which may be important for family labor supply (Lise and Seitz, 2011). For our second addition to the model, we incorporate home production into the model as a time constraint that limits time available for

[3]See Doepke and Tertilt (2016) for a discussion of modelling families in economics.

[4]This can be micro-founded with a bargaining game where bargaining weights are determined be relative income.

market labor. We estimate home production externally from the model using the American Time Use Survey (ATUS) (Hofferth, Flood, Sobek and Backman, 2020). It is determined by household income share, sex, number of children, and age. We instrument income shares with wage shares to avoid endogeneity of home production time impacting labor hours. Adding heterogeneous home production will allow for us to control for differential time constraints within couples which may also impact primary versus secondary labor supply decisions.

We estimate our extended model and predict labor supply changes that better match the data for reasonable levels of labor supply elasticity. We find that switching from individual to joint tax systems decreases the labor supply of secondary earners by 1.9 percent and increases the labor supply of primary earners by 1.5 percent. Our full model accounts for 81 percent of the difference between the data and baseline model's labor supply responses for secondary earners. For primary earners, we account for 33 percent of the difference. Overall, we find that allowing for differences in consumption and home production within households to help us more closely match the labor supply responses to changes in marginal tax rates for same sex couples.

Finally, we re-estimate our model for heterosexual married households and repeat the policy exercise to evaluate the difference in labor supply of heterosexual couples under joint versus individual income taxation. We estimate the models under joint taxation because we do not have data on heterosexual couples filling individually. We then compare the implied labor supply with individual taxation for men and women under the baseline model and under our full model.[5] As with same sex couples, we find smaller labor responses to changes in the tax system. The baseline model predicts that women supply 3 percent fewer yearly hours under joint taxation compared to individual taxation and that men supply 1.8 percent more. The full model with private consumption and home production predicts only a 0.1 percent decrease in hours and a 0.04 percent change in men's hours.

[5]Because we use aggregated data, the representative primary earner for heterosexual households is male and the representative secondary earner is female. Therefore, evaluating the labor responses of secondary earners and of women in heterosexual households will be equivalent.

The smaller labor supply response for heterosexual couples compared to same sex couples in the full model comes from the sensitivity of home production to changes in relative after-tax wages. Andresen and Nix (2019) find that home production time sharing varies between same sex couples and heterosexual couples largely due to gender norms. Accordingly, we estimate home production time separately for individuals in heterosexual and same sex couples in the ATUS. In particular, to account for gender norms in heterosexual couples we interact sex with other regressors in determining home production time. We find income shares play a much larger role in determining home production for same sex couples compared to heterosexual couples. We take this as evidence that gender norms play a larger role in determining home production time for heterosexual couples in the United States than for same sex couples. This interpretation is consistent with work from Lichard, Pertold and Škoda (2021) that women's home production time is more invariant to income in countries with stronger gender norms. Because home production will move a lot less for heterosexual couples when changing tax systems, the market labor supply also changes less.

Despite smaller labor responses to changing the tax system for married couples in the full model, we find larger responses for intra-household consumption shares. In the baseline model, the division of consumption is not tied to relative wages and therefore a change in marginal tax rates changes individual labor supply more than individual consumption. That is, the substitution effect dominates the income effect. However, in the full model where private consumption varies with after-tax wages, the income effect largely cancels out the substitution effect. So while labor supply is similar under joint and individual taxation, the within-household consumption inequality is smaller under individual taxation. This may have implications for welfare analysis and evaluating aggregate consumption inequality measures (Lise and Seitz, 2011). Accordingly, policymakers evaluating changing tax systems ought to consider consumption responses and not only labor supply responses for households.

The rest of the paper will proceed as follows: section 2 documents our empirical analysis of labor supply of same sex couples before and after the legalization of same sex marriage;

section 3 describes the base model with equally split consumption and the extended model where private consumption can vary with relative wages; section 5 details the calibration and what the models predict about the labor supply response to change tax systems; and finally in section 6 we conclude.

2 Empirical Analysis

Beginning in 2013, same sex marriage was recognized by the federal government for federal tax purposes. This allowed same sex married households in the sixteen states where same sex marriage was legalized to file joint tax returns instead of filing individually. Same sex marriage was legalized in nineteen additional states in 2014 and then legalized by all states in 2015 following the United States Supreme Court ruling *Obergefell v. Hodges*. Which states recognized same sex marriage in each year is listed in Table 1. Because being legally married is a requirement for filing taxes jointly, this sudden change in tax systems faced by same sex couples offers a natural experiment to study the effects of joint taxation on labor supply.

Year	States
2013	California, Connecticut, Delaware, Hawaii, Iowa, New Hampshire, New York, Maine, Maryland, Massachusetts, Minnesota, New Jersey, New Mexico, Rhode Island, Vermont, Washington
2014	Alaska, Arizona, Colorado, Idaho, Indiana, Illinois, Kansas, Montana, North Carolina, Nevada, Oklahoma, Oregon, Pennsylvania, South Carolina, Utah, Virginia, West Virginia, Wisconsin, Wyoming
2015	Alabama, Florida, Georgia, Kentucky, Louisiana, Michigan, Missouri, Mississippi, North Dakota, Nebraska, Ohio, South Dakota, Tennessee, Texas

Table 1: Year of Recognition of Same Sex Marriage by State

Note: This table shows the year same sex marriage bans were struck down in each state. Same sex marriage became legal in every state in 2015 following the ruling in *Obergefell v. Hodges*. Same sex marriage became federally recognized for tax purposes in 2013 following *United States v. Windsor*.

We use variation in labor supply of households with same sex couples from the American Community Survey (ACS) to test the effect of joint taxation on household labor supply (Ruggles et al., 2021). Our sample looks four years before and after the legalization of same sex marriage in each state. Accordingly, we are using data from 2009 to 2019. We drop the 19 states that have fewer than 500 household observations who identify as being in same sex couples across all years of the sample. The ACS is a repeated cross section, so we cannot track the same couple from non-married to being married. However, we restrict our sample to look at unmarried same sex couples before marriage legalization in their state and then we only look at married couples in the state after marriage legalization.[6] This results in having 12,265 same sex households before legalization and 9,774 after. We aggregate household level data from the ACS to state-year level averages which takes our number of households to 124 for both before and after samples.

To ensure we are comparing the labor supply of similar couples before and after legalization of same sex marriage, we compare the state-year level statistics. Table 2 shows that our samples for comparison are very similar across average income, number of children, and education. Whether or not we drop different groups or tails of the distribution does not significantly change these summary statistics.

	Before Legalization and Unmarried	After Legalization and Married
Average Income	\$49,136	\$50,268
Average Number of Children	0.40	0.56
Percent with High school degree	95%	95%
Percent with Bachelors degree	49%	48%
Sample size	124	124

Table 2: Characteristics of Same Sex Households

Note: groups include yearly averages for 5 years before and 5 years after legalization of same sex marriage. The ACS is a repeated cross section. Although we cannot track households from one year to the next, this table shows that the aggregate statistics of the groups before and after are very similar. We therefore consider them comparable.

[6]Here we are assuming that all married couples are filing taxes jointly because we cannot see it explicitly for households in the ACS. However, the almost all married couples in the US file joint taxes.

We remove a linear time trend from the data to account for underlying trends in labor data. We also remove the bottom and top one percent of observations to remove any possible outliers or extreme values. We drop the actual year of legalization when calculating averages and variances before and after legalization even though we include the year of same sex marriage legalization in the graphs.

We evaluate the labor response of same sex couples before and after marriage legalization by earner status within the couple. For primary earners, we consider the member of the household that makes the highest total income. The secondary earner is then the member of the household that makes the second most income. So by definition, there must be an employed primary earner for analysis of the secondary earner. We show graphs below for the average hours worked per year by primary and secondary earners and then also the employment rate for secondary earners conditional on the primary earner being employed. Our main empirical finding is that the labor supply of does not change in a statistically or economically significant way when shifting from individual to joint taxation systems over both the extensive and intensive margin.

In Figure 1, we plot the average of hours worked per year by secondary earners in same sex couples for each year relative to legalization in their state. Each box plot shows the distribution of average yearly hours worked across secondary earners from all states. The box shows the interquartile range while the whiskers show the maximum and minimum hours worked. The circle represents the mean of average yearly hours worked by secondary earners in same sex couples across states. The red dashed horizontal line to the left of zero on the horizontal axis represents the average hours worked for the four years before before legalization and the blue dashed line to the right is the average hours worked for the four years after legalization. We drop the year of legalization for computing the before and after averages. We find that hours for secondary earners drops by 23 hours from before and after the legalization of same sex marriage and thus access to joint taxation. This is small when considering yearly hours. This change is not statistically significant with a p-value of 0.239

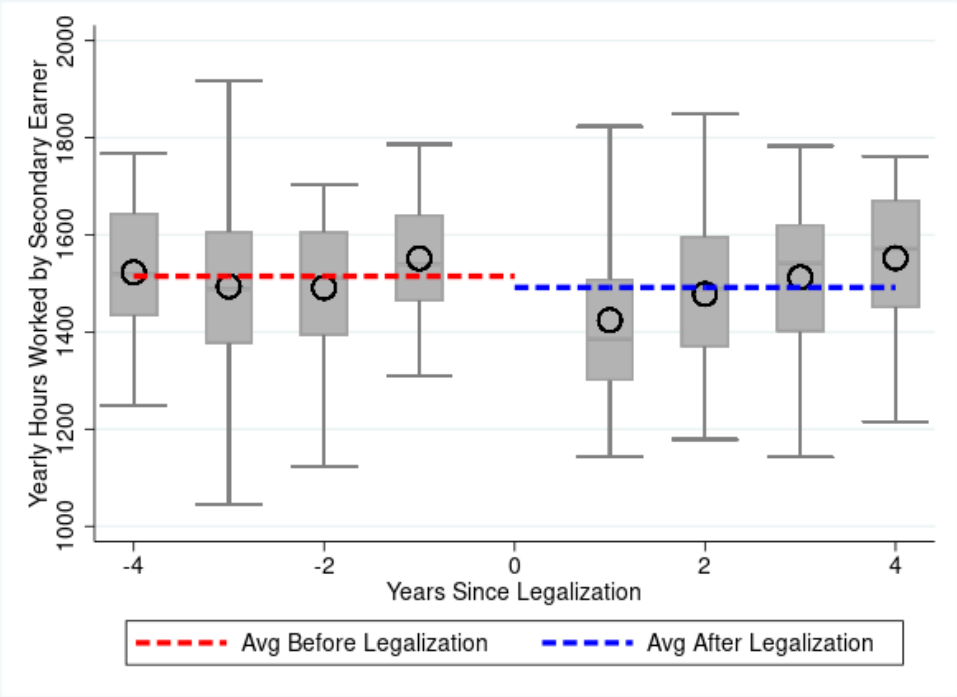

Figure 1: Yearly Hours of Secondary Earners in Same Sex Couples

Note: This graph shows average yearly hours worked by secondary earners in same sex couples aggregated over all states in years relative to legalization of same sex marriage in the state of where the couple resides. The before sample is restricted to only include unmarried individuals to account for same sex couples getting married in a different state before legalization in their own state. The after sample is restricted to look at only married same sex couples. The difference in average yearly hours from before to after legalization is -23. The sample distributions of secondary earner hours for the before and after groups are different with p-value of 0.239.

and we cannot reject the null hypothesis of no change. This is illustrated by the blue and red dashed lines being close together at zero.

We find even smaller magnitudes for yearly hours of primary earners. Figure 2 plots average hours for primary earners in same sex couples. Similar to what we find for secondary earners, we find that yearly hours do not change in a statistically significant way. They increase by 3 hours from before to after legalization. Qualitatively, this change has the correct sign. When switching from individual to joint taxation, the relative marginal tax on the primary earner decreases and thus should induce an increase in labor supply according to the standard models. What is novel in here and in the previous figure are that hours really are not moving much in the data for same sex couples.

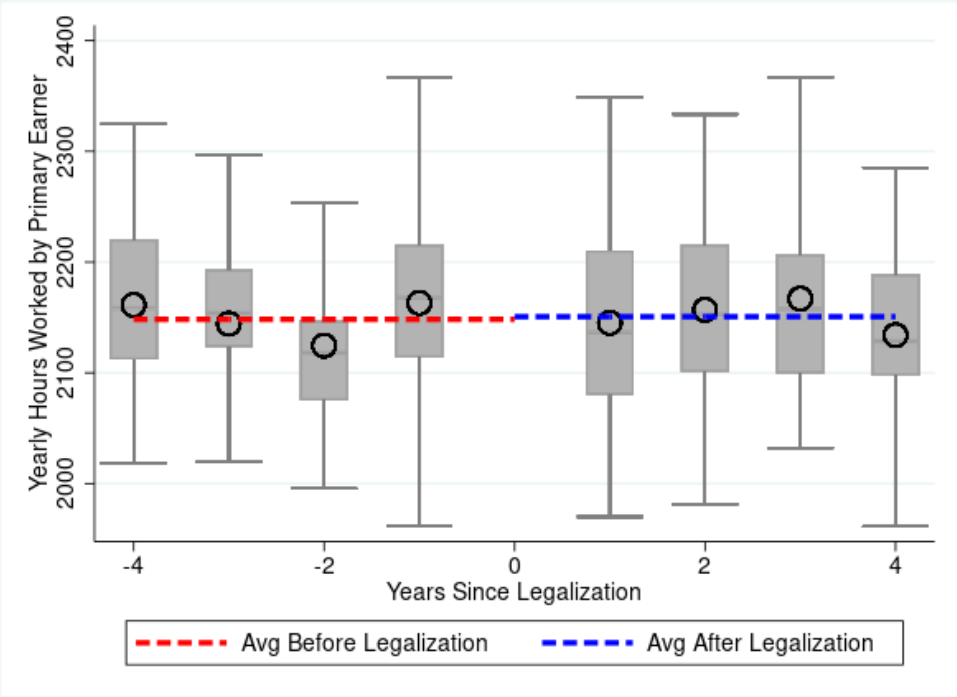

Figure 2: Yearly Hours of Primary Earners in Same Sex Couples

Note: This graph shows average yearly hours worked by primary earners in same sex couples aggregated over all states in years relative to legalization of same sex marriage in the state of where the couple resides. The before sample is restricted to only include unmarried individuals to account for same sex couples getting married in a different state before legalization in their own state. The after sample is restricted to look at only married same sex couples. The difference in average yearly hours from before to after legalization is 3. The sample distributions of secondary earner hours for the before and after groups are different with p-value of 0.860.

To evaluate the extensive margin, in Figure 3 we plot the employment rates for secondary earners in same sex couples before and after the legalization of same sex marriage, represented as zero on the horizontal axis. Remember, by definition, for there to be a secondary earner there must be a primary earner. Therefore this graph is looking at the share of couples where one person is employed versus if two people are employed. Over the sample, approximately 80 percent of same sex couples have both members working in the labor market. Around marriage legalization, we find a slight drop in the employment rate of 0.005, but it is also not statistically significant with a p-value of 0.49.

The main result of this section is that same sex couples are not changing their labor supply following changes in marginal tax rates. This is a very different result from the

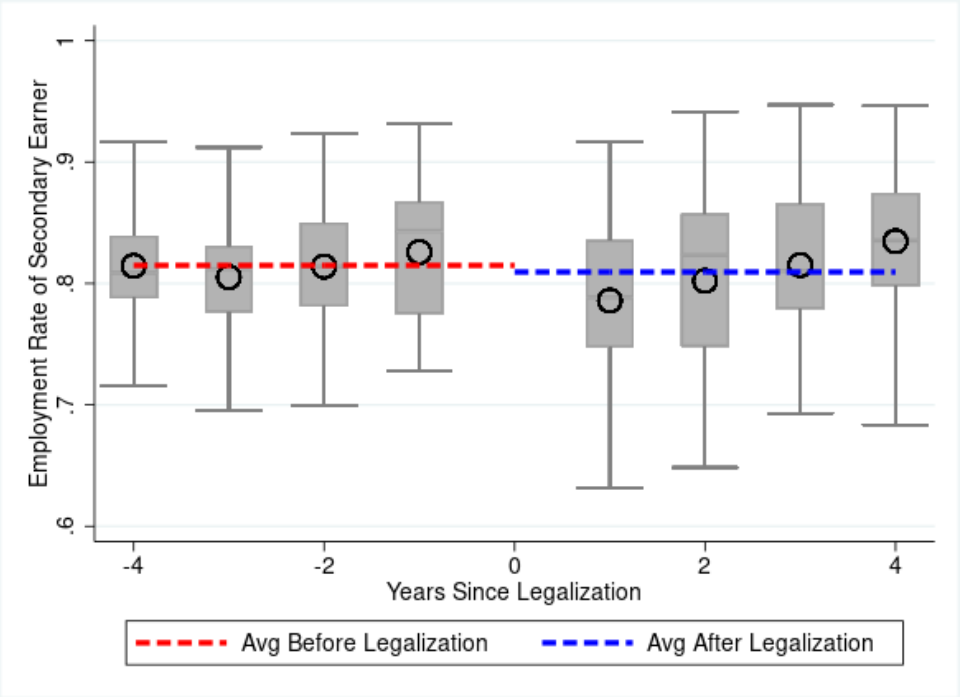

Figure 3: Employment of Secondary Earners in Same Sex Couples Before and After Legalization of Same Sex Marriage

Note: This graph shows employment rate of secondary earners in same sex couples aggregated over all states in years relative to legalization of same sex marriage in the state of where the couple resides. The before sample is restricted to only include unmarried individuals to account for same sex couples getting married in a different state before legalization in their own state. The after sample is restricted to look at only married same sex couples. By definition, the primary worker in these couples is employed. The difference in the average employment rate approximately 0.005. The p-value testing if the before and after groups are different is 0.49.

macroeconomic public finance literature that finds a labor disincentive effect of joint taxation (Bick and Fuchs-Schündeln, 2017, 2018; Bronson and Mazzocco; De Nardi, Fella, Knoef, Paz-Pardo and Van Ooijen, 2021; Guner et al., 2012; Keane, 2011; Wu and Krueger, 2021).. In the next section, section 3, we will describe the base model, which represents what is commonly used in the literature, as well as our extension to allow for unequal consumption sharing within households. In the following section, section 5, we will compare the labor responses from the data versus what is implied by the models.

3 Comparison of Models with Family Labor Supply

In this section we will detail two static models of family labor supply. In the first model (subsection 3.1), we consider a standard setup where agents in the households pool their consumption and the only labor option is market labor. Members of the household then equally split consumption. This is similar to the setup in Bick and Fuchs-Schündeln (2018), Doepke and Kindermann (2019), and others from the family labor supply literature. We show that in this setup the decision of labor supply of the secondary earner in households is very sensitive to marginal labor tax rates and thus can produce large responses in labor in our policy exercise in section 5.

In the second model (subsection 3.2), we add two key ingredients: private consumption and home production. These two ingredients will help us match (1) that secondary earners in same sex households do not change their labor supply after switching from individual to joint tax systems, and (2) that secondary earners work relatively fewer hours. The addition of private consumption causes the model to predict that switching to joint taxation will have very small effects on labor supply since households will adjust their consumption allocations proportionally with wages so that income and substitution effects cancel. Allowing for division of home production to be differ by couple type makes it possible for us to generate correct looking relative hours by earner status and gender.

These two models produce different labor supply responses to changes in marginal tax rates by shifting the relative effect of the income versus substitution effects.First, there is an *income effect*: lower wages make time spent on labor less valuable, so labor supply decreases. Second there is a *substitution effect*: lower wages reduce consumption, so labor supply increases to replace lost income. If the wage decreases by more than consumption, the net effect on labor supply is negative. However, if the wage decreases the same percent as consumption, these two effects cancel and labor supply does not change. In the first model, the income effect dominates the substitution effect because changes in after-tax wages are much larger than changes in shared household consumption. In the second model, the

income and substitution effects largely cancel which is how we can produce smaller labor supply responses to changes in taxes.

3.1 Base Model (Pooled Consumption, No Home Production)

Consider a static model similar to the models frequently used in existing papers to study the effects of joint taxation on labor supply (e.g. examples here). Each household consists of two members, each with a wage w_i, where $i = 1, 2$ indexes members of the household. We will sort household members by wages so that $w_1 \geq w_2$. Therefore, $i = 1$ indicates the primary earner of a given household and $i = 2$ indicates the secondary earner. The key feature of this model is that there is perfect consumption sharing within households. Household members make separate decisions on their labor supply ℓ, but they receive equal levels of consumption c regardless of their relative wages.

Given wages $\{w_1, w_2\}$, households choose consumption c and labor supply for each household member $\{\ell_1, \ell_2\}$ to solve

$$\max_{c,\ell_1,\ell 2} \log c - \chi_1 \frac{\ell_1^{1+\frac{1}{\eta}}}{1+\frac{1}{\eta}} - \chi_2 \frac{\ell_2^{1+\frac{1}{\eta}}}{1+\frac{1}{\eta}}$$

subject to

$$c = w_1\ell_1 + w_2\ell_2 - T(w_1\ell_1, w_2\ell_2; F)$$

where $F \in \{I, J\}$ is the filing status of the household, which can be either individual I or joint J. The two possible tax functions are given by

$$T(y_1, y_2; F) = \begin{cases} y_1 + y_2 - y_1^{1-\tau} - y_2^{1-\tau}, & F = I \\ y_1 + y_2 - 2^{\tau}(y_1 + y_2)^{1-\tau}, & F = J \end{cases} \tag{1}$$

The joint taxation function is scaled by 2^{τ} so that $T(y, y; J) = T(y, y; I)$ for a any given y, which is approximately true in the US tax system.

Now consider the first order conditions to the above problem,

$$\ell_i^{\frac{1}{\eta}} = \left[1 - T'(w_1\ell_1, w_2\ell_2; F)\right] \frac{w_i}{\chi_i c}$$

Switching from individual to joint taxation makes effective after-tax wages

$$\left[1 - T'(w_1\ell_1, w_2\ell_2; F)\right] w_i$$

become higher for primary earners and lower for secondary earners. However, households perfectly share consumption c, so consumption of both earners is still split equally. The result is that the effective wage rate of secondary earners falls without a similar decrease in consumption. Therefore, the income effect dominates the substitution effect, so joint taxation creates large disincentive effects for secondary earners compared to individual taxation.

3.2 Full Model (Private Consumption, Home Production)

In this section, we describe an alternate model of household labor supply where consumption is not shared equally within households and households need to supply labor for home production. The addition of these two elements will produce smaller labor supply responses to changes in marginal taxes while still matching relative hours worked by men and women.

Instead of equally sharing consumption, household members share a common consumption good C, but also have private consumption $\{c_1, c_2\}$. Shared consumption reflects things like durables, while private consumption reflects spending that can vary with an agents individual income. Consumption is allocated according to a weighted planning problem, where the weights are decided by the value of each household member's labor supply. In this model, switching to joint taxation from individual taxation will have very small effects on labor supply. Essentially, when relative wages within a household change, consumption is reallocated so that the income and substitution effects on labor supply cancel. Therefore, switching from individual to joint taxation will have almost no disincentive effects on the

labor supply of secondary earners. However, it will result in higher consumption inequality within households since joint taxation effectively lowers the bargaining power of secondary earners.

Differences in hours worked between primary and secondary earners are driven by heterogeneous assignment of time spent on home production. Secondary earners are required to complete more home production tasks than primary earners, so their marginally disutility of labor is higher and they work fewer hours. We denote the home production required of each household member as h_i and for now we assume that $h_1 < h_2$.

Given weights ω and the household specific home production level $\bar{H}$, households choose private and shared consumption, and labor to solve

$$\max_{c_1,c_2,C,\ell_1,\ell 2} \omega(F)U_1 + (1-\omega(F))U_2$$

subject to

$$c_1 + c_2 + C = y(w_1\ell_1, w_2\ell_2; F)$$

where

$$U_i = \gamma \log c_i + (1-\gamma)\log C - \chi_i \frac{[\ell_i + h_i]^{1+\frac{1}{\eta}}}{1+\frac{1}{\eta}}$$

and

$$y(w_1\ell_1, w_2\ell_2; F) = w_1\ell_1 + w_2\ell_2 - T(w_1\ell_1 + w_2\ell_2; F)$$

and h_i is a function of ω that we will externally estimate in the next section.

The solution to the above maximization problem is characterized by the following four

equation system,

$$\chi_i(h_i + \ell_i)^{\frac{1}{\eta}} = [1 - T'(w_1\ell_1, w_2\ell_2; F)]\,\gamma\frac{w_i}{c_i} \tag{2}$$

$$c_1 = \gamma\omega(F)y(w_1\ell_1, w_2\ell_2; F)$$

$$c_2 = \gamma(1 - \omega(F))y(w_1\ell_1, w_2\ell_2; F)$$

$$C = (1 - \gamma)y(w_1\ell_1, w_2\ell_2; F) \tag{3}$$

Under the tax functions defined in (1), household income is given by

$$y(w_1\ell_1, w_2\ell_2; F) = \begin{cases} (w_1\ell_1)^{1-\tau} + (w_2\ell_2)^{1-\tau}, & F = I \\ 2^{\tau}(w_1\ell_1 + w_2\ell_2)^{1-\tau}, & F = J \end{cases}$$

The weights in the household problem determine how private consumption is split between the two members of the household. We define these weights as the relative value of each individual's labor. To compute the value of labor, we need to compute the price of labor within the household. We treat household income y as a production function that takes the labor supply of each household member (ℓ_1, ℓ_2) as inputs. The price of each individual's labor, v, is computed as the marginal product of their labor,

$$v_i \equiv \frac{\partial y(w_1\ell_1, w_2\ell_2; F)}{\partial \ell_i}$$

This price is multiplied times the individual's level of labor supply to get the total value of their labor, $v_i\ell_i$. Bargaining weights are defined as the share of total value produced by an individuals' labor,

$$\omega(F) \equiv \frac{v_1\ell_1}{v_1\ell_1 + v_2\ell_2} \text{ and } 1 - \omega(F) \equiv \frac{v_2\ell_2}{v_1\ell_1 + v_2\ell_2}$$

With individual taxation, the marginal value of an individual's labor supply is

$$\frac{\partial y(w_1\ell_1, w_2\ell_2; I)}{\partial \ell_i}\ell_i = \frac{\partial \left[(w_1\ell_1)^{1-\tau} + (w_2\ell_2)^{1-\tau}\right]}{\partial \ell_i}\ell_i = (1-\tau)(w_i\ell_i)^{1-\tau}$$

This implies that weights are given by the relative values of individual after-tax incomes

$$\omega(I) = \frac{(w_1\ell_1)^{1-\tau}}{(w_1\ell_1)^{1-\tau} + (w_2\ell_2)^{1-\tau}}$$

With joint taxation,the marginal value of an individual's labor supply is

$$\frac{\partial y(w_1\ell_1, w_2\ell_2; J)}{\partial \ell_i}\ell_i = \frac{\partial \left[2^{\tau}(w_1\ell_1 + w_2\ell_2)^{1-\tau}\right]}{\partial \ell_i}\ell_i = (1-\tau)2^{\tau}(w_1\ell_1 + w_2\ell_2)^{-\tau}w_i\ell_i$$

which means weights are given by relative values of individual before-tax incomes

$$\omega(J) = \frac{w_1\ell_1}{w_1\ell_1 + w_2\ell_2}$$

Individual Taxation First, consider individual taxation. In this case, household income is

$$y = T(w_1\ell_1, w_2\ell_2; I) = (w_1\ell_1)^{1-\tau} + (w_2\ell_2)^{1-\tau}$$

Using consumption shares of total income (3), private consumption for each household member is equal to

$$c_1 = \gamma(w_1\ell_1)^{1-\tau} \text{ and } c_2 = \gamma(w_2\ell_2)^{1-\tau}$$

use this to substitute for c_i in the labor supply equation (2) and notice that the wage drops out

$$\chi(h_i + \ell_i)^{\frac{1}{\eta}}\ell_i = 1 - \tau \tag{4}$$

Here, wages don't affect labor supply at all. Labor supply is completely defined by the level of home production time.

Joint Taxation Now, consider joint taxation. In this case

$$y = w_1\ell_1 + w_2\ell_2 - T(w_1\ell_1 + w_2\ell_2; J) = 2^{\tau}(w_1\ell_1 + w_2\ell_2)^{1-\tau}$$

which implies

$$c_i = \gamma w_i \ell_i 2^{\tau}(w_1\ell_1 + w_2\ell_2)^{-\tau}$$

use this to substitute for c_i in the labor first-order-condition and notice that the wage drops out

$$\chi(h_i + \ell_i)^{\frac{1}{\eta}}\ell_i = 1 - \tau$$

Notice this is the exact same labor supply function as with individual taxation (4). This means that switching from individual to joint taxation results only affects labor supply if time spent on home production changes. In the next section, we estimate how time spent on home production varies with the share of after-tax household income.

4 Estimation and Parameter Selection

In this section we take the base model from subsection 3.1 and our model with private consumption and home production from subsection 3.2 to the data. First we estimate the heterogeneous time costs that vary by the agent's sex, their partner's sex, number of children, and relative wages. We use the American Time-Use Survey (ATUS) to estimate the home production times (Hofferth et al., 2020). We pin down private consumption versus shared consumption using the Panel Study of Income Dynamics (PSID) (PSID, 2021). Then we back out the labor disutility for each individual to rationalize household labor supply.

4.1 Estimating Home Production Time

The ATUS is a survey that details time individuals spend on a variety of tasks throughout the day. We use demographic characteristics of survey respondents to estimate the mapping

from household characteristics to home production time. We estimate home production time for same sex couples to be a function of age, children, sex, and the share of after-tax household earnings (ω). [7] In particular, we estimate home production time as a log-linear equation in the share of household income and demographic characteristics,

$$\log h = \beta_0(\text{Share of Household Income}) + \beta_1 \text{Age} + \beta_2 \text{Age}^2 + \beta_3 \text{Age}^3 + \beta_4(1 \times \text{Female}) + \beta_6(\text{Has Children} \times \text{Has Children Under 5}) + \text{constant}$$

Since the share of household income depends on the level of home production time, we instrument it with the relative wages and demographic characteristics of the household. The results of this regression are reported in Table 3. The share of household income is again found to be significant in determining home production time, but now the level of its effect is large. In fact, time spent on home production for same sex couples is found to be essentially proportional to their share of household income.

Variable	Coefficient	Standard Error	P-Value
Household Income Share (ω)	-0.971	0.351	0.006
Female	0.274	0.184	0.136
Has Children × Children under 5			
Only children over 5	0.253	0.232	0.274
Children under 5	1.277	0.151	0.000
Age	0.771	0.057	0.285
Age^2	-0.017	0.001	0.319
Age^3	1.3×10^{-4}	1.4×10^{-4}	0.336

Table 3: Home Production Time Regression Results, Same Sex Couples

Note: this regression includes a linear time trend variable that is not reported. There are 266 observations for individuals in same sex couples. The R^2 for the regression is 0.2233. The table reports robust HC standard errors. Household income share is instrumented with relative wages and household demographic variables.

Similarly, we estimate home production for people in heterosexual marriages to be a function of age, children, sex, and the share of after-tax household earnings (ω). Due to the much larger number of observations for heterosexual couples, we incorporate more detailed

[7] ACS includes self-reported information. For filing out their sex, respondents have only had two options in the survey: male or female. Therefore, we are limited to evaluating sex as binary due to data availability.

variables for number of children and we allow variables to interact with sex of the survey respondent. The regression specification for people in heterosexual marriages is as follows:

$$\begin{aligned}\log h = {} & \beta_0(\text{Share of Household Income}) + \beta_1 \text{Age} + \beta_2 \text{Age}^2 + \beta_3 \text{Age}^3 + \beta_4(1 \times \text{Female}) \\ & + \beta_5(\text{Female} \times \text{Number Children}) + \beta_6(\text{Female} \times \text{Has Children Under 5}) + \text{constant}\end{aligned}$$

As before, we instrument the share of household income with the relative wages and demographic characteristics of the household. The results of the instrumented regression are reported in Table 4. Notably, the most important determinants of home production time for people in heterosexual couples are sex, number of children and the age of children. The share of household income is found to be significant in determining home production time, but the level of its effect is very small: a one percent increase in the income share is associated with only a 0.06 percent decrease in time spent on home production.

4.2 Model Parameters

The preference and tax parameters of the models are summarized in Table 5. We borrow the level of tax progressivity from Heathcote, Storesletten and Violante (2017) and assume the Frisch elasticity of labor supply is 0.5, which is a standard value, e.g. Heathcote et al. (2017) and Bick and Fuchs-Schündeln (2018). We set γ to match the consumption share of public goods – which we assume to be housing and food – in the Panel Study of Income Dynamics.

Parameter	Value	Source
τ	0.181	Heathcote et al. (2017)
η	0.5	Bick and Fuchs-Schündeln (2018)
γ	0.33	PSID 2001-2009

Table 5: Parameters

Variable	Coefficient	Standard Error	P-Value
Household Income Share (ω)	-0.058	0.023	0.014
Female	0.111	0.034	0.001
Number of Children $\times$ Sex			
1 $\times$ Male	0.187	0.037	0.000
2 $\times$ Male	0.301	0.035	0.000
3 $\times$ Male	0.285	0.044	0.000
$\geq 4 \times$ Male	0.226	0.073	0.002
1 $\times$ Female	0.390	0.028	0.000
2 $\times$ Female	0.545	0.028	0.000
3 $\times$ Female	0.617	0.034	0.000
$\geq 4 \times$ Female	0.618	0.054	0.000
Children under 5 $\times$ Sex			
Male	0.392	0.027	0.000
Female	0.463	0.021	0.000
Age	0.049	0.057	0.295
Age^2	-9.1×10^{-4}	0.001	0.508
Age^3	5.7×10^{-6}	1.1×10^{-5}	0.596

Table 4: Home Production Time Regression Results, Different Sex Couples

Note: this regression also includes year and state dummies that are not reported here. There are 30,590 observations for individuals in heterosexual couples. The R^2 for the regression is 0.1142. The table reports robust HC standard errors. Household income share is instrumented with relative wages and household demographic variables.

Finally use the model to back out values for χ_1, χ_2 to exactly match hours ℓ_1, ℓ_2 worked by households in the ACS data. This gives us parameter values that we can use in our policy experiments to quantify the effects of switching between individual and joint tax systems. Note that the χ values will be different for the base and full models since different values are needed to match hours worked in the data.

5 Policy Exercise: Joint vs. Individual Tax

In this section, we will report and discuss how the base model versus the full model match the data for same sex couples and what they imply for how the labor supply for heterosexual couples would respond to a theoretical switch from joint to individual taxation.

5.1 Matching Labor Response of Same Sex Couples

In section 2, we show that the labor supply before and after legalization of same sex marriage is not statistically different in terms of hours or employment. We first will report the fit of the base model in Table 6. The model is calibrated on couples from the before legalization sample where we drop all same sex couples that were married in order to focus on couples filing individually. The average yearly hours of secondary earners filing individual taxes is 1515 hours per year. In Table 6 we look at hours for secondary earners in same sex couples under joint taxes in the data and what is implied from the base model. In the data, find that hours decrease to 1492 hours per year but that these estimates are not statistically different from hours under individual taxes before legalization. In the subsequent rows of the table we show model predictions for different labor supply elasticity values. For a selection of labor elasticity parameters that are commonly used in the literature, between 0.5 and 0.7, secondary earners are predicted to decrease their labor hours under joint taxation 2 to 4 times more than what we find in the data. In the final row we show that the Frisch elasticity necessary to match the labor hours of secondary earners in same sex couples is 0.165, which is much lower than what is otherwise found in the literature. We see this as evidence to reject the base model as a good representation of secondary earner labor responses to marginal taxes. We then repeat the same exercise using the full model with private consumption. Using the same range of Frisch elasticities, we find that the full model predicts a response in hours worked between 0.4 and 1.3 times what is observed in the data. This suggests that the full model is able to closely match the response of hours worked by secondary earners in the data under reasonable values for labor supply elasticity.

We also look at the average yearly hours for primary earners in same sex couples in Table 7. Under individual taxes, we find that primary earners in same sex couples worked an average of 2148 hours per year. After the legalization of same sex marriage and access to joint tax filing, we find that primary earners work roughly the same number of hours. Again, we compare the data to the base model for a selection of commonly used labor supply

Secondary Earners	Avg. Yearly Hours, Joint Tax	Difference in Hours from Indv. Tax	P-value
Data	1492	-23	0.239
Base Model			
$\eta = 0.7$	1419	-96	0.000
$\eta = 0.6$	1446	-69	0.000
$\eta = 0.5$	1460	-55	0.004
$\eta = 0.165$	1492	-23	0.219
Full Model			
$\eta = 0.7$	1505	-10	0.593
$\eta = 0.6$	1497	-18	0.336
$\eta = 0.5$	1486	-29	0.122

Table 6: Data and Model Labor Supply of Secondary Earners in Same Sex Couples

Note: A primary earner is defined as the household member with the higher total income. Secondary earner is then the other member of the household. Before legalization we drop couples who are married and after legalization we drop couples that are not married. This helps us match before legalization to people filing individual taxes and after legalization to having the option for filing joint taxes. We compute average yearly hours worked in the data and then implied by the base model calibrated to labor decisions under individual taxes before legalization. We present results for the model with commonly used elasticities from the literature and also the elasticity that is necessary for matching the joint taxation labor supply we see in the data. Model implied labor supply uses the base model in subsection 3.1. Average yearly hours worked by secondary workers under individual taxes is 1515 hours. Please see Table 1 for when states legalized same sex marriage.

elasticities. The base model predicts that primary earners would increase their yearly labor supply by 49 to 68 hours when moving from individual to joint taxes, depending on the elasticity parameter, but the data showed a much smaller increase of 3 hours per year. To rationalize what we see in the data, we would need an extremely small Frisch elasticity of 0.025. Again, we see this as further evidence against the base model. Repeating the exercise using the full model with the same range of Frisch elasticities, we find that the full model predicts a response in yearly hours worked of 32 to 33 hours. The full model is still unable to match the small response in hours worked by primary earners, but the response is about half the response predicted by the base model.

Overall we find that the base model, which is similar to models common in the household

Primary Earners	Avg. Yearly Hours, Joint Tax	Difference in Hours from Indv. Tax	Prob(Diff>0)
Data	2151	3	0.860
Base Model			
$\eta = 0.7$	2216	68	0.000
$\eta = 0.6$	2206	58	0.000
$\eta = 0.5$	2197	49	0.000
$\eta = 0.025$	2151	3	0.860
Full Model			
$\eta = 0.7$	2180	32	0.003
$\eta = 0.6$	2180	32	0.003
$\eta = 0.5$	2181	33	0.003

Table 7: Data and Model Labor Supply of Primary Earners in Same Sex Couples

Note: A primary earner is defined as the household member with the higher total income. Secondary earner is then the other member of the household. Before legalization we drop couples who are married and after legalization we drop couples that are not married. This helps us match before legalization to people filing individual taxes and after legalization to having the option for filing joint taxes. We compute average yearly hours worked in the data and then implied by the base model calibrated to labor decisions under individual taxes before legalization. We present results for the model with commonly used elasticities from the literature and also the elasticity that is necessary for matching the joint taxation labor supply we see in the data. Model implied labor supply uses the base model in subsection 3.1. Average yearly hours worked by primary workers under individual taxes is 2139 hours. Please see Table 1 for when states legalized same sex marriage.

labor supply literature, is not able to match the labor supply responses of same sex couples. The full model with private consumption is able to get much closer to what we observe in the data with reasonable values for the Frisch elasticity of labor supply. In Table 6, with an elasticity parameter of 0.5, we find that secondary earners change their yearly hours worked by 29 hours in the full model compared to 23 hours in the data. This accounts for 81 percent of the difference between the data and the base model. Furthermore, in Table 7 we are able to generate smaller changes in hours worked by primary earners as well. With an elasticity parameter of 0.5, we find that primary earners change their yearly hours worked by 33 hours in the full model compared to 3 hours in the data. This accounts for 35 percent of the difference between the data and the base model. Table 8 summarizes the average yearly

hours under individual and joint taxes for same sex couples in the data and in the models with 0.5 elasticity parameter.

	Avg. Hours, F=I	Avg. Hours, F=J	Difference	Percent Change
Data				
Primary	2148	2151	3	0.1
Secondary	1515	1492	-23	-1.5
Base Model				
Primary	2148	2197	49	2.3
Secondary	1515	1460	-55	-3.6
Full Model				
Primary	2148	2181	33	1.5
Secondary	1515	1486	-29	-1.9

Table 8: Labor Supply of Same Sex Couples from Data and Models

Note: This table reports average yearly hours worked by primary and secondary earners in same sex couples in the data, from the base model, and from the full model. We calibrate the models to match the data under individual taxes exactly and then compare predicted hours under joint taxation. The difference and percent change columns are reporting changes in hours in moving from an individual to a joint tax system.

Ultimately, the variation of private consumption in the full model is what drives the smaller responses in labor supply to changes in tax regimes. Private consumption allows the income and substitution effects to cancel out when there is a change in marginal tax rates. This drives the labor supply response of primary and secondary earners closer to zero. Next, we will show what the model would predict for heterosexual couples where time spent on home production is more invariant to the share of after-tax household income within same sex couples.

5.2 Switching to Individual Taxation for Heterosexual Couples

In this subsection, we use the two models described before to study a counterfactual switch from joint to individual taxation for heterosexual married couples. This exercise is performed similarly as for same sex couples: we choose values for labor disutility of each individual in the model – χ_1, χ_2 – to exactly match hours worked in the data under joint taxation. We then change taxes from joint to individual in the model and report the change in hours worked predicted by the model in Table 9. The first row reports yearly hours worked by men and women in heterosexual marriages in the data. Since joint taxation was available to these couples for all years in the data, we do not report hours worked under individual taxation. The second row reports the predicted hours worked in the base model with pooled consumption. This model predicts large responses in hours worked for both men and women when switching from individual to joint taxation, with a 1.8 percent increase in hours worked by men and a 3 percent decrease in hours worked by women. These responses are similar to those found for same sex couples, which are reported in Table 8.

Finally, the third row reports the changes in hours worked found in the full model with private consumption. We find that the change in hours worked by both men and women in heterosexual couples are very close to zero. The small size of this change in hours worked is due to home production time for heterosexual couples being mostly invariant to the share of after-tax household income, as reported in Table 4. In the full model, if time spent on home production does not change when switching the tax system, hours worked will be unaffected. For heterosexual couples, a one percent change in the share of after-tax income results in only a 0.06 percent change in time spent on home production, so changing taxes between individual and joint systems will have very small effects on labor supply for heterosexual couples. Notably, the response of hours worked by heterosexual couples in the full model is much is much smaller than the response for same sex couples, which is shown in Table 8. Since time spent on home production by same sex couples responds about proportionally to changes in income shares, they will actually have much larger responses in labor supply

compared to heterosexual couples.

	Avg. Hours, F=I	Avg. Hours, F=J	Difference	Percent Change
Data				
Men	-	2031	-	-
Women	-	1435	-	-
Base Model				
Men	1995	2031	36	1.8
Women	1479	1435	-44	-3.0
Full Model				
Men	2030	2031	1	0.0
Women	1437	1435	-2	-0.1

Table 9: Data and Model Labor Supply of Heterosexual Couples

Note: This table reports average yearly hours worked by primary and secondary earners in heterosexual couples in the data, from the base model, and from the full model. We calibrate the models to match the data under joint taxes exactly and then compare predicted hours under individual taxation. The difference and percent change columns are reporting changes in hours in moving from an individual to a joint tax system.

6 Conclusion

In this paper, we study the labor disincentive effects of joint taxation in the United States using empirical and structural approaches. First, we use ACS data on the labor supply decisions of same sex couples before and after federal recognition of same sex marriage from 2009 to 2019 as a natural experiment to study the effects of switching from individually filing taxes to being able to file jointly. We find that the ability to file taxes jointly had small effects on hours worked and employment by both primary and secondary earners in same sex couples.

We then apply a standard model of household labor supply to data on same sex couples.

This model predicts a labor supply response for secondary earners that is over three times larger than what is observed in the data. To investigate further, we modify the standard model to include private consumption and heterogeneous home production time. Time spent on home production is estimated with American Time Use Survey data and depends on couple type, sex, age, number of children, and share of household income. Our model is able to match the small response in labor supply from changing tax regimes while also being consistent with relatively low labor supply by secondary earners.

Finally, we study a counterfactual switch from joint to individual taxation for heterosexual married couples. While the standard model predicts a 3 percent increase in female labor supply, our full model with private consumption and home production predicts an increase of only 0.1 percent. The small response is due to women's home production time being largely invariant to relative income within households and determined almost entirely by their age and number of children. Overall, we find that switching from joint to individual taxation has smaller effects on married households' labor supply compared to the literature. Nevertheless, switching from joint to individual taxation is may be welfare improving as it reduces intra-household inequality in private consumption.

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