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Spouse labor supply: fiscal incentive and income effect, evidence from French fully joint income tax system

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Abstract

The aim of the present paper is to measure the labor market participation elasticity with respect to income tax rates. A very complete data base of more than 500 000 observations a year is used. This data base is a large sample of the French income tax returns. The case of spouses is studied by comparing - for very similar couples - the probability of the secondary earner to participate in the labor market depending on the other foyer incomes on the one hand and depending on the tax rate which would apply on the income of this potential work on the other hand. Results find labor market participation elasticity with respect to income tax rate equal to -0.04 and with respect to income equal to -0.30. That for, it is outlined that joint income tax schedules have a negative impact on the secondary earners participation to labor market. As secondary earners are mainly women in France, joint income tax schedules have a negative impact on women participation to the labor market. Furthermore, different elasticities are measured for different population categories. Two phenomenons appear, they confirm each other partially. On the one hand, there is a difference between secondary earners more or less constrained to participate in the labor market. The more constrained ones have weaker elasticities than the less constrained ones. On the other hand, there is a major difference between the capital holders and the others. The capital holders' elasticity with respect to income tax rate is higher than their elasticity with respect to income. The opposite occurred for the other households.

Key words: Labor supply; Time allocation; Fiscal incidence.

JEL classification: H22; H31; J32.

1   Introduction

The aim of the present paper is to measure the labor supply elasticity of couple members with respect to income tax rates. More specifically, the case of secondary earners is pointed out with the hypothesis that they do not choose their working time but only their participation to labor market. With empirical estimations upon a very large base of French income tax returns, secondary earner participation elasticities with respect to tax rate and couple wealth are estimated and compared for different types of couples.

There exist two main reasons to limit the study to the case of secondary earners. One is linked to the economic subject, the other to econometric needs. First, some characteristics of income tax schedules may mainly influence secondary earner labor supply. Couple joint income taxation implies a very high tax rate on the secondary earner's potential wages, and therefore may be an incentive to give up working. Second, labor market is imperfect. Some workers are very constrainted on labor market, by financial needs or social pressure. Furthermore, there is quite little choice to really modify marginally one's working time. These two imperfections have a smaller impact on secondary earners because they have a real choice to participate or not because of the couple income due to primary earners. This choice is not only a marginal choice but may be a complete choice to participate to the labor market. Therefore, this choice is less constrained by working standards.

Estimating labor supply elasticities is a crucial point in determining optimal income tax schedule, and it can be done from different ways, finding different estimates. Blundell & MaCurdy (1999) define different wage elasticities. The most appropriate elasticity to describe response to one-and-for-all unanticipated shifts in net-of-tax wages is the intertemporal substitution elasticity corrected from future wage rate variations. The simple intertemporal substitution elasticity overestimates this key parameter. The static substitution elasticity is inferior to the intertemporal one without correction from future wage rate changes. Under some hypotheses - as the product of the discount factor and the interest rate equal to 1 - the static substitution elasticity is equal to the key parameter.

Feldstein (1995) uses panel data and the US 1986 tax reform to estimate an intertemporal taxable income elasticity, that he found high: higher than 1. However, this study concerns only the very high incomes, and does not control for the possible wage versus dividend shifts that some very high incomes are able to realize. Gruber & Saez (2002) also estimate intertemporal elasticity

of taxable income. They find that labor supply elasticity with respect to tax rate is quite high for the very high income agents. However, they find that the income effect is low. Piketty (1999) finds lower elasticities for lower income agents, and explains these results by a substantial income effect. After a tax rate increase, the marginal rate diminishes the net-of-tax wage, and therefore the incentive to work. However, not only the marginal wage is diminished, and the agent may have to work more to compensate its wealth decrease. Saez (2003) tries to estimate the difference between taxable income elasticity and wage income elasticity. He uses "bracket creep" variations and finds significant taxable income elasticities but insignificant and close to zero wage income elasticities. This can be due to labor market rigidities: workers (except for the very high income) do not have a real choice about their working time.

At that point, secondary earners may have a broader choice, and particularly the choice of participating to full time job market or to half time job market. Blundell et al. (1998) find for example a very high income effect for women with children, which should be for great part secondary earners. For a theoretical point of view, Kleven et al. (2006) study the optimal taxation of couples, using a specification where secondary earners choose only to participate or not, and not their working time. The model estimated in the present study is derivated from this one.

From an empirical point of view, Dagosvik et al. (1988), Bourguigon & Magnac (1990) and Blundell & Laisney (1998) estimate working hours supply elasticity, and not participation elasticity. From that hypothesis, Bourguigon & Magnac (1990) conclude that there is a lack of flexibility in working hours. Donni (2007), according to Donni (2003) theoretical results, keeps data about non participating secondary earners to estimate the household labor supply elasticities. However, the elasticities estimated deal with marginal working time variations. Piketty (1998) estimates the impact on secondary earner participation of different social gains, and specifically a parental allocation. He finds that allocations to non working women with children are very strong incentive for women with children to leave the labor market.

The present study focuses on the fiscal influence on secondary earner participation to the labor market. The point is to estimate secondary earner participation probability elasticities with respect to tax rate and income. The estimations use tax rate brackets as source of variation. The estimates are made separately for different social categories of couples, then compared. Thanks to the richness of the data base, it is possible to estimate the elasticities for a high number of different couple

categories - actually, a division between 3 000 couple categories is done. This allows avoiding some endogenous biases and provides information on differences between different secondary earner elasticities.

On a global point of view, substantial elasticities are found. Participation elasticity with respect to the tax rate is found equal to -0.04, and participation elasticity with respect to other incomes of the household is found equal to -0.30. This means that an increase from 10% to 11% (a 10% increase) of the marginal tax rate for the secondary earner would induce that 1 working secondary earner out of 250 will leave the labor market. An increase from 1000 to 1100 euros (a 10% increase) of the monthly other income of the households would induce that 1 working secondary earner out of 33 will leave the labor market. That for, joint income tax schedules have a negative impact on the secondary earner participation. As secondary earners are mainly women in France, joint income tax schedules have a negative impact on women participation to the labor market.

Furthermore, elasticities of different kinds of households are compared. Two main results are found. First, households more constrained on labor market (low qualified, young, with children) are less elastic than other households. Second, capital owner households have a higher elasticity with respect to tax rate and a lower income effect than other households.

The remainder of this paper is organized as follow. Section 2 presents the theoretical framework, explaining the parameters that are estimated in the following sections. Section 3 introduces to the French income tax schedule and presents the data used for the present study. Section 4 explains the estimation methodology and presents the results. Section 5 discusses the results and offers concluding remarks.

2   Theoretical framework

Labor market is deeply imperfect. Two of the main imperfections on the supply side are some vital or social constrains on the one hand, and the lack of marginal variation decision on the other hand. Therefore, household labor supply models should take into account the existence of a primary and a secondary earner. Kleven et al. (2006) present a model where the primary earner works and chooses his working hours and the secondary earner chooses to participate or not at a fixed working time. The specifications used in the present paper are similar to those of Kleven et al. (2006), with the decision of the secondary earner having no impact on the decision of the primary earner. The

condition is then that the income tax schedule should be separable. However, if the income tax schedule is not separable from itself, it can be considered as separable depending on the household participation decision process. The primary earner works and the household considers this income as the reference income. Then, the decision for the secondary earner to work is taken depending on the returns of this potential working.

The model estimated in the present paper considers a household utility function $U[C, L]$ depending positively on the household consumption and the secondary earner leisure. The influence of the secondary earner leisure on the household utility may either comes from the direct utility of leisure for the secondary earner as from the utility of the unwaged work made by the secondary earner during this "leisure" time. It may also correspond to consumption utility if the household has to pay wages for domestic services in case of secondary earner participation.

The reference situation is the secondary earner non participation. The secondary earner leisure is L_0 and the household income by consumption unit is $Y_0(\theta_1, \theta_2)$, allowing the household to consume $C_0(\theta_1, \theta_2)$. The parameter θ_1 represents the observable characteristics of the household, which can be the age of both members of the couple, their qualification, their social class, their number of children... This parameter defines a mean income whose the household may pretend to. Similar households with respect to θ_1 may receive different exogenous shocks θ_2 on their income. Therefore, if the secondary earner does not participate, the couple utility depending on θ_1 and θ_2 is given by equation 1.

$$U_{\theta_1, \theta_3}[C_0(\theta_1, \theta_2), L_0] \tag{1}$$

Where θ_3 reflects the individual preferences of the household. This parameter θ_3 is supposed to be unobservable and independent from θ_2. Therefore, the optimization process results in the probability for the θ_1 and θ_2 type secondary earner to participate and not in its actual choice to participate.

The secondary earner may work for wages $W(\theta_1)$, depending on the household characteristic parameter θ_1. This dependence comes from an endogamous hypothesis. Moreover, it is assumed that the income shock θ_2 has no impact on the potential secondary earner wages. Therefore, if the secondary earner participates, the couple utility depending on θ_1, θ_2 and θ_3 is given by equation 2.

$$U_{\theta_1,\theta_3}[C_0(\theta_1,\theta_2) + \frac{W(\theta_1) - I[W(\theta_1),\theta_1,\theta_2]}{P}, L_0 - T] \tag{2}$$

Where T is the working time, P is the price index and $I[W(\theta_1),\theta_1,\theta_2]$ is the income tax paid by the household on the secondary earner wages. This income tax depends on the secondary earner wages $W(\theta_1)$, but also on the other household income - actually θ_1 and θ_2 - because a joint income tax is studied.

To present the result on a graph, another hypothesis is made: the utility function is assumed to be separable. Two functions are then derivated from the utility function, depending on θ_1, θ_2, θ_3 and the working time t of the secondary earner. The first function $f_{\theta_1,\theta_3}(t,\theta_2)$ gives the utility increase due to consumption increase because of the secondary earner work. This function is increasing and concave with respect to the secondary earner working time t for two reasons: first, the utility function is assumed to be concave with respect to the consumption and second, the income tax schedule is assumed to be with increasing marginal rates. This function f is decreasing with respect to the income shock θ_2 for two reasons: first, the utility function is concave with respect to household consumption, which means that same net of tax secondary earner wages generate less additional utility when the rest of household income Y_0 is higher. It is the income effect. Second, the income tax schedule is joint and with increasing marginal rates. Therefore, when θ_2 is higher, the tax rate on secondary earner wages is higher, and the net of tax income from the secondary earner work is lower. It is the marginal tax rate effect.

The second function $g_{\theta_1,\theta_3}(t)$ gives the utility decrease due to leisure loss when the secondary earner works a time t. This function is assumed to be increasing and convex with respect to t and does not depend on θ_2. Figure 1 shows functions f and g for θ_1 and θ_3 fixed, and for two different values of the shock θ_2: a value $\bar{\theta}_2 = h$ for a high income shock and a value $\underline{\theta}_2 = l$ for a low shock.

According to the lack of flexibility in working hours, the only decision that can be taken by the secondary earner is to work a time T^* or not to participate to the labor market. In Figure 1, the secondary earner participates when the other income of the household has received a low shock $\underline{\theta}_2$ and does not participate when it has received a high shock $\bar{\theta}_2$.

According to θ_3 exogenous distribution, the income shock θ_2 should impact the probability for the secondary earner of a θ_1 household to participate to the labor market. The aim of the present study is to estimate the impact on the secondary earner participation rate of the θ_2 shock on the

Figure 1: Secondary earner decision to work depending on other income shock
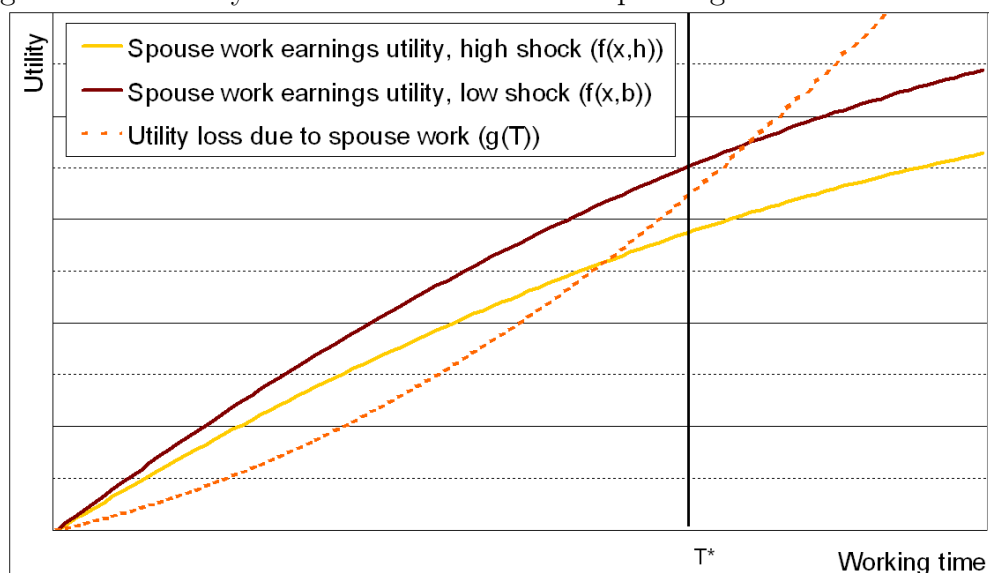
Note: This figure presents the participating choice, depending on the income shock θ_2 (shock on the couple income less the potential spouse wage). T^* is the legal work time, the only work time possible for the secondary earner.

per consumption unit household income. First of all, the total effect is estimated globally, then the income effect and the marginal tax rate effect are estimated separately.

3   Data

The present paper uses French data to estimate the elasticity of the secondary earner participation to labor market with respect to tax rate and household income. For doing so, a sample for 2005 of French income tax returns is used. This sample contains more than 500 000 observations representing the about 34 millions of French income tax returns. Therefore, the study uses more than 270 000 joint returns, as a sample of the 13 millions couples declaring jointly. The variables are all the information provided by households in their income tax return, except for the names and addresses.

In the French income tax return for married couple, the husband is declared as primary earner. For couples living together with a PACS[1], they can choose which one is declared as primary earner.

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[1]PACS is a couple contract with some difference with marriage (may be contracted between homosexual partners), that opens right to joint income tax declaration.

However, primary earners are mainly men whereas women are mainly secondary earners for the heterosexual couples. This declaration of "declaring people" (primary earner) or "spouse" (secondary earner) is meaningful. For the 2005 returns studied in the present papers, more than 77% of the couples were with primary earner wages higher than secondary earner's, and among the other 23%, some couples include a retired primary earner. Similarly, there were only 250 000 declared secondary earner participating as the declared primary earner does not, among more than 13 millions couples (less than 2%).

The French income tax schedule provides a good source of estimation for secondary earner participation elasticity, because it is progressive and married people may declare jointly. Concerning the progressive tax schedule, Figure 2 presents the French income tax schedule for a single without any child.

Figure 2: French income tax schedule
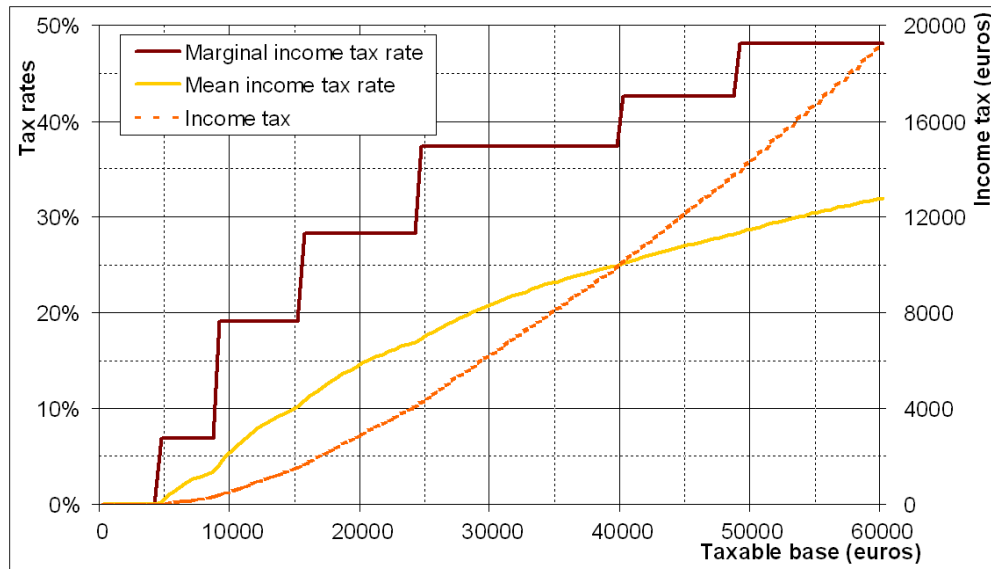
Note: This figure presents the French income tax schedule. The mean rate and the global tax are calculated for a single without children nor fiscal deduction.

Theoretical marginal rates appear to be high, but the real marginal rates are much lower. As an example, 2005 French income tax collected less than 3% of the annual GDP, as the same percentage is about 10% for most the other OECD countries. These high theoretical rates operate on a base substantially lower than the real incomes[2]. However, if the facial values of these rates are not valid,

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[2]For example, they operate on 72% of the wages lower than 120 000 euros, and on 50% of dividend income.

brackets exist. Therefore, this schedule defines a convex function f that gives the tax amount T from the income Y ($T = f(Y)$). The present paper uses the convexity of this function - and the non continuity of its derivative - to estimate the spouse participation elasticity.

Furthermore, married and PACSed couples may declare jointly. To calculate the joint income tax, a household should be attributed a number of *parts* p, according to Table 1.

Table 1: Number of *parts* for a declarant

Couple situation	Number of people in charge				
	0	1	2	3	suppl.
Couple (joint declaration)	2 parts	2,5 p.	3 p.	4 p.	+1 p.
Couple (separeted declaration)	1 p.	1,5 p.	2 p.	3 p.	+1 p.
Single	1 p.	2 p.	2,5 p.	3 p.	+1 p.
Widow	1 p.	2,5 p.	3 p.	4 p.	+1 p.

The number of *parts* due to couple is called the *conjugal quotient*, and the number of *parts* due to people in charge[3] is called *family quotient*. The household income tax is calculated as $T = pf(\frac{Y}{p})$, that is inferior to $f(Y)$ because f is convex. Similarly for the conjugal quotient, $2f\left(\frac{Y_1+Y_2}{2}\right) \leq f(Y_1) + f(Y_2)$. The tax reduction due to *conjugal quotient* is unbounded whereas the tax reduction due to *family quotient* is bounded.

For a given *family quotient*, the *conjugal quotient* provides an income tax diminish increasing with respect to the difference between the earner's incomes. Therefore, the tax diminish is mainly decreasing with respect to the secondary earner wages, whose first euro may be taxed at a quite high marginal rate. This tax schedule may be a negative incentive for the secondary earner to participate.

However, there exists a lot of other incentives to participate or not to participate to the labor supply. Figure 3 presents four of the main determinants for secondary earner participation.

Concerning the number of children (e.g. Figure 3a), there appears no difference between the participation of secondary earners with 1 and 2 children. After the third child, the participation ratio decreases strongly. Angrist & Evans (1998) demonstrate that this diminish is not only due to selection effects. Using the situation of having two first children of same sex as instrumental

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[3]People in charge are mainly children, but they may also be old or dependant people.

Figure 3: Determinants for second earner participation

a. Children

b. Income level

c. Age

d. Capital ownership

variable, they demonstrate that without other incidences, having three or more children constraints the women participation to labor market. In addition, the low participation rate for couple without any child in charge is due to three causes. First, there are some young couples whose secondary earner is still a student. Second, there are some old couples, whose children are not in charge any more, and who are retired. Third, other age couples without children may more easily stay out of the labor market because they have less responsibility.

Concerning Figure 3b, the curve presents two parts. First, the secondary earner participation rate is increasing with respect to the income tax bracket. An explaining way is endogamy. A low couple tax bracket means that the primary earner wages are low, and therefore that its qualification may be low. In that case, the probability for the secondary earner to be also low qualified is substantial. The second part of the curve is slowly decreasing. This may reflect the large scale

impact of income effect. Secondary earners married to a very rich primary earner have less necessity than other to work.

Figure 3c presents the link between age and participation. The clearer effect is retirement that begins just before age of 60. After 60, it is quite the case for all secondary earners. There is a very slow increase over the activity ages. Younger than 30 year-old secondary earners are a little less participating than older ones. It can be caused by the existence of student secondary earners.

The last of these four figures, Figure 3d, presents the impact of asset owning on participation. Asset owners participate less than other people. This is mainly caused by income effect, that is that they do not need to participate to earn income. Furthermore, it seems that the difference is larger concerning real assets than financial assets. The reason may be due to a composition effect. Old people are more likely to own real estate than financial assets.

The point of the empirical study is to capture only the fiscal incidence on secondary earner participation to labor market, and not the incidences presented in Figure 3. The empirical strategy is then to compare couples identical with respect to these determinants of spouse labor supply. According to the theoretical framework, the point is to compare only couples whose parameter θ_1 is the same. Therefore, categories are built to compare only identical couples, and estimations are done only within these categories. Table 2 presents the θ_1 parameter calibration that divided the sample between 3 000 household categories.

Table 2: Couple categorization

Parameters	Nb.	categories
Children	3	0, 1 or 2, ≥ 3
Child younger than 3	2	yes, no
Secondary earner age	5	≤ 30,30-40,40-50,50-60, > 60
Primary earner age	5	≤ 30,30-40,40-50,50-60, > 60
Primary earner wage	5	≤ 0.5 SMIC, 0.5-1, 1-2, 2-4, > 4 SMIC
Financial asset returns	2	yes, no
Real asset returns	2	0, < 0.5 SMIC, > 0.5 SMIC

Note: SMIC is the French minimum wage, the value of a year full time job is used as income reference.

In addition, it is important to note that the French finance departement provides a free electronic

service to estimate the income tax. Despite the huge complexity of the French income tax system, it is easy and quick to estimate the income tax on line, with and without the secondary earner potential wages.

4 Empirical results

In the fourth section, estimations are presented. There are two kinds of estimations aiming to catch two different effects. In the first subsection, the influence of the income shock θ_2 is globally estimated for different couple categories (estimates consider together the income and marginal tax rate effects). The point is to understand which kind of spouse has high or low participation elasticity. The second subsection tries to differentiate between the income effect and the marginal tax rate effect. The point is to understand the main participation motivation for the different couple categories.

4.1 Global estimation

The first subsection tries to understand globally the impact of primary earner income shocks θ_2 on the probability π of the secondary earner participation to the labor market. The regression, presented by equation (3), is a logit regression of the secondary earner participation rate on the yearly income - excepted secondary earner wages - by consumption unit (this income is noted Y_{cu} and catches the θ_2 impact), controlled by the couple category (θ_1) defined in Table 2.

$$\ln\left(\frac{\pi}{1-\pi}\right) = a + b\ln\left(Y_{cu}\right) + \sum_{\theta_1} c_{\theta_1}\mathbf{1}_{\theta_1} + u_i \tag{3}$$

With the results of this regression, and particularly the parameters b and π, the secondary earner participation global elasticity may be calculated following equation (4).

$$\epsilon^\pi = \frac{Y_{cu}}{\pi}\frac{\partial\pi}{\partial Y_{cu}} = b(1-\pi) \tag{4}$$

First, this regression is implemented on the whole sample. Then, it is implemented on different subsamples. Each subsample represents a different couple category. Table 3 presents the results for child and age categorizations. Table 4 presents the results for income categorizations.

12

Table 3: Spouse participation elasticity, child and age differention

	Participation ratio π	Income parameter b	**Overall elasticity** $b(1-\pi)$
Overall	47,9 %	-0,246	**-0,128***
		(0,001)	(0,001)
Children in charge			
No child	31,2 %	-0,360	**-0,247***
		(0,002)	(0,001)
1 or 2 children	70,3 %	-0,214	**-0,064***
		(0,001)	(0,001)
More than 3 children	53,2 %	-0,021	**-0,018***
		(0,003)	(0,001)
Child younger than 3			
No	45,6 %	-0,286	**-0,156***
		(0,001)	(0,001)
Yes	63,9 %	0,003	**0,001**
		(0,003)	(0,001)
Secondary eraner age			
Less than 30	67,2 %	0,044	**0,014***
		(0,005)	(0,002)
Between 30 and 40	69,6 %	-0,101	**-0,031***
		(0,002)	(0,001)
Between 40 and 50	69,7 %	-0,242	**-0,073***
		(0,002)	(0,001)
Between 50 and 60	55,1 %	-0,347	**-0,156***
		(0,002)	(0,001)
More than 60	5,4 %	-0,017	**-0,016***
		(0,000)	(0,000)
Primary earner age			
Less than 30	72,9 %	-0,033	**-0,009***
		(0,006)	(0,002)
Between 30 and 40	70,7 %	-0,093	**-0,029***
		(0,003)	(0,001)
Between 40 and 50	69,6 %	-0,257	**-0,078***
		(0,002)	(0,001)
Between 50 and 60	60,0 %	-0,334	**-0,134***
		(0,002)	(0,001)
More than 60	11,9 %	-0,247	**-0,218***
		(0,000)	(0,000)

Notes: b is the coefficient out of regression (3). Elasticities are calculated with respect to (4). *: significant at 5%.

Table 4: Spouse participation elasticity, income differention

	Participation ratio	Income parameter	Overall elasticity
	π	b	$b(1-\pi)$
Primary earner wages			
< 6 871	23,4 %	-0,124	**-0,095***
		(0,001)	(0,001)
< 13 742	63,1 %	-0,480	**-0,177***
		(0,006)	(0,002)
< 27 485	75,0 %	-0,925	**-0,231***
		(0,004)	(0,001)
< 59 970	72,3 %	-1,157	**-0,320***
		(0,005)	(0,001)
> 59 970	53,6 %	-0,409	**-0,190***
		(0,007)	(0,003)
Household incomes			
< 8 000	51,6 %	0,157	**0,076***
		(0,002)	(0,001)
< 12 000	59,0 %	-0,579	**-0,237***
		(0,015)	(0,006)
< 20 000	47,3 %	-1,359	**-0,716***
		(0,011)	(0,006)
< 50 000	34,0 %	-1,202	**-0,793***
		(0,008)	(0,005)
< 100 000	33,0 %	-0,227	**-0,152***
		(0,025)	(0,017)
< 250 000	37,0 %	0,048	**0,030**
		(0,037)	(0,023)
< 1 000 000	39,7 %	0,071	**0,042**
		(0,056)	(0,034)
> 1 000 000	40,1 %	-0,002	**-0,001**
		(0,106)	(0,063)
Movable capital			
No income	50,7 %	-0,158	**-0,078***
		(0,002)	(0,001)
Income	42,7 %	-0,372	**-0,213***
		(0,002)	(0,001)
Real estate			
No income	49,8 %	-0,242	**-0,121***
		(0,001)	(0,001)
Income	37,9 %	-0,264	**-0,164***
		(0,003)	(0,002)

Notes: b is the coefficient out of regression (3). Elasticities are calculated with respect to (4). *: significant at 5%.

First of all, it appears that the secondary earner participation elasticity is high and that the results are very significant (almost all significant at the level of 1%). The mean elasticity is found equal to -0.13, which is substantially high. For an example, the mean participation ratio being about 48%, if the income by consumption unit of 163 couples increases from 1500 to 1650 euros monthly - that is a 10% increase - 1 spouse among the 78 that participate to the labor market stops participating.

The point of the severall "by category" estimations is to compare secondary earner participation elasticity between different couple categories. Because the standard errors are quite all very small, not only the eslasticity estimates are significant, but the differences between these estimates are also significant. The main interpreting way is about constraints on the labour market. The idea is that because of individual reasons, some secondary earners are forced to participate or not to participate. Therefore, their participation does not depend (or suffer a weak dependence) on marginal variations of their household income.

The first constraint appearing is the existence of children in charge. Having children in charge gives responsibility and may be an incentive for the secondary earner to participate. Therefore, secondary earners without any child in charge have a high elasticity. This is not due only to composition effect, because young couples (mostly without children) and old couples (with children not in charge anymore) have very low elasticities. Concerning, the third and more children category, the results may be explained by the Angrist & Evans (1998) demonstration that third child presents a real constraint on wives participation in the labor market. Indeed, secondary earners with three children or more have an even less elasticity than those with one or two children. Furthermore, having a young baby seems to have an even stronger effect than having more than three children. Spouses with less than three year old children have a higher participation rate and a lower elasticity than spouses with more than three children.

Concerning the differentiation with respect to ages, two parameters are used: the secondary or the primary earner ages. For the categories under 60 year old, the results are similar for the two parameter differentiations. The secondary earner participation elasticity is increasing with respect to the couple age. The constraint here is due to the fact that young people do not work only to earn money, but also work to prepare the folllowing of their career. The decision to work is then less strongly linked with the household budgetary constraint. However, there exists a difference

between the two parameter categorizations concerning the more than 60 year old. The more than 60 year old secondary earners do not participate anymore, and have therefore very low participation elasticity. Though, among the spouses of more than 60 year old primary earners, there is some younger than 60 year old people. These secondary earners have very high participation elasticity with respect to their household income - high enough to compensate the other secondary earner low elasticity - because their retirement depends mainly on the income they would have during the rest of their lives.

The elasticity is found first increasing, then decreasing with respect to the primary earner wages and the household income. The increasing part is intuitive, and may be explained by two arguments. First, because of endogamy, spouses of primary earners with low wages have a higher probability to suffer classical unemployement. They are therefore constrained in the labor market and have quite no participation choice. Second, secondary earners whose household is less budgetary constrained are freer to choose whether or not they will participate. The decreasing part is less intuitive. An explaination is presented in the following subsection, by comparing income and tax rate effects.

Concerning asset owning, it appears that asset owners have higher elasticity than others. However, there may be many reasons and the second subsection, with tax rate effect and income effect differentiation, gives more information on that point too.

4.2   Tax incidence and income effect

To identify the real causes of secondary participation, this subsection aims at determinating two effects in the participation elasticity: the marginal tax rate effect and the income effect. This is possible because of two French income tax schedule properties. First, there exist tax deductions that partly disconnect household income from household marginal tax rate. Second, there are discontinuities in marginal tax rates whereas household income is continuous. The point of the present subsection is to estimate the income effect through marginal differences in the household income by consumption unit, and to estimate the tax rate through the income tax schedule discontinuities. In order to keep the income effect estimation, regression discontinuity analysis is not implemented. However, the potential tax rate on the secondary earner is used to estimate the tax rate effect, and the potential tax rate differences between households are depending almost only on the disctance to the tax schedule discontinuities.

The estimations take two steps. The first step is the secondary earner potential wages estimation to calculate the potential tax rate on the secondary earnings. What impact the potential tax rate is mainly the distance to the next bracket. Therefore, final results depend weakly on the secondary potential earnings estimation method[4]. The results presented here use the two steps Heckman method correcting from selection bias. First, the participation is estimated with a probit model, the Mills ratio $\hat{M}$ is calculated for each couple. This estimation is different from the main participation regression: it is done uniformly for the overall population, measuring the main participation causes (the main participation regression controls from these causes to understand only the tax and income impacts), as the children number, the age, the non-working income. In the present case, it is not a problem that some regressors are used for the two steps of the Heckman estimation: because of the huge number of observations, the Mills ratio is not colinear to the regressors. Then, regression (5) estimates the secondary earner potential wages.

$$\ln\left(W_S\right) = a + b\ln\left(W_P\right) + c\ln\left(Y_{RA}\right) + d\ln\left(Y_{FA}\right) + e\hat{M} + \sum_{i,j} f_{i,j}\mathbf{1}_{[ages=i,j]} + u \tag{5}$$

Where W_S are the secondary earner wages, W_P the primary earner wages, Y_{RA} the household real asset returns and Y_{FA} the household financial asset returns. This regression gives the potential wages W_S^p for each secondary earner. Two income taxes for each household are then calculated, taking into account all the income tax deductions, reductions... The first one is the income tax I_0 that would pay the household if the secondary earner does not participate to the labor market. The second is the income tax I_1 that would pay the household if the secondary earner participates and earns W_S^p. Following, the potential secondary earnings tax rate is calculated as $\tau = \frac{I_1 - I_0}{W_S^p}$.

What matters mostly is not actually the difference between potential wages, but the distance of the household to the next income tax bracket. This explains why the income and marginal tax rate elasticity estimates are similar using these potential wage estimates, potential wages estimated with OLS or arbitrary the same potential wages for every secondary earner.

Then, the second step consists in a logit regression of the participation rate with respect to both the secondary earner potential wage tax rate τ and the household other income Y_{cu} by consumption unit, as presented by equation (6).

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[4]Three estimations of tax rate and income effects have been implemented, with different potential secondary earnings estimations : OLS, Heckman method and a fix amount. The results are identical.

$$\ln\left(\frac{\pi}{1-\pi}\right) = \alpha + \beta\ln\left(\tau\right) + \gamma\ln\left(Y_{uc}\right) + \delta\ln\left(\tau\right)*\ln\left(Y_{uc}\right) + \sum_{\theta_1}\epsilon_{\theta_1}\mathbf{1}_{\theta_1} + u_i \tag{6}$$

From this regression, the tax rate elasticity and the income elasticity of secondary earner participation to labor market may be calculated, as presented by equations (7) and (8).

$$\epsilon_\tau^\pi = \frac{\tau}{\pi}\frac{\partial\pi}{\partial\tau} = \left(\beta + \ln\left(Y_{uc}\right)\delta\right)\left(1 - \pi\right) \tag{7}$$

$$\epsilon_{Y_{uc}}^\pi = \frac{Y_{uc}}{\pi}\frac{\partial\pi}{\partial Y_{uc}} = \left(\gamma + \ln\left(\tau\right)\delta\right)\left(1 - \pi\right) \tag{8}$$

This estimation process is first implemented on the whole sample. Then, it is implemented on different subsamples, representing different couple categories. Table 5 presents the results for child and age categorizations. Table 6 presents the results for income categorizations.

First of all, it can be noticed that the income effect seems to be higher with the present specification. The previous estimation strategy considers only the before tax income, and therefore underestimates the income effect. However, the previous interpretations does not take into account the elasticity values themselves, but the elasticity differences between different couple categories.

The previous subsection showed that the mean income effect is high, it appears now that the mean tax rate effect is also substantial: -0.038. For example, the mean participation ratio being about 47.9%, if the marginal income tax rate increases from 10% to 11% - that is a 10% increase - for 550 couples, 1 secondary earner among the 263 that participate in the labor market stops her participation.

Despite the importance of the participation elasticity with respect to the marginal tax rate, its value is almost allways lower than the participation elasticity with respect to income. Furthermore, concerning children and age categorizations, these two elasticities evolve in the same way as the general elasticity studied in the previous subsection. The only difference appears for the more than 60 year old categories. For the more than 60 year old secondary earners, the income effect decreases, whereas the tax rate effect stays at a medium level. For the spouses of more than 60 year old primary earners, the tax rate effect disappears whereas the income effect takes off. This confirms the hypothesis of high elasticity because of retirement reasons. The main incentive for a less than 60 year old secondary earner to follow his more than 60 year old spouse in retirement is the income that the household would earn if the secondary earner retires.

Table 5: Spouse participation elasticities, child and age difference

	Participation ratio π	Tax rate parameter β	Income parameter γ	Crossed parameter δ	**Tax rate elasticity** $[\beta+ln(Y_{uc})\delta](1-\pi)$	**Income elasticity** $[\gamma+ln(Y_{uc})\delta](1-\pi)$
Overall	47,9 %	1,405	-0,925	-0,152	**-0,038***	**-0,296***
		(0,012)	(0,003)	(0,001)	(0,008)	(0,002)
Children in charge						
No child	31,2 %	1,073	-0,992	-0,112	**-0,002**	**-0,503***
		(0,018)	(0,005)	(0,002)	(0,018)	(0,005)
1 or 2 children	70,3 %	1,759	-0,852	-0,206	**-0,047***	**-0,095***
		(0,017)	(0,005)	(0,002)	(0,007)	(0,002)
More than 3 children	53,2 %	1,814	-0,715	-0,190	**0,045**	**-0,059***
		(0,036)	(0,009)	(0,004)	(0,024)	(0,007)
Children younger than 3						
No	45,6 %	1,373	-0,947	-0,150	**-0,026***	**-0,316***
		(0,013)	(0,004)	(0,001)	(0,008)	(0,003)
Yes	63,9 %	1,250	-0,572	-0,130	**0,022**	**-0,069***
		(0,033)	(0,010)	(0,004)	(0,018)	(0,006)
Secondary earner age						
Less than 30	67,2 %	0,336	-0,302	-0,035	**0,007**	**-0,064***
		(0,053)	(0,019)	(0,006)	(0,025)	(0,009)
Between 30 and 40	69,6 %	1,915	-0,860	-0,214	**-0,017**	**-0,078***
		(0,027)	(0,008)	(0,003)	(0,012)	(0,004)
Between 40 and 50	69,7 %	1,688	-0,893	-0,193	**-0,033***	**-0,123***
		(0,021)	(0,006)	(0,002)	(0,008)	(0,002)
Between 50 and 60	55,1 %	1,530	-1,046	-0,164	**-0,017**	**-0,302***
		(0,020)	(0,006)	(0,002)	(0,012)	(0,003)
More than 60	5,4 %	-0,008	-0,010	0,001	**0,002**	**-0,012***
		(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
Primary earner age						
Less than 30	72,9 %	0,006	-0,461	-0,006	**-0,013**	**-0,120***
		(0,089)	(0,031)	(0,010)	(0,034)	(0,012)
Between 30 and 40	70,7 %	1,967	-0,927	-0,215	**-0,003**	**-0,092***
		(0,029)	(0,009)	(0,003)	(0,012)	(0,004)
Between 40 and 50	69,6 %	1,565	-0,863	-0,178	**-0,027***	**-0,120***
		(0,023)	(0,007)	(0,003)	(0,011)	(0,003)
Between 50 and 60	60,0 %	1,582	-1,023	-0,174	**-0,031***	**-0,252***
		(0,019)	(0,006)	(0,002)	(0,011)	(0,003)
More than 60	11,9 %	-1,324	-0,407	0,174	**0,308***	**-0,722***
		(0,000)	(0,000)	(0,000)	(0,000)	(0,000)

Notes: β, γ and δ are the coefficients out of regression (6). Elasticities are calculated with respect to (7) and (8). *: significant at 5%.

Table 6: Spouse participation elasticities, income differention

	Participation ratio	Tax rate parameter	Income parameter	Crossed parameter	**Tax rate elasticity**	**Income elasticity**
	π	β	γ	δ	$[\beta + ln(Y_{uc})\delta](1-\pi)$	$[\gamma + ln(Y_{uc})\delta](1-\pi)$
Primary earner wages						
< 6 871	23,4 %	0,405	-0,442	-0,053	**-0,070***	**-0,237***
		(0,014)	(0,005)	(0,002)	(0,018)	(0,005)
< 13 742	63,1 %	3,289	-1,467	-0,377	**-0,025**	**-0,092***
		(0,049)	(0,014)	(0,006)	(0,027)	(0,009)
< 27 485	75,0 %	6,367	-2,690	-0,677	**-0,016**	**-0,217***
		(0,045)	(0,012)	(0,005)	(0,016)	(0,005)
< 59 970	72,3 %	0,112	-1,203	-0,009	**-0,006**	**-0,328***
		(0,098)	(0,016)	(0,010)	(0,039)	(0,007)
> 59 970	53,6 %	1,271	-0,428	-0,191	**-0,368**^{o}	**-0,077***
		(0,294)	(0,033)	(0,028)	(0,196)	(0,023)
Household income						
< 8 000	51,6 %	-1,165	0,652	0,146	**0,029**	**0,052***
		(0,038)	(0,018)	(0,004)	(0,024)	(0,011)
< 12 000	59,0 %	2,285	-1,354	-0,240	**-0,031**	**-0,268***
		(0,278)	(0,089)	(0,030)	(0,161)	(0,051)
< 20 000	47,3 %	-9,600	0,710	1,017	**0,102**	**-0,844***
		(0,283)	(0,067)	(0,029)	(0,210)	(0,050)
< 50 000	34,0 %	-5,317	-0,666	0,567	**0,319**	**-1,088***
		(0,285)	(0,045)	(0,028)	(0,267)	(0,044)
< 100 000	33,0 %	17,800	-2,008	-1,652	**-0,334**	**-0,003**
		(1,513)	(0,161)	(0,137)	(1,436)	(0,155)
< 250 000	37,0 %	2,961	-0,319	-0,308	**-0,432**	**0,014**
		(2,511)	(0,235)	(0,211)	(2,231)	(0,209)
< 1 000 000	39,7 %	-2,434	0,211	0,140	**-0,381**	**0,031**
		(2,650)	(0,238)	(0,204)	(2,250)	(0,200)
> 1 000 000	40,1 %	-4,114	0,274	0,291	**-0,057**	**-0,044**
		(5,537)	(0,439)	(0,378)	(4,661)	(0,377)
Movable capital						
No income	50,7 %	2,253	-1,341	-0,237	**0,029***	**-0,349***
		(0,016)	(0,006)	(0,002)	(0,012)	(0,004)
Income	42,7 %	0,475	-0,568	-0,065	**-0,091***	**-0,226***
		(0,023)	(0,005)	(0,003)	(0,021)	(0,005)
Real estate						
No income	49,8 %	2,005	-1,218	-0,214	**0,003**	**-0,333***
		(0,014)	(0,004)	(0,002)	(0,012)	(0,003)
Income	37,9 %	0,633	-0,442	-0,084	**-0,123***	**-0,167***
		(0,034)	(0,007)	(0,004)	(0,032)	(0,007)

Notes: β, γ and δ are the coefficients out of regression (6). Elasticities are calculated with respect to (7) and (8). *: significant at 5%.

Concerning the wage and income categorizations, it appears in the previous subsection that elasticity is first increasing then decreasing. For the increasing part, the reason of this variation is mainly the income effect, which reaches -1 for the couples earning yearly between 12 000 and 50 000 euros by consumption unit. Following, the income effect decreases for richer households. It seems that the tax rate effect increases when the global elasticity decreases, but this result is not significant.

The elasticity crossing is significant for the asset owning categorizations. The asset owners have higher tax rate elasticity and lower income elasticity than asset non owners. This crossing occurs both for financial asset owning and real asset owning. There are two ways of understanding this phenomenon. The first interpretation is that budget constraint of the richer households is not tightening at all. Therefore, income effect is weak. At the opposite, they make the participation depends on what the secondary earner may earn, and the elasticity with respect to income tax rate is high.

The other way of understanding the elasticity crossing is to have an intertemporal interpretation. This is not an interpretation opposed to the previous one, but a complementary interpretation. Wealthier households and asset owners have a longer run intertemporal optimization of their decisions (or wealth and capital allow their owners to optimize intertemporally their decisions). For these households, an income shock is smoothed all along the life cycle and has therefore little impact on their labor market participation decisions.

5 Conclusions

The present study points out the impact of household income and income tax rates on the secondary earner participation in the labor market. That for, it outlines that joint income tax schedules may have a negative impact on the secondary earners participation. As secondary earners are mainly women in France, joint income tax schedules have a negative impact on women participation in the labor market.

This negative impact occurs through two different ways. First, joint income tax schedules provide income tax reduction to households. Therefore, they are wealthier, which is an incentive not to participate for the secondary earner. This income effect is particularly effective for middle class households. Second, joint income tax schedules make the tax rate higher for secondary earner

wages. This is also an incentive not to participate for the secondary earner. This tax rate effect is particularly effective for higher class households. Lower class households are little impacted by these two effects, because they are more constrained on the labor market from a demand point of view.

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