TEPP WORKING PAPER

N° 2019 - 05

INEFFICIENT COUPLES: NON-MINIMIZATION OF THE TAX BURDEN AMONG FRENCH COHABITING COUPLES

OLIVIER BARGAIN, DAMIEN ECHEVIN, NICOLAS MOREAU, ADRIEN PACIFICO

www.tepp.eu

TEPP - Institute for Labor Studies and Public Policies
TEPP - Travail, Emploi et Politiques Publiques - FR CNRS 3435

ISSN 2110-5472

Inefficient Couples: Non-minimization of the Tax Burden among French Cohabiting Couples

Olivier Bargain (Bordeaux University), Damien Echevin (Sherbrooke University), Nicolas Moreau (Réunion University), Adrien Pacifico (Aix-Marseille University)

November 2019

Abstract

The present paper investigates the tax returns of French cohabiting couples with children, defined here as neither married nor in a civil union. These couples represent an interesting case, because they form two separate tax units according to French tax laws and must optimally assign their children to one of the parents' tax units to optimize tax rebates. Using administrative tax data and a microsimulation model, we analyze whether cohabiting couples allocate their children to minimize the joint tax burden of the family. We find, however, that children are not optimally allocated in 25% of cases. We interpret the reasons why couples fail to financially optimize their situation by discussing the usual explanations (e.g., transaction costs, "simple rule," inertia) as well as a more specific reason: the potential non-cooperative behavior of cohabiting couples, possibly related to the lack of a binding agreement or potential asymmetries of information between partners. We also find suggestive evidence regarding heuristics (such as the equal split rule for an even number of children), a large degree of inertia (based on fiscal status changes over two years), and possible non-cooperation (suboptimal couples tend to separate more and marry less in the subsequent period).

Keywords: efficiency, non-cooperative model, income taxation, learning, tax returns.

JEL Classification: D13, D61, H31

1 Introduction

A huge body of literature examines the reasons why individuals fail to financially optimize with respect to benefit take-up and tax filing (Chetty, 2015; Leicester et al., 2012). The reasons include complexity, cognitive bias (heuristics, inattention, inertia), and disutility associated with compliance and hassle costs (among others, see recent evidence in Benzarti, 2015; Bhargava and Manoli, 2015; Feldman et al., 2016; Jones, 2012; LaLumia et al., 2015). People often address the issue of tax complexity by responding to the most salient or obvious aspects of the decision problem (Abeler and Jäger, 2015; Chetty et al., 2009). While the literature focuses on individual decisions and their potential biases, suboptimal decisions may also be due to coordination failures or a lack of cooperation in households. Another strand of the economic literature uses household efficiency as the core axiom when modeling the collective behavior of couples for welfare and policy analyses (Chiappori, 1988). Efficiency is usually explained by an implicit cooperation process or by infinitely repeated interactions within non-cooperative couples that eventually lead to efficiency (cf. Donni and Chiappori, 2011 for a survey and Campaña, Gimenez-Nadal and Molina, 2018 for a modern account on efficiency tests).

In the present paper, we focus on household decisions regarding tax filing with the aim to detect potential inefficiencies in couples. We concentrate on French cohabiting couples with children, which are defined here as neither married nor in a civil union.[1] Cohabiting couples represent an interesting case, because they face a coordination problem regarding tax filing in France. Unlike married or civil union couples that form a single tax unit, cohabiting couples must file separate tax returns and assign each of their children to one of the two tax units in order to benefit from child-related tax rebates. Each child can be allocated to only one of the parents who must select an allocation on an annual basis that is often non-neutral for tax payments. There is usually a subset of allocations that minimize the overall tax liability of the household. In this annually repeated process, couples can make side payments so that the partner not benefiting from the child tax rebates is compensated by the other. A failure to compensate the other partner or choose the allocation that minimizes tax liability is direct evidence of inefficiency and may indicate the limited commitment of couples (Chiappori and Mazzocco, 2017).

To assess whether cohabiting couples file their tax returns optimally, we propose a simulation strategy based on administrative tax data on household income levels (taken from various sources) and characteristics (relevant for tax calculation) as well as their actual tax liability. Using a microsimulation model that reproduces the official tax rules, we calculate the optimal tax liability for each household

[1] Note that civil unions and marriages are treated in the same way in our description, as they both give right to the same tax rebates in France.

as the minimum liability after iteratively assigning children to one or the other parent.[2] By comparing this optimal value to the actual tax liability, we can identify the inefficient couples. We find that around 25-30% of French cohabiting couples do not minimize tax payments, with a non-negligible fraction making rather large optimization errors. We provide further suggestive evidence in line with the standard interpretations of inefficiency (heuristics, inattention, inertia) as well as the potential non-cooperation in couples. First, we find patterns pointing to the use of "simple rules" such as attributing all children to the main earner or making an equal split in the case of an even number of children. Second, the absence of changes between two years is consistent with inertia, as it shows limited signs of learning in the household; this trend appears in the same proportions for both efficient and inefficient couples. Finally, substantial inefficiencies in the first year are associated with higher chances of separation in the following year as well as fewer transitions to marriage or civil union. This suggests that non-cooperation is one of the key mechanisms behind inefficiency.

Two studies conducted in other countries are particularly similar to ours in this respect. Stowhase (2011) tests the inefficiency of couples' choice of tax classes for wage income in Germany, observing that 20% of couples do not minimize their tax payments. However, the key difference with our setting is that inefficiency is temporary in this German case, while the fiscal loss is definitive in France. Jones and O'Hara (2016) examine US households with children and at least two related tax filers to determine whether the household minimizes income tax liability by optimally assigning dependents among filers. They observe that optimal assignment increases with the payoff for doing so, which is especially the case among filers eligible for the Earned Income Tax Credit (EITC).

Our study contributes to several fields of the economic literature. First, it adds to the empirical literature on tax filers who "leave money on the table," i.e., who fail to financially optimize their situation in all kinds of categories. However, the failure to claim children in an optimal manner may not only be motivated by the usual drivers of inefficiency (hassle costs, limited rationality) but may also reflect an element of non-cooperation in couples. Second, most of the collective model literature focuses on strategies to derive testable conditions based on the assumption of efficiency in couples. However, these tests often depend on auxiliary assumptions and are unsuited to detect *inefficiency*.[3]

[2] This paper uses confidential administrative data, available upon request from the French Secure Data Hub (https://www.casd.eu/). Our results were certified by the Certification Agency for Scientific Code and Data (www.cascad.tech). The replicability certificate and the execution report are available at https://www.cascad.tech/certification/62-a-direct-measure-of-inefficiency-within-couples-tax-optimization-in-french-cohabiting-couples/.

[3] Early tests involve cross-derivatives of male and female Marshallian demand functions or proportionality conditions using distribution factors (Bourguignon et al., 2009), which necessarily depend on auxiliary assumptions that include functional forms or separability assumptions (e.g., egoistic preferences). Part of these limitations are overcome by the nonparametric approach to test collective rationality (Cherchye et al., 2007). However, measurement errors may not be systematically taken into account. Furthermore, recent studies

Against this background, we provide an original measurement of inefficient behavior that is specific to tax filing.

Finally, the external validity of our analysis is not necessarily limited, because we focus on cohabiting couples with children. Nowadays, this group is a very common type of household in France, where the majority of births occur outside of marriage. Even if many couples tend to marry after the birth of their first child, a relatively large fraction of cohabiting parents remain in free or civil unions.[4]

2 Empirical approach

2.1 Data

We use an administrative dataset, namely the *Echantillon Démographique Permanent* (EDP), which combines different civil state registers (birth, death, and marriage registers as well as electoral registers), tax returns, pay slips, and census information. We focus primarily on the year 2013 for our main results, while additional results draw on 2014. The EDP is designed as a random sample of the population based on birthdate, including 2.7 million individuals for 2013. Ideally, we wanted to follow couples over several years to verify the extent to which inefficient behavior persists over time. However, we had at our disposal only two years (2013-2104) of data with detailed tax returns for which tax simulations could be performed. Social security numbers are used in the EDP to link individuals over time so that the two-year sample forms a panel.

The first step of our work relates to data preparation and selection using the different datasets matched in the EDP. Cohabiting couples with children are identified as follows (see also Costemalle, 2017). A household is defined as individuals living in the same dwelling. We select households comprising a woman and a man who are neither married nor in a civil union and who live with their biological children. Because of the complex tax rules in the case of dependent children over the age of 18 years, we exclude households with older children. To verify that the adults form a cohabiting couple, we use civil registers to retrieve the birthdates of each child's parents, which are then matched with the birthdates of the adults living in this household. In this way, we directly eliminate stepfamilies and

question the power of these tests against inefficient alternatives. Most testable conditions are necessary (but not sufficient) for efficiency, which means that other decision-making processes such as non-cooperative behavior leading to inefficient outcomes cannot be detected by these tests (Naidoo, 2015). On the ability to perform meaningful tests, see also Dauphin et al. (2017).

[4] According to the French Statistical Institute (INSEE, 2011), French families (including 13.7 million children under 18 years) are comprised of 50% of married or civil union couples, 20% of cohabiting couples (our sample), 20% of single-parent families, and 9% of blended families (married and non-married couples with children from past relationships). Out-of-wedlock births accounted for 11% of all the births in 1980, 20% in 1990, 43% in 2000, 54% in 2010, and 59% in 2017 (INSEE, civil registries). By comparison, in the US, they represented around 42% of all births in the recent years (National Center for Health Statistics).

same-sex couples, which are subject to different tax rules because one of the adults is not the biological parent. We obtain a baseline sample of 51,190 cohabiting couples with children under 18 years for 2013 (for a description, see Table A.1 in the Appendix).

For some of our estimations, we included data on education level taken from the census. In this case, the sample is smaller (32,292 couples in 2013), and due to the census sampling design, it is biased toward areas of less than 10,000 inhabitants.[5] We keep this limitation in mind when using the sample for regressions that include education data. In Table A.1, we compare this reduced sample to the baseline sample: many sociodemographic variables are significantly different (we report p-values), but this is mainly because of the large sample sizes and precise mean difference tests; it rather appears that the differences are relatively modest. Another approach, as suggested by Imbens and Rubin (2015), is to consider normalized differences, defined as $|\bar{X}_1 - \bar{X}_2|/\sqrt{\frac{S_1^2+S_2^2}{2}}$ for the covariates *i*=1, 2 for the mean $\bar{X}_i$ and standard deviation s_i. While there is no established convention, based on the conservative rule of thumb suggested by Imbens and Rubin, the normalized difference becomes large if it exceeds 0.2. The last column of Table A.1 indicates that our results are far below this level.

2.2 Tax rules and simulations

Tax rules. The French tax system includes both a withholding flat tax (the so-called CSG/CRDS, representing 8% of wage income in 2013) and a progressive income tax. Here, we focus on the latter tax, which shifts over time: the income tax for year *t* is declared and paid in year *t+1*. Married or civil union couples file joint returns for this progressive income tax: they represent a single tax unit (along with all their dependent children), and all their income is jointly taxed. The situation differs for cohabiting couples who represent two distinct tax units and file their tax returns separately. When children are biological descendants of both cohabiting partners, each child must be associated with either the man's or the woman's tax unit. This allocation of children can change annually, regardless of whether the family configuration has evolved.

The general rule used to account for children is the family quotient (*quotient familial*). This system is a concrete application of the equal sacrifice principle (Young, 1987). Formally, for a tax unit i, the progressive tax schedule $t()$ is applied to an equivalent income $y_i/s(k_i)$, which is the taxable income of that unit, y_i, deflated by an equivalence scale. The total tax liability of this unit is then calculated as

[5] The French census is collected over a period of five years. It is systematically collected once every five years for localities of less than 10,000 inhabitants, while 8% of localities of more than 10,000 inhabitants are randomly selected and interviewed each year. We matched our selected households with census data from 2010 to 2014, which provides education information for 100% of areas with less than 10,000 inhabitants and for 1-0.92[5] (≈34%) of the population living in larger cities.

$T_i = s(k_i) \cdot t(\frac{y_i}{s(k_i)})$. The equivalence scale $s(k_i)$ depends on the number of dependent children attached to this unit, k_i. This scale includes a number of adult-equivalents, or "fiscal shares," calculated as 1 for the cohabiting adult (or 2 for married or civil union partners) plus 0.5 for the first and second child attached to the unit, and 1 for each additional child. Hence, for a cohabiting partner i, the explicit scale is $s(0) = 1$, $s(1) = 1.5$, $s(k_i) = k_i$ for $k_i \geq 2$.

As the progressive tax schedule is applied to the equivalent income and not to the taxable income, the family ratio scheme tends to lower the impact of progressive income taxation and disproportionally benefit wealthy taxpayers with many children. To limit this effect, the maximum relief that a taxpayer can obtain in 2013 through the application of this system is fixed at $p = 2{,}000$ EUR per half "fiscal share" beyond the first share, which amounts to $p \cdot 2(s(k_i) - 1)$. Cohabiting couples thus make two tax payments, T_f and T_m (tax paid by the woman and man, respectively), so that the total household tax liability is $T = T_f + T_m$. In Table A.2, we illustrate the family ratio scheme and maximum relief rule for the tax system in 2013. Suppose that the taxable income of taxpayers 1 and 2 are 20,000 and 80,000 €, respectively, with a number of dependent children varying from 0 to 4. As can be seen, the tax liability decreases significantly with the number of dependent children, although the tax relief mechanism limits this decrease for high taxable incomes.

Simulations. We use the tax simulator OPENFISCA, a microsimulation model used by various public administrations in France. It provides very accurate calculations of the tax and benefit instruments based on household information in the administrative data system. In particular, it can be used to calculate the amount of income tax paid by each household based on household income levels and demographic characteristics. These data taken from the EDP are perfectly reliable given the administrative nature of the data source.[6] Information on the number k_f (k_m) of children attached to the father's (mother's) tax unit is available in the tax registers.

We use the tax simulator to calculate counterfactual scenarios. For each cohabiting couple with children, we simulate the household tax liability T for the different possible allocations (k_f, k_m) of $k = k_f + k_m$ children for parents $i = f, m$ with a total of $k + 1$ possible allocations: for instance, in a family with two children, both children can be allocated to either the mother's or the father's tax return, or there can be an equal split. Based on counterfactual simulations, we can identify the subset of optimal child allocations, i.e., the allocations leading to a minimization of the tax liability.

[6] The EDP contains detailed information on individual incomes according to seven categories, including labor income and various types of capital income, which can be used for the application of more specific tax rules that are not detailed here.

We can also compute the maximal loss from non-optimization, calculated as the difference in tax liability between the worst and optimal allocation(s). Losses are potentially very high. The *maximum loss*, or the average difference between the optimal and worst allocations, represents 2.1% of taxable income (annual average of 750 €) or *35% of the average tax liability*. In Figure 1, the light gray bars show the distribution of maximal losses expressed as a percentage of pre-tax household income. For the majority of cohabiting couples, the allocation choice of children is far from neutral. Indeed, half of households could experience a potential loss of up to 1.7% of annual income (corresponding to 610 € on average), while around 70% could lose more than 1% (corresponding to around 350 € on average).

Based on fiscal data, we are able to observe the actual choices made by cohabiting partners. For each household, we can determine whether or not it optimizes the attribution of children to minimize the tax liability. We can also compute actual losses, i.e., the gap in tax payments between the actual and optimal allocation. The distribution of these losses is shown in dark bars in Figure 1 and discussed hereafter.

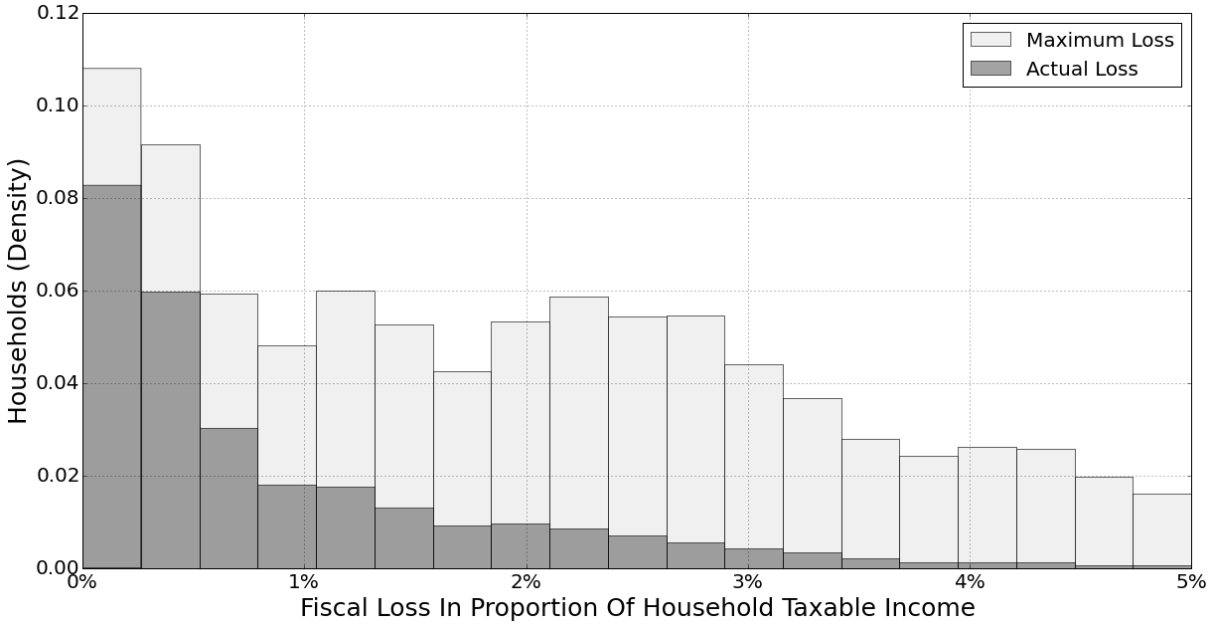

Figure 1: Actual and maximum fiscal loss due to non-optimization

Source: Authors' calculation based on EDP data. Sample of cohabiting parents of biological children under 18 years. The selection excludes 11.3% of couples who cannot optimize (the tax liability is the same regardless of the allocation of children to one or the other parent, being zero in 8.9% of cases and strictly positive in the remaining 2.4%).

In the Appendix, Table A.3 provides a demographic breakdown (i.e., by number of children *k*). For each group, it shows how the number of optimal allocations is distributed between polar cases (i.e., from "only one allocation is optimal" to "all *k+1* allocations are optimal"). Some results are derived for the subgroup of couples who have a margin of optimization. This group of *potential optimizers* (PO) excludes 11.3% of households located on the diagonal for whom all allocations are optimal: the tax

liability is the same regardless of the allocation of children, being zero in 8.9% of cases and strictly positive in the remaining 2.4%. Results that focus on PO induce a slight bias against large families: as seen in Table A.3, the proportion of households not needing to optimize increases with families of three or more children: 14.3% for three children, 24.7% for four, and 34.1% for five and more. This pattern is simply explained by the fact that when a partner is not liable for tax, it is not necessary to allocate more children to him/her.

We also consider a sub-subgroup of households *with only one optimal allocation* among all possible allocations, corresponding to the first column of Table A.3. This situation is very frequent for households with up to three children. Arguably, this selection of potential optimizers with a unique optimum (POU) will be biased toward small and average-sized families (k<4), which is not problematic given that large families represent a minority (group sizes are reported in the last column).

3. Results

3.1 Main results

Inefficiency rates. The main results are provided in Table 1. We consider (1) the entire selection of cohabiting couples with children under 18 years; (2) the PO subgroup (88.7% of the initial sample); and (3) the POU sub-subgroup (83% of the initial sample). For each of these samples, we report the distribution of cohabiting couples by family size (column 1), the number of non-optimizers (column 2), and their proportion (column 3). A non-negligible rate of inefficiency is observed: overall, 24.8% of cohabiting households are non-optimizers, with this figure increasing to 28% for PO and 29.1% for POU. The average loss among non-optimizers corresponds to 0.9% of pre-tax income (320 € annually) or 14.9% of the average tax liability, which is quite a substantial amount.

Since these figures may conceal a slight bias against large families, we discuss the inefficiency rate by family type. For families with one or two children, the proportion of non-optimizers (i.e., 28.4% of all couples with two children) increases when focusing on PO (31.5%) and POU (34%). The rate of non-optimization for POU rises steeply in larger families, but this is less relevant given the considerable reduction in the sample size. An interesting pattern emerges for the baseline selection as well as the PO and POU subgroups, since inefficiency rates are higher for families with an even number of children (i.e., two and four). A possible explanation may be the use of simple allocation rules such as the “equal split” rule, discussed in our interpretations below.

Table 1: Rate of non-optimization (and large non-optimization) by demographic group

Family type	No. of households	No. of non-optimizers	Proportion of non-optimizers	No. of households with losses >1% of income	Proportion of households with losses >1% of income
	(1)	(2)	(3)	(4)	(5)
All households					
1 child	27,316	6,147	0.225	1,534	0.056
2 children	20,411	5,787	0.284	2,280	0.112
3 children	2,399	454	0.189	222	0.093
4 children	909	296	0.326	175	0.193
5 children+	41	7	0.171	3	0.073
Total	51,190	12,703	0.248	4,221	0.082
Potential optimizers (couples who can optimize)					
1 child	24,211	6,147	0.254	1,534	0.063
2 children	18,358	5,787	0.315	2,280	0.124
3 children	2,055	454	0.221	222	0.108
4 children	684	296	0.433	175	0.256
5 children+	27	7	0.259	3	0.111
Total	45,411	12,703	0.280	4,221	0.093
Potential optimizers with a unique optimal allocation					
1 child	24,211	6,147	0.254	1,534	0.063
2 children	16,527	5,617	0.340	2,184	0.132
3 children	1,457	406	0.279	197	0.135
4 children	271	195	0.720	133	0.491
5 children+	6	4	0.667	2	0.333
Total	42,480	12,375	0.291	4,054	0.095

Source: Authors' calculation based on EDP data for 2013. Sample of cohabiting biological parents of children under 18 years. The subsample of potential optimizers excludes those for whom all allocations are optimal. Within this group, we consider a sub-subsample of potential optimizers with one optimal allocation among all possible allocations.

These results can be mitigated when examining large income losses. Table 1 reports the number (column 4) and proportion (column 5) of households who make substantial optimization errors with large inefficiencies, defined as income losses greater than 1%. This proportion is around one-third of all inefficiencies (i.e., 8.2% of cohabiting couples), which increases when focusing on PO (9.3%) and POU subgroups (9.5%). However, the same pattern emerges as above: inefficiency rates are larger for families with two or four children.

The proportion of actual losses, represented by dark bars in Figure 1, can be compared to the distribution of maximal losses. We observe a high number of errors at lower levels between 0.1% and 0.5% of total income, which decreases regularly from 0.6% to 5% of income. For 70% of the PO subgroup, their worst allocation exceeds 1% of income. This allocation is nevertheless chosen by 13% of PO (9.3% of the baseline sample).

3.2 Interpretations and potential mechanisms

We discuss the reasons underlying potential tax return inefficiencies. Choosing the wrong child allocation – i.e., not minimizing tax liability – is clearly suboptimal and may result from transaction costs (time required to learn about the optimal allocation), cognitive biases (tax complexity leading to heuristics, confusion, and inertia), or commitment issues in couples. We examine each of these explanatory mechanisms below. While they cannot be tested, we provide informal checks in the analysis by drawing from the intuitions outlined below.

Informational costs. The first possible explanation relates to whether a couple understands the tax rules and then faces transaction costs to optimize. This aspect draws on a large body of literature on the lack of information about tax policies (e.g., Bhargava and Manoli, 2015), the potentially high burden imposed by tax compliance (Pitt and Slemrod, 1989; Slemrod, 1989), and the associated hassle costs (Benzarti, 2015).[7] In our case, the family quotient system is a very well-known mechanism in France that has existed for decades. It is highly popular with French households on account of the large tax advantage that it provides to families with children, which was initially popularized as a contributing factor to the relatively high fertility rate in France compared to neighboring countries (Landais, 2003). In their tax declaration, residents must explicitly state their number of dependent children, and in the case of cohabiting partners, they are reminded that each child can only be allocated once (i.e., to one of the two tax units).[8] The question thus arises as to whether families can easily

[7] Several studies analyze non-optimizing behavior, which is explained by procrastination or the nuisance of keeping receipts in the case of underreporting charitable donations, for example (Fack and Landais, 2016). Our context is a slightly different, since couples are required to assign their children when filing their tax returns.

[8] Failing to do so is considered to be tax fraud, and an official letter would prompt the couple to correct their declaration and jointly inform the authorities regarding the beneficiary of the child allocation.

identify the optimal situation. Considering the case of couples with dependent children in 2013, this population is young enough to be internet users familiar with online administrative information such as the French tax authority website (www.impots.gouv.fr). In 2013, this website was visited 103.1 million times, most often for the tax simulator with 27.7 million simulations being performed. Taxpayers can thus simulate their tax liability by providing the same information as found on tax returns (including the child allocation) and applying the same tax rules. However, it may be a burden for cohabiting couples with many children to simulate all the possible *k+1* allocations – and, indeed, greater inefficiency is expected in this case. Nevertheless, it cannot be excluded that these transaction costs can explain the suboptimal decisions in certain households, especially if the gains from searching the optimal situation are perceived to be minimal compared to the opportunity cost (of time). In the following section, we test whether inefficiency is correlated with family size or proxies for cognitive skills (such as higher education).

Cognitive biases, heuristics, and inertia. Sources of error due to cognitive biases are more likely because of specific heuristics applied in the case of tax filing. It is possible that people do not take an all-inclusive view of their finances (Thaler, 1999), and as a result, the biases of mental accounting and "focusing illusion" may explain apparently irrational behavior (Feldman, 2010). People may make decisions regarding complex matters like tax by responding to the most salient or obvious aspect of a choice set or decision problem (Chetty et al., 2009; McCaffery and Baron, 2004a; Miller and Mumford, 2015). There is a burgeoning literature on "psychological frictions" associated with the complexity of policy rules and the resulting confusion for individuals (Bhargava and Manoli, 2015; LaLumia et al., 2015; Liebman and Zeckhauser, 2004; Rees-Jones and Taubinsky, 2019), especially the misinterpretation of what affects tax liability (Feldman et al., 2016). Although some taxpayers seek information after exogenous shocks to tax salience (Hoopes et al., 2015), they may not adjust their tax information in a timely manner, with the literature pointing to incomplete adjustments or inertia (e.g. Jones, 2012). Considerations of fairness may also be incompatible with efficiency when considering tax design (McCaffery & Baron, 2004b). In our situation, the idea that both partners should benefit from the child tax relief may prevail – according to the couple's own heuristics – over a precise calculation of the optimal allocation. For instance, a sense of fairness may be associated with an "equal split" for those with two or four children, a bias that we will investigate in the next section.

Non-cooperation in couples. This particular explanation concerns more than individual cognitive biases, as it involves a coordination problem in couples, which has rarely been studied in the tax design literature. It may be the case that couples do not redistribute resources efficiently, so that we encounter a problem of dynamic non-cooperative behavior (Chiappori and Mazzocco, 2017). This type of explanation is easily described: an efficient decision would involve the optimal allocation of children

to tax units coupled with a side payment made from the partner benefiting the most from child tax relief to the other partner. However, this may not occur because of heuristics and symbolic reasons, as emphasized above, or because of the absence of a binding agreement between partners regarding the possibility of making these compensating transfers.

Consider the example summarized in Table 2. Assume partner *m* earns more than partner *f* (200 and 150 in our example, which reflects the average gender income gap in France). He tries to convince her to attach all the children to his tax unit by promising to share some of the optimization gains. For instance, assume that *f*'s (m's) pre-tax income is 150 (200), and her (his) tax liability is 15 (40) due to progressivity. She obtains a smaller reduction (10 vs 14) if children are attached to her tax unit. In the former case, she gives nothing to her partner as she earns less. In the latter case, he transfers half of his gains to her.

Table 2: An example of the allocations of children for tax purposes

Outcomes for *(f,m)*	Initial situation (no children)	Choice 1: all children allocated to mother	Choice 2: all children allocated to father
Gross income	150, 200	150, 200	150, 200
Tax liability	15, 40	**5**, 40	15, **26**
Net income	135, 160	145, 160	135, 174
Net, after transfer	135, 160	145, 160	142, 167
Total net household income	295	305	309

Choice 2 is optimal in this simple case (children attached to the father). The mother may accept this – even though she is disadvantaged compared to choice 1 – if she considers that both partners will benefit (+8 each) compared to their situation before the birth of children (possibly taken as a reference point). Conversely, she may ex-ante refuse choice 2, as she anticipates an insufficient redistribution (he may promise more than half of the gain, but the agreement is non-binding). She could then argue that choice 1 is neutral for him compared to before the birth of children, and he may accept this, especially if he does not share his own resources with her.[9]

[9] This type of inefficiency may emerge even more frequently in the case of asymmetrical information, which increases the commitment issue. Efficiency in collective models is based on the assumption of perfect information, although recent evidence shows that it is limited (Baland and Ziparo, 2017). For instance, the father may prefer choice 1 (she gains 10) rather than searching for an optimum, because these calculations would reveal the large imbalance in net incomes and possibly lead to redistributive pressure. Another reason is that even in a situation with infinitely repeated interactions, the folk theorem shows that almost every allocation situated

This example may suitably characterize the situation immediately after the arrival of the first child. Renegotiation can take place in the following year at the next annual tax declaration.[10] Whether inefficiency persists can be verified across two years in our study. It may endure because of inertia in household decisions. While the literature indicates that inefficiency is especially obvious in one-off decisions (for instance, location choices, as exemplified in Lundberg and Pollack, 2013), enduring inefficiency for repetitious decisions such as tax filing seems to more strongly favor non-cooperation.[11] Strong disagreements may result in separation or an absence of further commitment (i.e., marriage), which we will explore below.

Finally, several studies reject the efficiency of household decisions for the allocation of productive inputs, notably in the context of developing countries (Duflo and Udry, 2004; Ziparo, 2016). We can make an analogy that the process of allocating children to the man or woman is a particular type of production decision, affecting the resources controlled by each partner and requiring some degree of cooperation if the couple wants to maximize total resources. Even if the household is efficient in terms of consumption decisions, this productive step may fail to provide overall efficiency.[12] In the next section, we discuss the rate of rejection of this "productive efficiency."

Potentially confounding policies. As noted by Jones and O'Hara (2016), much of the behavior surrounding the assignment of dependent children may stem from the confusing definitions of a qualifying child in the tax code. In particular, different definitions of taxes, tax credits, and social benefits create complexity that may lead to noncompliance stemming from fraud or error (Holtzblatt and McCubbin, 2003; McCubbin, 2000). In the present case, we examined whether the child allocation has implications on other elements of the tax-benefit system, but this is not the case. Regarding family and social benefits, some welfare payments depend on whether a household is taxable or not. However, cohabiting partners with children are considered to be married couples in this respect. Thus, their allocation of dependent children for income tax purposes has no incidence on the amount of

between a non-cooperative Nash outcome and the Pareto efficient outcome could be stable. In other words, (infinitely) repeated interactions do not necessarily lead to efficient behavior (Baland and Ziparo, 2017).

[10] In the first year, a sequential game may also take place in which one partner is taken by surprise, i.e., *m* fills in his tax form first, leaving *f* facing this choice (see the experimental evidence on "who holds the mouse" in de Palma et al., 2011). Regardless of the dynamic decision-making process, a suboptimal allocation may be chosen to reduce the tax paid by one spouse without fully compensating the other.

[11] Tax payments are made in three installments in February, May, and September for 40% of French taxpayers or monthly for 60% of them. Early payments are calculated based on the previous tax year. The tax declaration (including the child allocation) is made in May/June, leading to a subsequent adjustment in payments (i.e., in the September installment or in the monthly installments following the tax declaration).

[12] Baland and Ziparo (2017) offer a comprehensive review of the limitation of the efficiency assumption in development economics, but many of their arguments also apply to rich countries, especially in relation to the role of time and uncertainty, the limited commitment problem in couples, and the possibility of asymmetric information between spouses.

possible social benefits.[13] It is important to stress that in cases of separation, the right to decide on the child's place of residence is based on the "best interests of the child," with judges favoring shared custody. The previous allocation of children in their parents' tax returns does not enter into consideration. For social benefits, children are allocated to the primary carer according to the law, which is independent of previous tax choices.

3.3. Further characterization of inefficient households

Patterns of inefficiency. Beyond the mean rates of inefficiency, we suggest a more detailed analysis in Table 3 by focusing on families with one to four children, since larger families are much less common. In the table, panel (a) shows the distribution of actual allocations by family size and type of allocation ("all children allocated to the man," "equal split," etc.). Panel (b) shows the distribution in the case of random allocations. Chi-squared tests comparing panels (a) and (b) indicate that effective allocations deviate significantly from random allocations (all p-values are 0 for all family sizes). For instance, in families with one child, 59% claim the child on the father's tax return, which is significantly different from a random allocation of 50% in this case.

For each allocation type and demographic group, panel (c) reports how frequently this allocation is optimal. These frequencies sum up to more than 1, because several allocations can be simultaneously optimal. For this reason, panel (c) is not directly comparable with (a) and (b), even though it still gives useful indications. For instance, in families with one child, it is more often optimal to associate the child with the father's tax unit (optimal for 70% of couples) as opposed to the mother's (41%). As seen above, actual allocations (panel a) tend to move in this direction (59% for fathers and 41% for mothers) compared to random allocations. For families with four children, our conjecture of a bias associated with the simple "equal split" rule seems to apply: this equal allocation is chosen in a majority of cases (80% in panel a) even though it is less often optimal (61% in panel c).

Other biases may be at play but are not visible in these results. For instance, claiming all children on the tax return of the father, as the main earner, may be another heuristic choice that is effectively optimal in most cases. To detect the influence of "simple rules," we extract information on the frequency of typical errors in panel (d). For families with one child, the first row shows that in families where it is non-optimal to claim the child with the father, 29% still choose to do so. This type of error also emerges in families with two and three children. In couples with four children (and, to a lesser extent, with two), very suggestive evidence points to the "equal split" bias. As discussed, this simple

[13] We contacted the French Family Benefits Fund (*Caisse nationale des allocations familiales*), which is responsible for the payment of all family, housing, and social benefits in France. For these benefits, the unit of entitlement is the household. In this respect, cohabiting couples are treated in the same manner as married or civil union couples and form a household with their dependent children.

and apparently fair rule may not only be a type of heuristic but also a sign of cooperation failure between partners.

Table 3: Distribution of effective, random, optimal, and suboptimal allocations by demographic group and allocation type

	No. of children:			
	1	2	3	4
(a) Actual allocation (distribution across allocation types)				
All children allocated to the man	0.59	0.44	0.58	0.14
All children allocated to the woman	0.41	0.18	0.13	0.03
Equal split		0.39		0.80
Most children allocated to the man			0.18	0.03
Most children allocated to the woman			0.11	0.01
(b) Random allocation (distribution across allocations types)				
All children allocated to the man	0.50	0.33	0.25	0.20
All children allocated to the woman	0.50	0.33	0.25	0.20
Equal split		0.33		0.20
Most children allocated to the man			0.25	0.20
Most children allocated to the woman			0.25	0.20
(c) Optimal allocation (how often each allocation type is optimal)				
All children allocated to the man	0.70	0.59	0.74	0.70
All children allocated to the woman	0.41	0.22	0.22	0.33
Equal split		0.48		0.61
Most children allocated to the man			0.14	0.15
Most children allocated to the woman			0.16	0.16
(d) Suboptimal allocation (how often each suboptimal allocation is chosen)				
All children allocated to the man	0.29	0.17	0.12	0.00
All children allocated to the woman	0.24	0.10	0.06	0.01
Equal split		0.26		0.78
Most children allocated to the man			0.13	0.02
Most children allocated to the woman			0.08	0.01
No. of observations	27,316	20,411	2,399	909

Source: Authors' calculation based on EDP data for 2013. Sample of cohabiting biological parents of children under 18 years. For each family size, the table shows (a) how *actual allocations* are distributed across allocation types, (b) how *random allocations* are distributed across allocation types, and (c) how *optimal allocations* are distributed (since several allocations can be optimal, the probabilities vertically amount to more than 1 in this panel). Panel (d) is different: for each family size and allocation type, it shows the proportion of couples making an error by following this particular allocation type (for instance, among couples with one child for whom it is not optimal to assign the child to the father, 29% do so and hence commit an error).

Profile of non-optimizers. To continue this descriptive analysis of tax sub-optimization, we propose a simple regression of the non-optimization status in relation to several basic characteristics (Table 4). The first two columns focus on our baseline sample, since very similar results were obtained for the PO and POU subgroups (specific comments are provided below in the event of significant differences). Consistent with the risk of choosing an "equal split" in the case of an even number of children (as documented in Table 3), families with two and four children have a significantly higher probability of making an optimization error in general and a large error in particular compared to the omitted group (i.e., those with one child). The age of the older child is a good indicator of a couple's endurance and thus its chances of achieving efficiency through cooperation and coordination. It also corresponds to the duration for which the cohabiting couple is faced with the optimization issue of child allocation, thus indicating the time available to learn about the tax rules or simulate their tax liabilities under different allocation scenarios. Controlling for the age of the parents and the number of children, the age of the eldest child is negatively and significantly correlated with the probability of overlooking the optimal allocation. Perhaps counterintuitively given the previous argument, older couples are more likely to be inefficient overall (but not commit large errors). The chances of optimization errors increase with the couple's income, essentially because low-income couples correspond to clearer situations: the wife is more frequently out of the labor market in poorer households, while her partner is tax-liable only if the children are not allocated to him. By contrast, the probability of large errors decreases with income, perhaps because wealthy families tend to more systematically optimize their finances.[14] Finally, for cohabiting couples, civil union may be seen as a means of tax optimization, since it allows them to benefit from the same tax treatment as married couples without the obligation to marry. In this respect, we observe that cohabiting couples who have the most to gain fiscally from civil union are also more likely to sub-optimize their child allocation. While this might indicate that inefficient couples make suboptimal decisions in more than one domain, it is not certain that civil union is fiscally optimal for all couples. Indeed, civil union is a less binding form of contract compared to marriage, but it may still entail costs (Leturcq, 2012) at the time of the union (commitment to cohabiting, reciprocal material assistance for regular household expenses such as rent, food, and health, and joint liability for debts) or in the event of partnership breakdown (if the partners opt for joint ownership).

[14] This result is stable regardless of the specification (log of income, quadratic form, etc.). A flexible specification using dummies for income quintiles tends to confirm the given explanation, since the probability of optimization errors is significantly positive for quintiles 2, 3, 4, and 5 (relative to quintile 1) while the probability of "large" errors is significantly positive for quintiles 2, 3, and 4 and turns negative at the top of the distribution, which is consistent with tax optimization behavior among the wealthy.

Table 4: Profile of non-optimizers

	Binary dependent		Binary dependent (sample with education variables)	
	Non-optimizer	Non-optimizer (loss >1%)	Non-optimizer	Non-optimizer (loss >1%)
Two children (a)	0.0580***	0.0530***	0.0519***	0.0526***
	(0.0043)	(0.0026)	(0.0055)	(0.0032)
Three children (a)	-0.0249***	0.0302***	-0.0324***	0.0258***
	(0.0082)	(0.0058)	(0.0101)	(0.0069)
Four or more children (a)	0.0797***	0.0957***	0.0969***	0.1045***
	(0.0118)	(0.0099)	(0.0155)	(0.0136)
Age of eldest child	-0.0048***	-0.0033***	-0.0050***	-0.0040***
	(0.0008)	(0.0004)	(0.0010)	(0.0006)
Mean age of parents / 100	0.3277***	0.0048	0.2592***	0.0284
	(0.0469)	(0.0246)	(0.0522)	(0.0311)
Annual income / 10,000	0.0085**	-0.0115***	0.0335***	-0.0106***
	(0.00357)	(0.00087)	(0.00387)	(0.00114)
Tax gain from marriage/civil union	0.2137***	0.2908***	0.1983***	0.2946***
	(0.0049)	(0.0040)	(0.0062)	(0.0051)
At least a Master's degree (both parents)			-0.1069***	-0.0453***
			(0.0122)	(0.0065)
At least a Master's degree (father)			-0.1010***	-0.0502***
			(0.0124)	(0.0071)
At least a Master's degree (mother)			0.0131	-0.0010
			(0.0093)	(0.0050)
Constant	0.0495***	0.0349***	0.0215	0.0321***
	(0.0111)	(0.0067)	(0.0160)	(0.0089)
No. of observations	51,190	51,190	32,292	32,292

Source: Probit estimations based on EDP data for 2013 and authors' calculation of tax optimization. Sample of cohabiting biological parents of children under 18 years. A linear probability model with standard errors that are robust to heteroscedasticity of unknown form gives almost identical results (and a R2 of 0.06 in columns 1 and 3, and 0.22 in columns 2 and 4). Standard error in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

(a) Reference: one child.

The last two columns of Table 4 show the regression results conducted on a smaller sample with education variables. For the common set of covariates, these results are highly comparable to those

on the entire sample despite the aforementioned bias toward small population areas in the French census. To verify cognitive skills, we added education variables to the analysis. In families where both parents or only the father hold a Master's degree or PhD, optimization errors are less frequent, perhaps due to the ability of more educated couples to understand the tax rules and optimize them.[15]

A detailed breakdown of the causes of inefficiency is beyond the scope of the present paper and would probably require experimental evidence. Nonetheless, we can provide suggestive evidence about the potential cognitive biases and non-cooperative behavior.

3.4 Transition patterns, learning, and inertia

We present the transition patterns in terms of tax optimization behavior. We characterize transitions between 2013 and 2014 using panel information for couples who remain cohabiting and continue to face the issue of allocating children to two tax units.[16] To clarify the analysis, we focus on couples with a fixed number of children over the two years and only one optimal allocation in both years (the amount of this optimal allocation may vary). This subgroup represents 24,514 households, which is a sufficiently large group to make interesting observations.

The transition patterns are reported in Table 5. We first distinguish optimizers and non-optimizers in 2013 (first column), which are in comparable proportions to the baseline results for the POU subgroup (Table 1), namely 71% and 29%, respectively. The second column splits these groups according to whether the (single) optimal allocation evolved between 2013 and 2014. The reasons for a possible change include a change in earnings (due to events such as job loss, wage rise, etc.) or tax reforms.[17] Yet only a minority of couples experienced changes that affected the optimal choice.

We study the optimizing behavior of families in 2014. The proportion of non-optimizers is similar to 2013 (28.8%). The last two columns of Table 5 show a breakdown according to the different situations (all reported frequencies sum up to 1). The largest groups are composed of couples whose unique optimal allocation did not change over the two year and who remain optimizers (group C, 59.9%) or non-optimizers (group H, 18.3%). Non-optimizers represent 23.4% of groups C+H, indicating that the

[15] Alternative estimations that include a dummy for locality size – to account for the sampling bias in this smaller sample – give similar results.

[16] In other words, couples who were married or entered a civil union in 2014 are not included. If these new unions are regarded as a form of tax optimization and a reflection of cooperative behavior, then the following characterization concerns a slightly different group from our initial 2013 sample, i.e., a group that is, by definition, less likely to coordinate.

[17] Reforms in the 2013-2014 period include changes to the tax bands (i.e., an increase of 0.8%, which is lower than wage inflation and may generate "bracket creep"), a change to the family quotient system and amount of possible tax relief (namely, a decrease of p from 2,000 to 1,500 € per half-fiscal share beyond the first share), and a small change to the tax credit mechanism benefiting couples with low tax liability (*décote fiscale*).

rate of inefficiency is only slightly less than the 2013 rate (29%) for those with stable circumstances and unchanged decisions. For group H, it is likely that inertia plays a role in households remaining non-optimizers in addition to the persistence of cognitive biases and non-cooperative behavior.[18]

Table 5: Transition patterns for demographically stable couples

(only one optimal allocation per year)

Choice in 2013	Optimal allocation in 2014 (compared to 2013)	Choice in 2014	
		Optimizer (71.2%)	Non-optimizer (28.8%)
Optimizer (17,382; 70.9%)	Changed (2,420; 14%)	A: 494, 2%	B: 1,926, 7.9%
	Unchanged (14,962; 86%)	C: 14,692, 59.9%	D: 270, 1.1%
Non-optimizer (7,132; 29.1%)	Changed (2,221; 31%)	E: 1,855, 7.6%	F: 366, 1.5%
	Unchanged (4,911; 69%)	G: 413, 1.7%	H: 4,498, 18.3%

Source: Transitions between 2013 and 2014 using EDP data and authors' calculation of tax optimization. Sample of cohabiting biological parents of children under 18 years with stable demographics (number of children) who are potential optimizers with only one optimal allocation in each year.

The other groups with constant optimal allocations consist of couples who change their child allocation in 2014 (groups D and G). Group G is much larger, which may reflect a majority of learners regarding tax optimization and/or cooperation/coordination in couples. The other subset of couples who switch to optimization (group E) or non-optimization (group B) is much larger and essentially composed of "involuntary movers": 98% of them did not update their child allocation between the two years, while the optimal allocation has simply changed. Group E with improved optimization in 2014 may have experienced lucky inertia or may have been close to the correct allocation in 2013 but fully optimized in 2014. Similarly, group B seems to deteriorate but may have experienced unlucky inertia or switched from optimization in 2013 to a slight sub-optimization in 2014.[19]

[18] Staw (1974) and Staw and Ross (1989) use the term "escalating commitment" to describe people's common tendency to not question initial decisions that are nevertheless contradicted by the facts.

[19] Additional calculations show that the average fiscal loss of group E in 2013 (and group B in 2014) was below average. Couples who face a new optimum and need to change the child allocation (A and F) are the counterparts of the two main groups (C and H), but they cannot benefit from lucky inertia. Group A are optimizers who adjust

On the whole, there is little learning and much inertia in households: 81.8% of couples maintain the same optimization status over both years (61.9% optimizers, 19.8% non-optimizers). When the optimal allocation is stable, persistence in the same status is even higher, being 96.6% (73.9% optimizers and 22.6% non-optimizers), while in the remaining 3.7%, a majority (60%) seems to learn. When the optimal allocation changes, the transition pattern mainly reveals lucky (40%) or unlucky inertia (41.5%).

3.5 Non-cooperation

Finally, we question whether the lack of cooperation possibly revealed by tax inefficiency is associated with specific trends in marital status. As previously mentioned, it is expected that non-cooperative couples tend to marry less and separate more frequently. Based on our initial sample of potential optimizers in 2013 (45,411 observations), we verify any changes made to their marital status between 2013 and 2014, i.e., whether the couple stays unmarried, marries, enters into a civil union, or separates. Since only large non-optimization losses may reveal non-cooperative behavior, we primarily focus on losses above 1% of income.

We find that the rate of new marriages in 2014 among optimizers in 2013 is 10% higher than among non-optimizers, while the rate of separation is 32% lower. To go beyond basic statistics and control for household characteristics that could possibly affect these trends, we estimate a multinomial logit with the three categories of marital status in 2014 (the omitted category is the status quo). We also control for the basic covariates previously used in the profile of non-optimizers. These estimations are conducted on the PO subgroup, but sensitivity analyses are discussed below.

The results reported in Table 6 are striking, even if merely suggestive: being a non-optimizer in 2013 is associated with significantly higher chances of separation and significantly lower probabilities of marriage or civil union in 2014. We also report marginal effects: the change in marital status probability corresponds to 0.6 percentage points in the case of separation, -0.9 percentage points for marriage, and -0.6 percentage points for civil union. Other variables are interesting. Couples with more children tend to marry more often than those with only one child, but they do not tend to enter into a civil union. The duration of relationships, as proxied by the age of the eldest child, is associated with higher chances of separation and lower chances of entering into a civil union. Richer couples seem more stable, as they tend to separate less and marry or enter into a civil union more often. The potential tax gain from marriage or civil union is strongly associated with entering into civil unions and, to a lesser

their choice to the new optimum. By contrast, group F constantly opts for a suboptimal allocation, with 75% being subject to unlucky inertia (their choice is suboptimal in both years).

extent, into marriage. This is consistent with the fact that a civil union is less costly and easier to terminate than a marriage (Leturcq, 2012).

Sensitivity checks are reported in Table A.4 in the Appendix. We alternatively use the baseline selection, the PO subgroup (i.e., baseline estimates from Table 5), and the nested POU: all three selections yield similar results. We then focus on the smaller sample containing education variables that are controlled. Estimates lead to the same conclusions. The last row shows the regression results when varying the non-optimization definition, i.e., non-optimizers lose more than 0.5% of annual income. The correlation with changes in marital status is arguably smaller (and becomes insignificant in the case of marriage), but this points to the same type of interpretations.

Table 6: Correlates of marital status change in 2014

Marginal effects	Probability of separation	Probability of marriage	Probability of civil union
Large non-optimization in 2013 (a)	0.006**	-0.009***	-0.006**
	(0.003)	(0.003)	(0.003)
Two children (ref: one)	-0.002	0.012***	-0.003*
	(0.002)	(0.002)	(0.002)
Three or more children (ref: one)	-0.002	0.016***	-0.010**
	(0.003)	(0.003)	(0.004)
Age of the eldest child	0.001**	0.000	-0.002***
	(0.000)	(0.000)	(0.000)
Mean age of parents / 100	-0.040***	-0.170***	-0.080***
	(0.013)	(0.019)	(0.015)
Annual income / 10,000	-0.003***	0.003***	0.005***
	(0.001)	(0.001)	(0.000)
Income difference between partners	0.002***	0.000	-0.003***
	(0.001)	(0.001)	(0.001)
Tax gain from marriage/civil union (b)	0.003*	0.007***	0.014***
	(0.002)	(0.002)	(0.002)

Source: Multinomial logit estimation (marginal effects reported) of changes in marital status between 2013 and 2014 based on EDP data and authors' calculation of tax optimization. Sample of cohabiting biological parents of children under 18 years who are potential optimizers in 2013 (i.e., excluding those for whom all allocations are optimal). All the covariates refer to the situation in 2013 (non-optimization, family composition, etc.). No. of observations: 45,411. Standard error in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

(a) Dummy = 1 if large non-optimization in 2013 (i.e., misallocation of children in tax returns leads to a loss of more than 1% of household income)

(b) Dummy = 1 if marriage or entering into a civil union would have lowered the tax liability in 2013.

4. Conclusion

In this paper, we suggest a direct measurement of cohabiting couples' inefficiency for a repeated decision that affects the budget constraint, namely tax optimization via the allocation of children for tax rebates. Cohabiting couples with children who do not optimally assign their children to the woman's or the man's tax unit fail to maximize disposable household income. According to our results, this is the case for around 800,000 cohabiting couples (29.1% of cohabiting couples in 2013 and 28.8% in 2014). The average loss among non-optimizers corresponds to 15% of the average tax liability, which is a sizable amount.

We find traces of heuristics such as an equal split for an even number of children or claiming all the children on the main earner's tax return. There seems to be little learning and much inertia among cohabiting couples, as most stay in the same optimization status from year to year even in the case of financial disadvantage. Future research should look at this dynamic over a period of several years in order to check whether inefficient couples eventually improve their situation by learning or cooperation and are able to achieve efficiency after a few years. The present study is a first attempt, as it includes only two years of administrative data, but further research should follow couples over a longer time period to identify the precise effects of changes in tax rules or individual circumstances.

Without experimental data, it is difficult to disentangle the contributions of cognitive bias, heuristics, and non-cooperative behavior when examining the allocation of children to their parents' tax units. Nonetheless, our results indicate that inefficient allocations of children between tax units may partly be due to non-cooperation within the household. We show that the couples making large optimization errors also tend to separate more and marry less, all else being equal. This is suggestive of non-cooperation as a possible mechanism for tax inefficiency.[20] To explore this notion further, new research could conduct experiments with real couples or pairs of individuals who could participate in tasks that mimic real-world decisions regarding tax filing and a (productive) allocation problem.[21]

[20] Previous studies have tended to test uniform behavior, even though heterogeneity prevails in the real world. Among the exceptions, a few theoretical contributions, notably Cherchye et al. (2015) and d'Aspremont and Dos Santos Ferreira (2018), consider the continuum of types between cooperative and non-cooperative couples. We document here the coexistence of efficient and inefficient types. Our results indicate that (collective) models positing efficiency are not suitable for a large fraction of the population, while they also (trivially) imply a rejection of the unitary model. Indeed, if partners pool their income, they aim to maximize disposable household income and optimize the way in which they allocate children for tax declarations. To date, the best evidence against the unitary model was the rejection of income pooling following a "wallet-to-purse" transfer induced by policy reform (Lundberg et al., 1997).

[21] See recent experimental evidence in Couprie et al. (2016, 2017) and de Palma et al. (2011).

References

Abeler, J. and S. Jäger. (2015). Complex tax incentives. In: American Economic Journal: Economic Policy, 7(3), 1-28.

d'Aspremont, C. and R. Dos Santos Ferreira (2018). Enlarging the collective model of household behaviour: a revealed preference analysis, forthcoming in Economic Theory.

Baland, J.M. and R. Ziparo (2017). Intra-household bargaining in poor countries, WIDER Working Paper Series 108

Benzarti, Y. (2015). How Taxing Is Tax Filing? Leaving Money on the Table Because of Compliance Costs. Berkley, working paper

Bhargava, S. and D. Manoli (2015). Psychological Frictions and the Incomplete Take-Up of Social Benefits: Evidence from an IRS Field Experiment. American Economic Review, 105, 11, 3489-3529

Bourguignon, F., M. Browning and P.-A. Chiappori (2009). Efficient intra-household allocations and distribution factors: implications and identification, Review of Economic Studies, 76, 503–528.

Campaña, J.C., I.J. Gimenez-Nadal, J. A. Molina (2018). Efficient Labor Supply for Latin Families: Is the Intra-Household Bargaining Power Relevant?, IZA Discussion Papers 11695, Institute for the Study of Labor (IZA).

Cherchye, L., B. de Rock and F. Vermeulen (2007). The Collective Model of Household Consumption: A Nonparametric Characterization. Econometrica, 75(2), 553-574.

Cherchye, L., Cosaertz, S., Demuynck, T. and De Rock, B. (2015). Noncooperative household consumption with caring, KU Leuven, Center for Economic Studies DPS15.29.

Chetty, R., A. Looney and K. Kroft (2009): Salience and Taxation: Theory and Evidence, American Economic Review, 2009, 99 (4), 1145–1177

Chetty, R. (2015). Behavioral Economics and Public Policy: A Pragmatic Perspective. American Economic Review P&P, 105(5), 1-33

Chiappori, P.A. (1988). Rational household labor supply. Econometrica, 56, 63-89.

Chiappori, P.A. and M. Mazzocco (2017). Static and Intertemporal Household Decisions. Journal of Economic Literature, 55 (3): 985-1045.

Costemalle V. (2017). Les données fiscales de l'EDP : une nouvelle source d'informations sur les couples et les familles ?, Document de travail, n° F1708, Insee, 2017

Couprie H., F. Cochard, A. Hopfensitz (2017). What if women earned more than their spouse? An experimental investigation of work-division in couples, Experimental economics, 11 , p.1-22

Couprie H., F. Cochard and A. Hopfensitz (2016). Do spouses cooperate? An experimental investigation, Review of economics of the household, 14 (1), p.1-26

Dauphin, A., Fortin, B., Lacroix, G. (2017). Is Consumption Efficiency Within Households Falsifiable?, Review of Economics of the Household, pages 1-30.

De Palma, N. Picard and A. Ziegelmeyer (2011). Individual and couple decision behavior under risk: evidence on the dynamics of power balance. Theory and Decision, 70, 1, 45–64

Duflo, E. and C. Udry (2004). Intrahousehold Resource Allocation in Cote d'Ivoire: Social Norms, Separate Accounts and Consumption Choices. NBER Working Papers 10498

Donni, O. and P.A. Chiappori (2011). Non-unitary models of household behavior: a survey of the literature. In: Molina, A. (Ed.), Household Economic Behaviors. Berlin: Springer.

Fack, G. and C. Landais (2016, eds.). Philanthropy, Tax Policy and Tax Cheating: A Long Run Perspective on US data, Oxford University Press.

Feldman, N.E. (2010). Mental Accounting Effects of Income Tax Shifting. Review of Economics and Statistics. 92(10), 70-86

Feldman, N. E., P. Katuscak, and L. Kawano (2016). Taxpayer Confusion: Evidence from the Child Tax Credit, American Economic Review, 106(3), 807–835

Hoopes, J.L, D.H. Reck and J. Slemrod (2015). Taxpayer Search for Information: Implications for Rational Attention", American Economic Journal: Economic Policy, 7(3), 177-208

Holtzblatt, Janet, and Janet McCubbin (2003). "Whose Child is it Anyway? Simplifying the Definition of a Child." National Tax Journal 56 (3), 701–718.

INSEE (2011): Survey on families and housing.

Imbens, G. and D. Rubin (2015), Causal Inference for Statistics, Social, and Biomedical Sciences, An Introduction, Cambridge University Press

Jones, D. (2012). Inertia and Overwithholding: Explaining the Prevalence of Income Tax Refunds. American Economic Journal: Economic Policy, 4(1), 158-185

Jones, M.R. and A. B. O'Hara (2016). Do Doubled-Up Families Minimize Household-Level Tax Burden?, National Tax Journal, 69(3), 613-640,

LaLumia, S., J.M. Sallee and N. Turner (2015). New Evidence on Taxes and the Timing of Birth. American Economic Journal: Economic Policy, 7(2), 258-293

Landais C. (2003). Le quotient familial a-t-il stimulé la natalité française ?, Economie Publique, 13, 3-31.

Leicester, A., P. Levell, I. Rasul (2012). Tax and benefit policy: insights from behavioural economics, IFS Commentary C125

Leturcq, M. (2012): Will you civil union me? Taxation and civil unions in France Journal of Public Economics, 96, 541–552

Liebman, J.B. and R. Zeckhauser (2004). Schmeduling, Harvard working paper.

Lundberg, S. J., R. A. Pollak, and T. J. Wales (1997). Do Husbands and Wives Pool Their Resources? Evidence from the United Kingdom Child Benefit. The Journal of Human Resources 32(3), 463–480

Lundberg, S. J., and R. A. Pollak (2003). Efficiency in marriage. Review of Economics of the Household 1, 153-167

McCaffery, E. J., & J. Baron (2004a). Framing and taxation: Evaluation of tax policies involving household composition. Journal of Economic Psychology, 25, 679–705

McCaffery, E. J., & Baron, J. (2004b). Heuristics and biases in thinking about tax. In Proceedings of the 96th Annual Conference on Taxation (2003) (pp. 434–443). Washington, DC: National Tax Association

McCubbin, Janet (2000), EITC Noncompliance: The Determinants of the Misreporting of Children, National Tax Journal, 53:4, pp. 1135-64

Miller, B. and K. Mumford (2015). Personal Income Tax Salience: Evidence from the Child and Dependent Care Credit Expansion. National Tax Journal, 68(3), 349–362

Naidoo, J. (2015). The Power of Tests for Pareto Efficiency Within the Family. Mimeo, Department of Economics, University of Chicago.

Pitt, M. M. and J. Slemrod (1989): "The Compliance Cost of Itemizing Deductions: Evidence from Individual Tax Returns," The American Economic Review, 1224 –1232.

Rees-Jones, A. and D. Taubinsky (2019). Measuring Schmeduling, NBER, Working Paper 22884

Robinson, J. (2012). Limited Insurance within the Household: Evidence from a Field Experiment in Kenya. American Economic Journal: Applied Economics, 4(4): 140–64

Slemrod, J. (1989): "The return to tax simplification: An econometric analysis," Public Finance Review, 17, 3–27.

Staw, B. M. (1976). Knee-deep in the big muddy: a study of escalating commitment to a chosen course of action, Organizational Behavior and Human Performances,16, 27-44.

Staw, B. M., and Ross J. (1989). Understanding behavior in escalation situations, Science, 246, 216-246.

Stowhase, S. (2011). Non-minimization of source taxes on labor income: empirical evidence from Germany, Review of Economics of the Household, 9, 293–306

Young, H. P. (1987). Progressive Taxation and the Equal Sacrifice Principle, Journal of Public Economics, 32, 203–214

Ziparo, R. (2016). Why Do Spouses Communicate: Love or Interest? A Model and Some Evidence from Cameroon. Unpublished mimeo.

Appendix

Table A.1: Descriptive statistics

	Baseline sample	Sub-sample with education	Difference	Mean difference test (p-value)	Normalized difference (abs. value)
Taxable income	35,406	35,439	-34	0.841	0.00
	(25,692)	(19,234)	(156.05)		
Taxable income (father)	20,589	20,652	-63	0.607	0.00
	(19,456)	(12,981)	(112.31)		
Taxable income (mother)	14,816	14,787	29	0.742	0.00
	(13,441)	(11,068)	(85.57)		
Age (father)	35.0	35.3	-0.3	0.000	0.04
	(7.0)	(6.8)	(0.05)		
Age (mother)	32.7	33.0	-0.3	0.000	0.05
	(6.4)	(6.2)	(0.04)		
Number of children	1.56	1.58	-0.02	0.000	0.03
	(0.71)	(0.69)	(0.00)		
Mean age of children	3.7	4.0	-0.2	0.000	0.07
	(3.2)	(3.2)	(0.02)		
Age of the eldest child	4.5	4.8	-0.3	0.000	0.08
	(3.69)	(3.67)	(0.03)		
Age of the youngest child	3.0	3.1	-0.2	0.000	0.05
	(3.06)	(3.08)	(0.02)		
No. of observations	51,190	32,292			

Sources: EDP data for 2013 and authors' own calculation.

Table A.2: Two examples of the French family quotient scheme

	Number of dependent children				
	0	1	2	3	4
Taxpayer 1: Taxable income 20,000 €					
Tax liability without maximum relief	1,450	654	0	0	0
Tax liability with maximum relief	1,450	654	0	0	0
Taxpayer 2: Taxable income 80,000 €					
Tax liability without maximum relief	19,336	15,584	12,778	7,168	5,801
Tax liability with maximum relief	19,336	17,836	16,336	13,336	10,336

Table A.3: Distribution of optimal allocations by family size

Number of children	Number of optimal allocations							Group size	Group size (%)
	1	2	3	4	5	6	7		
1	0.886	0.114						27,316	0.534
2	0.810	0.090	0.101					20,411	0.399
3	0.607	0.144	0.106	0.143				2,399	0.047
4	0.298	0.175	0.160	0.120	0.248			909	0.018
5	0.146	0.098	0.268	0.122	0.024	0.342		41	0.001
6	0.076	0.047	0.057	0.170	0.151	0.160	0.340	106	0.002
Group size	42,470	5,457	2,466	478	242	33	36	51,182	1.000
Group size (%)	0.830	0.107	0.048	0.009	0.005	0.001	0.001	1.000	

Source: Authors' calculation based on EDP data for 2013. Sample of cohabiting biological parents of children under 18 years. The number of possible allocations is "number of children + 1." Hence, the subsample of "potential optimizers" (those for whom not all allocations are optimal) excludes the diagonal (in blue). We will also consider the sub-subsample of "potential optimizers with only one optimal allocation" (i.e., those in the first column).

Table A.4: Sensitivity analysis for marital status change in 2014 and large non-optimization in 2013

Sample	No. of observations	Covariate of interest	Controls	Probability of Separation	Probability of Marriage	Probability of Civil Union
Baseline selection	50,424	Loss >1% of income	Baseline	0.005*	-0.010***	-0.008***
				(0.003)	(0.003)	(0.002)
Potential optimizers	45,191	Loss >1% of income	Baseline	0.006**	-0,009***	-0,006**
				(0.003)	(0.003)	(0.003)
Potential optimizers with a unique optimal allocation	42,269	Loss >1% of income	Baseline	0.006**	-0.010***	-0.006**
				(0.003)	(0.003)	(0.003)
Potential optimizers, subsample with education	29,284	Loss >1% of income	Baseline + education	0.005*	-0.013***	-0.007**
				(0.003)	(0.004)	(0.003)
Potential optimizers	45,191	Loss >0.5% of income	Baseline	0.004**	-0.003	-0.004*
				(0.002)	(0.002)	(0.002)

Source: Multinomial logit estimation of marital status change between 2013 and 2014 based on EDP data and authors' calculation of tax optimization. Sample of cohabiting biological parents of children under 18 years. We report only the coefficient for the non-optimization status in 2013 defined as the misallocation of children to tax units resulting in a loss >1% or >0.5% of household income. Baseline controls as in Table 5. Standard error in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

TEPP Working Papers 2019

19-4.Seeking for tipping point in the housing market: evidence from a field experiment
Sylvain Chareyron, Samuel Gorohouna, Yannick L'Horty, Pascale Petit, Catherine Ris

19-3.Testing for redlining in the labor market
Yannick L'Horty, Mathieu Bunel, Pascale Petit

19-2.Labour market flows: Accounting for the public sector
Idriss Fontaine, Ismael Galvez-Iniesta, Pedro Gomes, Diego Vila-Martin

19-1.The interaction between labour force participation of older men and their wife: lessons from France
Idriss Fontaine

TEPP Working Papers 2018

18-15.Be healthy, be employed: a comparison between the US and France based on a general equilibrium model
Xavier Fairise, François Langot, Ze Zhong Shang

18-14.Immigrants' wage performance in the routine biased technological change era: France 1994-2012
Catherine Laffineur, Eva Moreno-Galbis, Jeremy Tanguy, Ahmed Tritah

18-13.Welfare cost of fluctuations when labor market search interacts with financial frictions
Elini Iliopulos, François Langot, Thepthida Sopraseuth

18-12. Accounting for labor gaps
François Langot, Alessandra Pizzo

18-11.Unemployment fluctuations over the life cycle
Jean-Olivier Hairault, François Langot, Thepthida Sopraseuth

18-10. Layoffs, Recalls and Experience Rating
Julien Albertini, Xavier Fairise

18-9. Environmental policy and health in the presence of labor market imperfections
Xavier Pautrel

18-8. Identity mistakes and the standard of proof
Marie Obidzinski, Yves Oytana

18-7. Presumption of innocence and deterrence
Marie Obidzinski, Yves Oytana

18-6. Ethnic Discrimination in Rental Housing Market: An Experiment in New Caledonia
Mathieu Bunel, Samuel Gorohouna, Yannick L'Horty, Pascale Petit, Catherine Ris

18-5. Evaluating the impact of firm tax credits. Results from the French natural experiment CICE
Fabrice Gilles, Yannick L'Horty, Ferhat Mihoubi, Xi Yang

18-4. Impact of type 2 diabetes on health expenditure: an estimation based on individual administrative data
François-Olivier Baudot , Anne-Sophie Aguadé,Thomas Barnay, Christelle Gastaldi-Ménager, Anne Fargot-Campagna

18-3. How does labour market history influence the access to hiring interviews?
Emmanuel Duguet, Rémi Le Gall, Yannick L'Horty, Pascale Petit

18-2. Occupational mobility and vocational training over the life cycle
Anthony Terriau

18-1. Retired, at last? The short-term impact of retirement on health status in France
Thomas Barnay, Eric Defebvre

TEPP Working Papers 2017

17-11. Hiring discrimination against women: distinguishing taste based discrimination from statistical discrimination
Emmanuel Duguet, Loïc du Parquet, Pascale Petit

17-10. Pension reforms, older workers' employment and the role of job separation and finding rates in France
Sarah Le Duigou, Pierre-Jean Messe

17-9. Healthier when retiring earlier? Evidence from France
Pierre-Jean Messe, François-Charles Wolff

17-8. Revisting Hopenhayn and Nicolini's optimal unemployment insurance with job search monitoring and sanctions
Sebastien Menard, Solenne Tanguy

17-7. Ethnic Gaps in Educational Attainment and Labor-Market Outcomes: Evidence from France
Gabin Langevin, David Masclet, Fabien Moizeau, Emmanuel Peterle

17-6. Identifying preference-based discrimination in rental market: a field experiment in Paris
Mathieu Bunel, Yannick L'Horty, Loïc du Parquet, Pascale Petit

17-5. Chosen or Imposed? The location strategies of households
Emilie Arnoult, Florent Sari

17-4. Optimal income taxation with composition effects
Laurence Jacquet, Etienne Lehmann

17-3. Labor Market Effects of Urban Riots: an experimental assessment
Emmanuel Duguet, David Gray, Yannick L'Horty, Loic du Parquet, Pascale Petit

17-2. Does practicing literacy skills improve academic performance in first-year university students? Results from a randomized experiment
Estelle Bellity, Fabrices Gilles, Yannick L'Horty

17-1. Raising the take-up of social assistance benefits through a simple mailing: evidence from a French field experiment
Sylvain Chareyron, David Gray, Yannick L'Horty

TEPP Working Papers 2016

16-8. Endogenous wage rigidities, human capital accumulation and growth
Ahmed Tritah

16-7. Harder, better, faster...yet stronger? Working conditions and self-declaration of chronic diseases
Eric Defebvre

16-6. The influence of mental health on job retention
Thomas Barnay, Eric Defebvre

16-5. The effects of breast cancer on individual labour market outcomes: an evaluation from an administrative panel
Thomas Barnay, Mohamed Ali Ben Halima, Emmanuel Duguet, Christine Le Clainche, Camille Regaert

16-4. Expectations, Loss Aversion, and Retirement Decisions in the Context of the 2009 Crisis in Europe
Nicolas Sirven, Thomas Barnay

16-3. How do product and labor market regulations affect aggregate employment, inequalities and job polarization? A general equilibrium approach
Julien Albertini, Jean-Olivier Hairault, François Langot, Thepthida Sopraseuth

16-2. Acces to employment with age and gender: results of a controlled experiment
Laetitia Challe, Florent Fremigacci, François Langot, Yannick L'Horty, Loïc Du Parquet, Pascale Petit

16-1. An evaluation of the 1987 French Disabled Workers Act: Better paying than hiring
Thomas Barnay, Emmanuel Duguet, Christine Le Clainche, Yann Videau

TEPP Working Papers 2015

15-10. Optimal Income Taxation with Unemployment and Wage Responses: A Sufficient Statistics Approach
Kory Kroft, Kavan Kucko, Etienne Lehmann, Johannes Schmieder

15-9. Search frictions and (in) efficient vocational training over the life-cycle
Arnaud Chéron, Anthony Terriau

15-8. Absenteeism and productivity: the experience rating applied to employer contributions to health insurance
Sébastien Ménard, Coralia Quintero Rojas

15-7. Take up of social assistance benefits: the case of homeless
Sylvain Chareyron

15-6. Spatial mismatch through local public employment agencies. Answers from a French quasi-experiment
Mathieu Bunel, Elisabeth Tovar

15-5. Transmission of vocational skills at the end of career: horizon effect and technological or organisational change
Nathalie Greenan, Pierre-Jean Messe

15-4. Protecting biodiversity by developing bio-jobs: A multi-branch analysis with an application on French data
Jean De Beir, Céline Emond, Yannick L'Horty, Laetitia Tuffery

15-3. Profit-Sharing and Wages: An Empirical Analysis Using French Data Between 2000 and 2007
Noélie Delahaie, Richard Duhautois

15_2. A meta-regression analysis on intergenerational transmission of education: publication bias and genuine empirical effect
Nicolas Fleury, Fabrice Gilles

15_1. Why are there so many long-term unemployed in Paris?
Yannick L'Horty, Florent Sari

TEPP Working Papers 2014

14-14. Hiring discrimination based on national origin and the competition between employed and unemployed job seekers
Guillaume Pierné

14-13. Discrimination in Hiring: The curse of motorcycle women
Loïc Du Parquet, Emmanuel Duguet, Yannick L'Horty, Pascale Petit

14-12. Residential discrimination and the ethnic origin: An experimental assessment in the Paris suburbs
Emmanuel Duguet, Yannick L'Horty, Pascale Petit

14-11. Discrimination based on place of residence and access to employment
Mathieu Bunel, Yannick L'Horty, Pascale Petit

14-10. Rural Electrification and Household Labor Supply: Evidence from Nigeria
Claire Salmon, Jeremy Tanguy

14-9. Effects of immigration in frictional labor markets: theory and empirical evidence from EU countries
Eva Moreno-Galbis, Ahmed Tritah

14-8. Health, Work and Working Conditions: A Review of the European Economic Literature
Thomas Barnay

14-7. Labour mobility and the informal sector in Algeria: a cross-sectional comparison (2007-2012)
Philippe Adair, Youghourta Bellache

14-6. Does care to dependent elderly people living at home increase their mental health?
Thomas Barnay, Sandrine Juin

14_5. The Effect of Non-Work Related Health Events on Career Outcomes: An Evaluation in the French Labor Market
Emmanuel Duguet, Christine le Clainche

14_4. Retirement intentions in the presence of technological change: Theory and evidence from France
Pierre-Jean Messe, Eva Moreno – Galbis, Francois-Charles Wolff

14_3. Why is Old Workers' Labor Market more Volatile? Unemployment Fluctuations over the Life-Cycle
Jean-Olivier Hairault, François Langot, Thepthida Sopraseuth

14_2. Participation, Recruitment Selection, and the Minimum Wage
Frédéric Gavrel

14_1. Disparities in taking sick leave between sectors of activity in France: a longitudinal analysis of administrative data
Thomas Barnay, Sandrine Juin, Renaud Legal

TEPP Working Papers 2013

13_9. An evaluation of the impact of industrial restructuring on individual human capital accumulation in France (1956-1993)
Nicolas Fleury, Fabrice Gilles

13_8. On the value of partial commitment for cooperative investment in buyer-supplier relationship
José de Sousa, Xavier Fairise

13-7. Search frictions, real wage rigidities and the optimal design of unemployment insurance
Julien Albertini, Xavier Fairise

13-6. Tax me if you can! Optimal non linear income tax between competing governments
Etienne Lehmann, Laurent Simula, Alain Trannoy

13-5. Beyond the labour income tax wedge: The unemployment-reducing effect of tax progressivity
Etienne Lehmann, Claudio Lucifora, Simone Moriconi, Bruno Van Der Linden

13-4. Discrimination based on place of residence and access to employment
Mathieu Bunel, Emilia Ene Jones, Yannick L'Horty, Pascale Petit

12-3. The determinants of job access channels: evidence from the youth labor market in Franc
Jihan Ghrairi

13-2. Capital mobility, search unemployment and labor market policies: The case of minimum wages
Frédéric Gavrel

13-1. Effort and monetary incentives in Nonprofit et For-Profit Organizations
Joseph Lanfranchi, Mathieu Narcy

The TEPP Institute

The CNRS **Institute for Labor Studies and Public Policies** (the TEPP Institute, FR n°3435 CNRS) gathers together research centres specializing in economics and sociology:

- L'**Equipe de Recherche sur l'Utilisation des Données Individuelles en lien avec la Théorie Economique** (Research Team on Use of Individuals Data in connection with economic theory), **ERUDITE**, University of Paris-Est Créteil and University of Paris-Est Marne-la-Vallée
- Le **Centre d'Etudes des Politiques Economiques de l'université d'Evry** (Research Centre focused on the analysis of economic policy and its foundations and implications), **EPEE**, University of Evry Val d'Essonne
- Le **Centre Pierre Naville** (Research on Work and Urban Policies), **CPN**, University of Evry Val d'Essonne
- Le **Groupe d'Analyse des Itinéraires et des Niveaux Salariaux** (Group on Analysis of Wage Levels and Trajectories), **GAINS**, University of the Maine
- Le **Centre de Recherches en Economie et en Management**, (Research centre in Economics and Management), CREM, University of Rennes 1 et University of Caen Basse-Normandie
- Le **Groupe de Recherche ANgevin en Économie et Management** (Angevin Research Group in Economics and Management), GRANEM, University of Angers ;
- Le **Centre de Recherche en Economie et Droit** (Research centre in Economics and Law) CRED, University of Paris II Panthéon-Assas ;
- Le **Laboratoire d'Economie et de Management Nantes-Atlantique** (Laboratory of Economics and Management of Nantes-Atlantique) LEMNA, University of Nantes ;
- Le **Laboratoire interdisciplinaire d'étude du politique Hannah Arendt** – Paris Est, LIPHA-PE
- Le **Centre d'Economie et de Management de l'Océan Indien**, « CEMOI », équipe d'accueil n°EA13, rattachée à l'Université de la Réunion
-

The TEPP Institute brings together 223 researchers and research professors and 100 PhD students who study changes in work and employment in relation to the choices made by firms and analyse public policies using new evaluation methods.