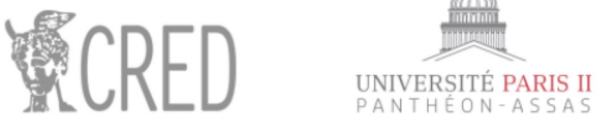

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Capital incomes are more elastic than labor incomes

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Capital incomes are more elastic than labor incomes*

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Abstract

We compare labor incomes responses to capital income responses for French taxpayers. We use two different approaches. First, we use a difference-in-differences strategy based on a reform of capital income taxation. We find a very strong response of capital income which is entirely driven by the response of dividends. Conversely, labor earnings do not respond, even when looking only at responses by taxpayers with self-employed incomes. Second, we use an IV approach taken from the Elasticity of Taxable Income literature. We find a 0.65 capital income elasticity with respect to its own marginal net-of-tax and a small but statistically significant elasticity of labor incomes with respect to capital net-of-tax rate, the latter result being at odds with the prediction of an income-shifting model. Conversely, the labor income elasticity with respect to its own marginal net-of-tax rate is low (around than 0.1), while the cross-based elasticity is around -0.4.

I Introduction

The Elasticity of Taxable Income has been proved to be an important "sufficient statistics" to quantify the efficiency-equity tradeoff regarding optimal income taxation. While the empirical literature estimating the ETI (Feldstein (1995), Auten and Carroll (1999), Gruber and Saez (2002), Kopczuk (2005), Weber (2014), see the survey by Saez et al. (2012)) is essentially concerned with the response of the overall taxable income, little is known about the decomposition of these responses across the different types of incomes. In this paper, we propose to open the black box of the elasticity of taxable income by estimating separately the response of capital income and of labor income to tax reforms in France.

For this purpose, we used the comprehensive personal income tax files (POTE) now available to researchers on the CASD[1]. This administrative database covers the universe of taxpayers and contains an identifier that allows us to track for each tax household the evolution of its tax returns from 2008 to 2017. Based on these data, we use two complementary methods to evaluate the effect of capital income taxation. We first use a difference-in-differences method in order to visualize graphically the effect of the 2013 reform. However, other changes in the

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[1]This is the POTE database (for Permanent Emission Processing Occurrences file) which has been available on the Secure Data Access Centre (CASD) since June 12, 2019.

taxation of dividends took place over the period 2008-2017, which may disrupt the difference-in-differences method, we are also implementing an instrumental variable method in order to better treat all changes in marginal rates of capital income over the period.

The difference-in-differences estimation is based on the 2013 tax reform act that suppress the option for taxpayers to exit some of their capital income from the personal income tax base and submit them to dual tax schedule. This so-called PFL option has been suppress by the 2013 tax reform act. The difference-in-difference strategy compares the various income dynamics of taxpayers using the PFL between 2008 and 2011 (the *treated* group of taxpayers) with the dynamics of incomes of other taxpayers (the *control* group of taxpayers). In particular, observing tax returns between 2008 and 2011 allows us to test the assumption of common trends, before analyzing the dynamics of behavioral responses after 2012. In this method, we focus on taxpayers whose taxable incomes were located in the highest income tax bracket.

In this sample, we obtain the difference-in-differences results: the tax households that used the PFL before 2013 saw their capital income decrease between 2011 and 2013 by about 45% and their dividends by about 70% compared to the evolution of the same income for the taxpayers in the control group. On the other hand, the differences in the evolution of labor income between the two groups of taxpayers are much smaller and even insignificant in our preferred specification.

These results suggest, on the one hand, a high sensitivity of capital income to its tax rate. They are conform with the macroeconomic evolution of dividends paid, which decreased by half a point of GDP between 2012 and 2013 (see Figure 1, INSEE blue series). The fact that capital income and dividends fall more sharply for households using the PFL suggests that at least part of this fall in dividends would correspond to household responses and not just to a change in dividend distribution policy on the part of companies. On the other hand, the lack of response from earning income, particularly from self-employed, suggests that these strong capital responses can only be explained very marginally by a shift of dividends to earned income by self-employed. While hoarding behavior cannot be ruled out, these results suggest that, at least in the short term, the end of the PFL acted by the 2013 Finance Act would have been associated with a sharp contraction of the tax base, and therefore, through this, with dry losses for public finances.

A large number of tax reforms were implemented during the same period and affected taxpayers with similar characteristics. Therefore, we include these reforms in our regressions with specific trends for households exposed to them. We also drive several robustness checks on different sub-samples, including: taxpayers that we identify each year as self-employed or, on the contrary, taxpayers that we never identify as sefl-employed; households whose used to payed the wealth tax named *Impôt de solidarité sur la fortune (ISF)*. The results remain broadly the same: compared to the taxpayers of the control group, the taxpayers of the treated group experienced after 2012 a sharp drop in their capital income, an even more pronounced drop in their dividends, but no clear change in their labor income.

The difference-in-differences method plots the causal effect of the 2013 reform on the evolution of dividends. However, while we are confident about its internal validity, its external validity is more disputable: our results evaluating the 2013 reform can hardly be extrapolated to other reforms or periods. Indeed, the control and treatment groups are defined on PFL option before its abolition, which is relevant for assessing the effects of the abolition of the PFL, but is not necessarily relevant for understanding the effect of other reforms affecting the taxation of capital income that were implemented at the same time. For this, an instrumental variable method is needed to treat the changes in marginal rates generated by all the reforms over the period 2008-2017. This method allow us to estimate an average elasticity of capital income at its marginal net-of-tax rate by comparing the evolution of the income of different taxpayers according to the way they are affected by the different reforms. In line with Auten and Carroll (1999) and Gruber and Saez (2002), we use as instrumental variables the changes in

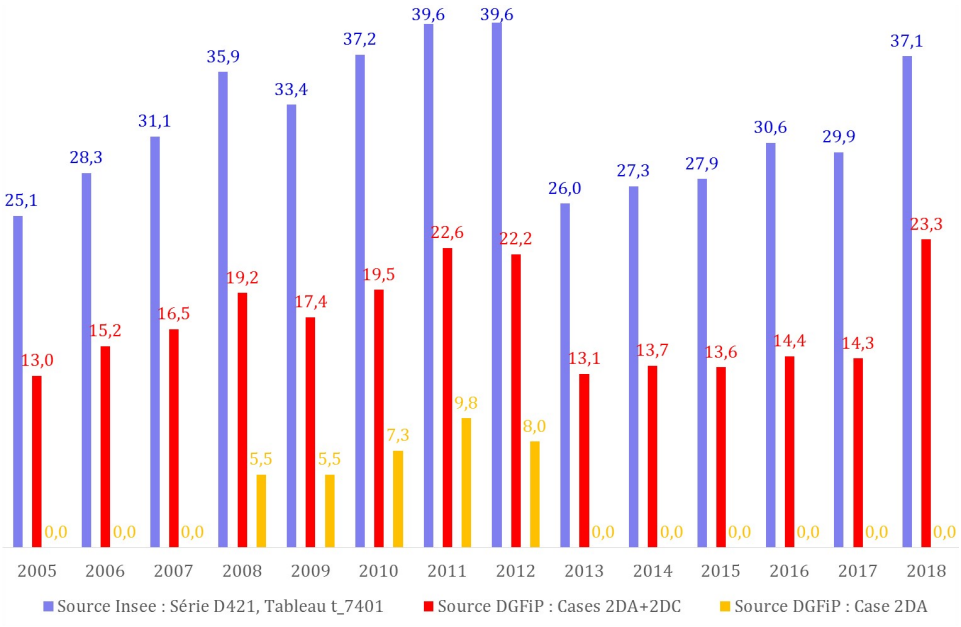

Figure 1: The evolution of dividends in France in billions of euros. Dividends paid out of PEAs and life insurance accounts are subject to special tax treatment throughout the period and are therefore excluded from tax boxes 2DA (dividends to PFL) and 2DC (dividends included in the personal income tax)

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marginal net-of-tax rates that would have been experienced by taxpayers if their incomes had not changed in real terms. In this way, the instruments capture the part of changes in marginal rates that are caused by changes in taxation alone, which allow us to interpret the estimated elasticities in terms of behavioral responses to taxation.

We obtain an elasticity of around 0.65 of capital income at their own marginal net-of-tax rate[2]. This estimate is robust over different population sub-samples. Moreover, the cross-elasticity of labor income with respect to the capital income marginal net-of-tax rate estimated by this method is slightly positive, confirming the results of the first method on the absence of income shifting, extending this result over the entire period 2008-2017. On the other hand, we find a negative, very high and highly significant elasticity of capital income at the marginal net-of-tax rate of labor income. One possible interpretation would be that in France, income shifting behavior would occur in response to changes in the taxation of earned income but not in response to changes in the taxation of capital income.

This paper is part of the literature estimating the behavioral responses of taxable income to tax reforms (see in particular Feldstein (1995), Auten and Carroll (1999), Gruber and Saez (2002), Saez (2003), Kopczuk (2005), Saez et al. (2012) and Weber (2014) on US data, Kleven and Schultz (2014) on Danish data and Piketty (1999), Lehmann et al. (2013), Cabannes et al. (2014), Sicsic (2019) on French data). In this literature Kleven and Schultz (2014) find in particular that capital income is characterized by an elasticity to its own marginal net-of-tax rate which is said to be higher than labor income in Denmark (see also the results Hermle and Peichl (2018) on German data). Our contribution consists in studying not only the responses of capital income

[2]The marginal net-of-tax rate is the complement of the marginal tax rate. It shows how much an after-tax income increases when before-tax income increases by 1. For example, if the marginal tax rate is 35%, the marginal net-of-tax tax rate is 65%.

to their own marginal net-of-tax rate, but also in studying the responses of labor income to the capital marginal net-of-tax rate [3].

We also contribute to the empirical literature on the taxation of dividends. Chetty and Saez (2005) and Yagan (2015) estimate the effect of the 2003 dividend tax cut in the United States. To do this, they use a difference-in -differences approach on companies data. Chetty and Saez (2010) and Yagan (2015) obtain elasticities of about 0.5 on dividends with respect to the marginal tax rate. But Yagan (2015) finds that the reform would not have had a significant effect on corporate investment. These results could be explained by the fact that the companies' investment would mainly be financed by self-financing (*new view*) and borrowing and not by a capital increase (*old view*).

Boissel and Matray (2019) use the methodology of Chetty and Saez (2005) and Yagan (2015) on data from French companies, which enables them to study the effect of the *increase* in social security contributions applying to SARL executives that has occurred in France from 2013. Boissel and Matray (2019) find a strong reaction from taxable dividends (elasticity around 0.6) but very weak reactions from investment and no effect on earnings.

Bach et al. (2019) study, as we do, the effect of the 2013 end of the PFL. They use difference-in-differences methods using both household and companies data. Their results on companies data confirm the results of Yagan (2015) and Boissel and Matray (2019) on the effects of dividend taxation on business investment. On household data, Bach et al. (2019) use, as we do, a difference-in-differences approach, but with a different definition of control and treatment groups. While we include in the treatment group those taxpayers who declared dividends under the PFL in 2008-2011, Bach et al. (2019) includes in their treatment group those taxpayers who declared dividends under the PFL in 2012. In addition, they work on a smaller sample by retaining only taxpayers receiving at least 1 000 € of dividends where we retain all taxpayers receiving a positive amount of dividends. Despite these differences, they are in line with our result of the absence of effects of dividend taxation on labor income, especially for the self-employed, and therefore the absence of income shifting.

Several studies have highlighted income shifting behaviors in Israel (Romanov, 2006), Norway (Alstadsæter and Wangen, 2010), Finland (Pirttilä and Selin, 2011, Harju and Matikka, 2016) and Sweden (Edmark and Gordon, 2013, Alstadsæter and Jacob, 2016). Our results, in line on this point with Boissel and Matray (2019) and Ben Jelloul et al. (2019) suggest the absence of such behavior in France in response to capital taxation reforms before 2018, but the presence of significant income shifting in response to labor income taxation reforms.

The elasticity of dividends at their own marginal net-of-tax tax rate obtained by Bach et al. (2019) on household data is particularly high (around 4). In our view, this high elasticity could be explained by the fact that the end of the PFL followed several much less salient and visible increases in the dividend tax rate that had previously taken place between 2010 and 2013. Responses after 2013 would then reflect a reaction to all of these increases, whereas the 4 figure is calculated under the assumption of a reaction at the end of the PFL only. From this point of view, the instrumental variable approach that we are conducting, which allows us to integrate all the reforms of capital taxation, allows us to obtain an elasticity of 0.7, which we consider more relevant for an ex-ante evaluation of another reform of capital taxation.[4]. We also find higher elasticity (around 1.5) for taxpayer with top capital income.

Our article is part of a series of recent works studying behavioral responses to tax reforms in France. In addition to the previously mentioned work of Boissel and Matray (2019) and Bach et al. (2019), Carbonnier (2014) studies the effect of the family quotient on the participa-

[3] Kleven and Schultz (2014) find that cross-elasticities between labor income and capital taxation are negatively significant but much lower than the direct elasticities. The authors find that the elasticity of labor income to capital taxation is zero over the entire period of interest in the study, and -0.028 for the main reform only

[4] Kleven and Schultz (2014) show that the effect of the 1987 tax reform in Denmark, which was very salient, was stronger than the average effect observed over the period, a result in line with the idea developed by Chetty (2012) that responses to reforms can be skewed by optimization frictions when they are not sufficiently salient.

tion of married women. Aghion et al. (2017) study the cost of tax complexity for self-employed individuals who can choose between the actual plan, the auto-entrepreneur plan, and the simplified auto-entrepreneur plan. Lardeux (2019) examines the effect of the income tax discount and collection threshold on the distribution of taxable income. Guillot (2019) is interested in taxing 75% of wages over 1 000 000€ in 2013 and 2014. Pacifico (2019, Chapter 3) examines the effects of the caping of the tax advantage due to children in 2013. Aghion et al. (2019) highlight the divergence after 2013 between the trend in the incomes of taxpayers belonging to the upper percentile after 2012 compared to other taxpayers.

The institutional context and the reform under consideration will be presented in section II. The III presents the data. Section IV presents our difference-in-differences method results, while section V presents the results we obtained with the instrumental variable method. The last section concludes.

II Policy Variation

II.1 Institutional Background and Policy Variation Before 2013

Between 2008 and 2012, taxpayers could choose between two options for the taxation of their dividends and capital income (excluding life insurance) [5]. They could choose to comprehensively include these incomes with the personal income tax base (IR). In this case, the dividends benefit from a 40% tax rebate, with a fixed rebate of 1 525€ for a single person and 3 050€ for a couple until 2011. Alternatively, they could choose to subject this income to a flat tax, namely Prélèvement Forfaitaire Libératoire (PFL), deducted at source, the rate of which varied according to the type of income (see Table 1). In practice, this option was more advantageous for the highest incomes. The PFL rates gradually increase in 2011 and 2012. This increase

		2008 – 2009	2010	2011	2012
Dividends	IR	18%	18%	19%	21%
	PS	12,1%	12,3%	13,5%	15,5%
	Total	30,1%	30,3%	32,5%	36,5%
Fixed capital incomes	IR	18%	18%	19%	24%
	PS	12,1%	12,3%	13,5%	15,5%
	Total	30,1%	30,3%	32,5%	39,5%

Table 1: Tax Rates on flat tax PFL by Type of Capital Income from 2008 to 2012

prefigures the 2013 reform. It is based on a will to bring the taxation of capital income closer to the taxation of labor income. According to the French government, "The measure to raise the PFL rate to 24% was part of the second part of the implementation of the plan to balance public finances following the financial crisis and was defended by the government, in addition to this budgetary imperative, by the will to bring the taxation of capital income closer to the taxation of labor income".

II.2 The 2013 Reform

The Finance Act for 2013 puts an end to the possibility of opting for the PFL for capital income (from securities and movable capital) received from 2013 onwards (with the exception

[5] It concern income from non-exempt capital products such as income from shares and company units, interest from government bonds, Treasury bills, interest from home savings plans subscribed for more than 12 years.

of life insurance contracts and certain products that remain in the PFL [6]). The reform leads *de facto* dividends and fixed-income investment products obtained in the year t to be taxed comprehensively with the income tax base in the year $t+1$ [7]. The 40% tax rebate on dividend is maintained. Thus, taxpayers who opted for the PFL and whose marginal tax rate was 45% saw their marginal tax rate on dividends go from 36.5% [8] to 40.2% [9] and their marginal tax rate of 39.5% [10] to 58.2% [11], excluding tax exemptions [12].

It is important to underline that this reform was explicitly included in François Hollande's electoral program [13], before he was elected President of the Republic in May 2012. Thus, even if it was implemented in 2013, it is plausible that households with high capital income, mostly composed of dividends, may have changed their behavior in anticipation as early as 2012. This anticipation effect may have been reinforced by the increase in marginal tax rates that took place as early as 2011. It is for these different reasons that we take the year 2011 and not 2012 as the reference year in our estimation by difference-in-differences (see part IV).

II.3 Other Reforms in 2011-2014

A major difficulty in assessing the effect of the reform under review is the concomitance of several other tax reforms implemented between 2012 and 2014. These include:

- the **income tax "bracket creep"** in 2011 and 2012: income tax schedule were frozen in nominal terms in 2011 and 2012, while each year the thresholds increase at the rate of inflation (excluding tobacco).
- the **Removal of the fixed tax rebate on dividend** since 2012 [14];
- the **comprehensively including capital gains on securities with the personal income tax** by the 2013 Finance Law on income, thus creating a new category of income subject to income tax scale, capital gains on securities having previously been subject to a flat tax.

[6] The PFL was maintained for solidarity savings products given within the framework of a solidarity-based automatic payment mechanism (PFL at a reduced rate) and interest paid to a non-cooperative State or territory (whose PFL was higher). It should also be noted that the income tax and PFL exemption of regulated savings books and contractual savings products has not been affected by the reform: these products have remained exempted.

[7] However a mandatory withholding flat-tax (PFO) under the same conditions as the PFL (rebate and rate) is maintained from 2013 and is to be deducted from the income tax payable in the following year. This PFO is essentially designed not to create a cash-flow problem in 2013 but has no effect on the taxation of capital income. It should be noted, however, that the law provides that taxpayers whose tax income is below a certain threshold may apply for an PFO exemption in 2013 on distributed income and income from fixed-income investments. The finance law for 2013 also introduced the possibility of opting for a flat tax of 24% for income below 2,000 euros. To summarize, between 2013 and 2018, capital income in the year t was taxed in income tax in the year t+1 (with a mandatory lump-sum levy collected in the year t and refunded as a tax credit in the year t+1, for certain households).

[8] which corresponds to the sum of the PFL of 21% and the 15.5% for social security contribution (SSC) on capital income

[9] This corresponds to the application of the marginal tax rate of 45% on the 60% of taxable dividends, taking into account a 40% tax rebate on dividends plus 15%.5 SSC, taking into account the 5.1% CSG deduction: $40.2\% = 0.6 times 45\% + (15.5\% - 0.45 times 5.1\%)$.

[10] which is the sum of the 21% PFL and the 15.5 % SSC on capital income

[11] which corresponds to the application of the marginal tax rate of 45 % plus 15.5 % SSC, taking into account the rebate of 5.1 % of CSG: $58.2\% = 45\% + (15.5\% - 0.45\%, 5.1\%)$. (Conseil des Prélèvements Obligatoires, 2018)

[12] Solidarity savings products are still subject to a PFL at a rate of 5 %. Life insurance policies held for 8 years or more are always subject to a PFL of 7.5%, and those held for less than 8 years are subject to a PFL of 15 or 35% (depending on whether they are more or less than 4 years old). Investment income paid in an uncooperative state is taxed at a rate of 75 %

[13] 14^{th} of the 60 commitments of candidate François Hollande

[14] In 2011 the amount of the annual fixed tax rebate was set at 1,525 for singles and 3,050 for couples subject to comprehensive taxation.

- the obligation to pay **social security contributions on the dividend of SARL executives in excess of 10% of the share capital** introduced by the 2013 Social Security Finance Law, a reform studied by Boissel and Matray (2019) ;
- the introduction in 2013 and 2014 of a 75 % tax on salaries over 1,000,000 euros. This tax is paid by companies for employees receiving a gross annual salary of more than one million euros. It is calibrated so that the top marginal rate is 75% (including all taxes, i.e. an increase of 10 points). The effects of implementing this tax have been studied by Guillot (2019);
- the textbflowering the ceiling of the tax advantage due to children in 2013 and 2014: the cap goes from 2,336 euros per additional half share to 2,000 euros in 2013 and 1,500 euros in 2014. The effects of this reform have been studied in particular by Pacifico (2019) and Sicsic (2019);
- the **creation of an income tax bracket with a marginal rate of 45%** for income above 150,000 euros in 2013 (on 2012 income), studied by Sicsic (2019);
- the implementation of a Special tax on High Income **Contribution Exceptionnelle sur les Hauts Revenus, CEHR** in 2012. The CEHR depends on the reference tax income (RFR): 3% for an RFR of more than EUR 250,000 (twice as much for couples) and +4% for an RFR of more than EUR 500,000. It leads to a 49% top MTR.

III Data

III.1 Fiscal Data

For our study, we use the POTE database [15] in panel format produced by the General Direction of Public Finance (DGFIP) on the CASD. These files contain all of the tax item of personal income tax files, and the date of birth of all taxpayers and their children. This includes all the elements of the 2042 and 2042 complementary tax returns of the tax filers, as well as various processing variables used for the calculation of the income tax. They are exhaustive and include an encrypted identifier of tax households and an encrypted identifier of each taxpayer, making them "panelegible". Even if the income tax is declarative, since 2005, the declaration n°2042 has been pre-filled by the tax authorities: the main incomes [16] are transmitted by the paying agencies (employers, pension funds, public employment service, payroll tax administration, banks) to the tax authorities.

We also use the wealth tax "ISF/IFI" [17] files. These files are made up of "tax returns n°2725" of the tax households liable to the wealth tax because their movable and immovable assets exceeds a certain threshold[18]. These files contain the various components of wealth taxable assets for taxpayers with taxable assets in excess of 2.57 million of euros: real estate assets, movable assets, liabilities, the various deductions and the wealth tax ceiling[19]. They are comprehensive and include the same encrypted identifiers as the POTE panel files,we can match them to the POTE panel files.

[15] Fichier Permanent des Occurrences de Traitement des Émissions

[16] from salaries and wages, early retirement benefits, unemployment benefits, daily sickness benefits, exempt overtime, pensions and income from movable capital received

[17] Impot de Solidarité sur la Fortune became Impot sur la Fortune Immobilière in 2018

[18] In 2008 the threshold of liability to wealth tax is set at 760 000€. It sets at 770 000€ in 2009, 790 000€ in 2010 and 2011 and 1 300 000€ in 2012

[19] For households with net assets of less than 2.57 million of euros, only the total net assets are to be filled in in the annual tax return No. 2042

III.2 Database Construction

Each year, depending on the financial acts, the definition of the declared income changes, which leads to changes in tax boxes. It is therefore necessary to take into account these changes to the tax boxes in order to maintain a stable definition of the different types of income used in this study (labor earnings, capital incomes, real estate incomes, self-employed incomes) to clearly define the control and treatment groups. To do so, we use the definition of category income that appears in the production balance sheets of the Tax and Social Income Survey (ERFS) produced by INSEE (National Institute of Statistics and Economics Studies).

Each year INSEE provides an ERFS production balance sheet in which it defines the category income of tax households in correspondence with the boxes on the tax returns, whether taxable or not. We use these documents to define for each year the income aggregates $y_{1,t}$, $y_{5,t}$, $y_{5pro,t}$, $y_{15,t}$, $y_{2,t}$, $y_{2div,t}$ and $y_{2int,t}$ whose simplified definition is described in Table 2.

Labor Incomes	
$y_{1,t}$	Wages + Unemployment benefits + Pensions
$y_{5,t}$	Farm incomes + Self-employed incomes
$y_{15,t} \overset{\text{def}}{\equiv} y_{1,t} + y_{5,t}$	Labor incomes
Capital incomes	
$y_{2,t}$	Capital incomes taxed at the flat tax + Capital incomes including in the computation of personal taxable income
$y_{2div,t}$	Dividends taxed at the flat tax + Dividends including in the computation of personal taxable income
$y_{2int,t}$	Fixed capital incomes

Table 2: Income aggregates created for each years t

Once the various income aggregates for each year constructed, a cylindrical panel of tax returns is build using the encrypted tax identifiers corresponding to household, tax filer "1", and tax filer "2". This technique excludes from our study households that experienced divorce, death, PACS or marriage between 2008 and 2017. The control and processing groups for the difference-in-differences exercises in section IV are built on this sample.

Different sub-samples are then constructed. The "self-employed" are identified either because BIC (Industrial and Commercial Profits), BNC (Non-Commercial Profits) or Agricultural income is reported, or because the household reports contributions to compulsory supplementary pension company schemes, including so-called "Madelin" contracts (boxes 6QS, 6QT or 6QU), which are intended for the self-employed (e.g. majority managers of limited liability companies).

III.3 Marginal Tax Rate Simulation

For the estimation of elasticities using the instrumental variable method *à la* Auten and Carroll (1999) and Gruber and Saez (2002), we need to simulate each year the amount of income tax and social security contributions payed in order to calculate the marginal effective tax rates on different types of income. To do this, we partly use the tax block and the parameters of the INES microsimulation model co-managed by INSEE, DREES and Cnaf and freely available since 2016. [20] We thus simulate over the period 2008-2017 the income tax brackets, income tax advantage du to children and its ceiling, and the main deductions to reconstitute a income based tax from declared income. We also simulate the CSG and CRDS on labor and capital incomes over the period 2008-2017 (based on the rates applicable to income, deducted from

[20] See https://www.insee.fr/fr/information/2021951 for a quick description or the more detailed presentation in https://adullact.net/projects/ines-libre.

net income by simulating employee contributions for high earners[21]). Taking social security contributions into account makes it possible to reconstitute the effective taxes faced by individuals (excluding corporation tax for dividends) and thus to have elasticities closer to real ones. To calculate the effective marginal tax rates on each income, we increase the different incomes by 5% in turn, which allows us to deduct a marginal tax rate by comparing the modified tax paid with the one simulated in the counterfactual scenario. For the econometric analysis, the marginal net-of-tax rates will be used and are calculated as the complement to 1 of the marginal rates. Thanks to our panel, we can build the different instruments according to the method of Auten and Carroll (1999) and Gruber and Saez (2002) by recovering the revenues of previous years and applying them inflation rate. We create the instruments related to each change in interest variables.

III.3.a Data description

	Broad Income	y_{15}	y_2	y_{2div}	Broad Income	y_{15}	y_2	y_{2div}
Exhaustive - 36 334 123 Households					Top 1 - 344 278 Households			
Mean	26 500	26 243	1 043	622	275 332	181 866	51 784	43 299
Standard deviation	66 279	32 347	33 890	32 814	583 282	206 529	342 941	333 460
P99	132 334	51 699	13 901	6 009	1 607 379	755 284	665 863	601 240
P90	49 895	121 533	1 004	65	416 611	293 458	202 943	100 000
P75	31 638	33 182	100	1	255 914	205 645	30 310	13 200
Median	18 623	19 820	1	0	181 948	158 304	3 279	191
P25	11 509	12 229	0	0	150 688	115 090	387	0

Table 3: Descriptive statistics of incomes by sub-samples in 2011

The left-hand side of the table 3 describes the distribution of the different income aggregates in 2011 for all tax filers. The right-hand side of the table 3 highlights the distribution of this income within the first percentile of the distribution by broad income (broad income of over 132,334€). We find the result of Garbinti et al. (2018) that capital income, and more particularly dividends, are very concentrated at the top of the distribution. The base sample for our study is made up of the cylindrical panel of tax households that we find from 2008 to 2017 and that report positive labor income y_{15}, positive capital income y_2 and positive dividends.

IV Difference-in-Differences Approach

IV.1 The Method

In this paper, we implement a Difference-in-Differences strategy exploiting the 2013 reform (end of the "PFL" flat tax) to study the responses of taxpayers to a change in capital income taxation. For this purpose, we compare the evolution of taxpayers' incomes according to whether they belong to a treatment group or a control group. The treated group includes all taxpayers who declared dividends to the PFL consecutively during the five years from 2008 to 2011. The control group includes all other taxpayers. Our goal is to estimate a Difference-in-Differences equation of the form:

$$\ln(y_{i,t}) = \alpha_i + \sum_k \delta_k \, \mathbb{1}_{t=k} + \sum_{k \neq 2011} \beta_k \, \mathbb{1}_{t=k} \times \mathbb{1}_{i \in Traite} + \sum_j \gamma_j \, X^j_{i,t} + u_{i,t} \quad (1)$$

[21] The simulation of employee contributions is crude and does not take into account the non-linear scale depending on the annual social security ceiling (see Sicsic (2019) for the scale). We pretend that all the individuals in our sample are in the last brackets.

where i is an index relating to the taxpayers, and t is a time dummy, where the variable $\mathbb{1}_{i \in Treated}$ is an indicator equal to 1 for the treated group and zero otherwise. The variable $y_{i,t}$ is then a type of taxpayers income i at date t for which we want to study the way it is impacted by the capital taxation. In the equation (1), the coefficients α_i are individual fixed effects capturing time-invariant heterogeneities between individuals; the coefficients δ_k are temporal indicators capturing common trends (actually capturing the trend of the control group) and $X_{i,t}$ are observable variables.

The coefficients of particular interest to us in the equation (1) are the β_k parameters that capture the trend divergences at each date between the treatment and control groups.

- The coefficient β_{2011} is normalized to zero because otherwise there would be redundancy between the coefficients δ_k, the coefficients β_k and the individual fixed effects α_i.
- For $k < 2011$, we'll test the assumption $\beta_k = 0$ to verify the common trend assumption.
- If and only if the common trend assumption is verified, the β_k coefficients for $k > 2011$ will capture the effect of the reform at the k date.

IV.2 Data Selection

For this estimation method, we select the taxpayers in our panel that have reported labor income, capital income and dividends over the entire study period (2008-2017). In addition, in order to avoid having our results affected by changes in tax brackets from one year to the next, we only retain in this sample the taxpayers that remain at the top of the income tax bracket in 2008, 2009, 2010 and 2011. As capital income is highly concentrated at the top of the distribution Garbinti et al. (2018), this selection essentially amounts to keeping taxpayers at the top of the distribution of reference tax revenues. It is on this cylindrical sample comprising 27 458 tax filers that we distinguish our treatment group (of 1 967 tax filers who declared dividends to the PFL in 2009, 2010 and 2011) from our control group comprising all other 25 491 tax filers (see Table 4 for descriptive statistics).

Statistics	y_{15}	y_2	y_{2div}	Family quotient	Age
	Treatment Group - 1 967 taxpayers				
Mean	298 508	464 576	435 590	2,0	61
Standard deviation	360 114	1 447 333	1 431 096	0,7	10
P75	337 507	420 875	386 910	2,0	67
Median	209 716	183 759	160 004	2,0	60
P25	133 942	70 968	54 997	2,0	55
	Control Group - 25 491 taxpayers				
Mean	240 405	66 271	53 929	2,0	60
Standard deviation	235 344	540 958	530 676	0,7	10
P75	290 654	29 270	12 916	2,0	65
Median	187 540	7 217	1 246	2,0	60
P25	110 521	1 825	161	1,5	53

Table 4: Descriptive statistics on the control and treatment groups in 2011

	y_{15}		y_2		y_{2Div}	
Controls	Without (1)	With (2)	Without (3)	With (4)	Without (5)	With (6)
β_{2008}	$0,028^{*}$ (0,011)	$-0,004$ (0,011)	$-0,027$ (0,041)	$-0,128^{***}$ (0,042)	$0,071^{***}$ (0,050)	$-0,056$ (0,052)
β_{2009}	$0,029^{**}$ (0,011)	$0,009$ (0,011)	$-0,018$ (0,041)	$-0,075^{*}$ (0,042)	$0,069$ (0,050)	$-0,032$ (0,052)
β_{2010}	$0,004$ (0,011)	$-0,010$ (0,011)	$0,080^{*}$ (0,041)	$0,015$ (0,042)	$0,102$ (0,050)	$-0,026$ (0,052)
β_{2012}	$0,011$ (0,011)	$-0,001$ (0,011)	$-0,409^{***}$ (0,041)	$-0,499^{***}$ (0,042)	$-0,440^{***}$ (0,050)	$-0,550^{***}$ (0,052)
β_{2013}	$0,031^{***}$ (0,011)	$-0,015$ (0,011)	$-0,674^{***}$ (0,041)	$-0,748^{***}$ (0,041)	$-1,122^{***}$ (0,050)	$-1,219^{***}$ (0,051)
β_{2014}	$0,055^{***}$ (0,011)	$-0,011$ (0,011)	$-0,636^{***}$ (0,041)	$-0,739^{***}$ (0,041)	$-1,078^{***}$ (0,050)	$-1,221^{***}$ (0,051)
β_{2015}	$0,056^{***}$ (0,011)	$-0,024^{**}$ (0,011)	$-0,619^{***}$ (0,041)	$-0,733^{***}$ (0,041)	$-1,131^{***}$ (0,050)	$-1,303^{***}$ (0,051)
β_{2016}	$0,079^{***}$ (0,011)	$-0,016$ (0,011)	$-0,590^{***}$ (0,041)	$-0,728^{***}$ (0,041)	$-1,212^{***}$ (0,050)	$-1,408^{***}$ (0,051)
β_{2017}	$0,005$ (0,011)	$-0,085^{***}$ (0,011)	$-0,759^{***}$ (0,041)	$-0,893^{***}$ (0,041)	$-1,470^{***}$ (0,050)	$-1,638^{***}$ (0,051)
N	247122					

Table 5: Results of estimating the β_k coefficients of the equation (1), without (columns (1), (3) and (5)) and with controls (columns (2), (4) and (6))

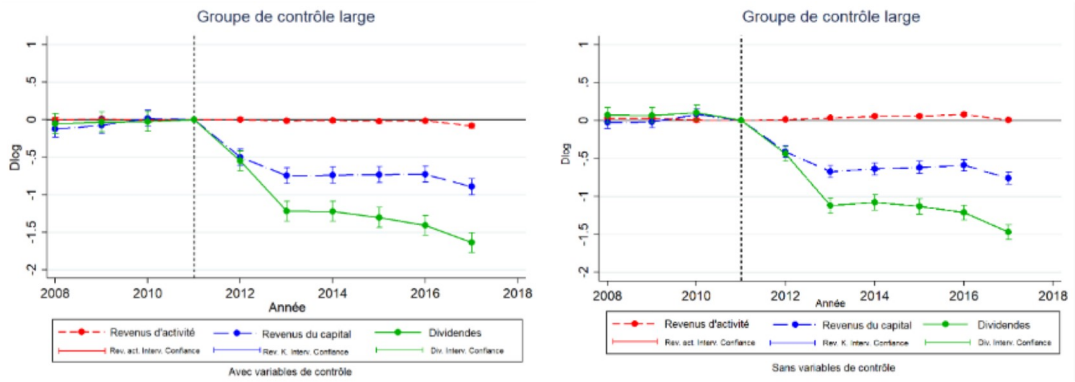

Figure 2: Results of estimating the β_k coefficients of the equation (1), without (left) and with controls (right). 99% Confidence Intervals.

IV.3 The Difference-in-Differences Method Results

IV.3.a The Capital Income Responses

The table 5 transcribes the results of estimating the β_k coefficients of the equation (1) without control variables $X_{i,t}$ (columns (1), (3) and (5) and with control variables (columns (2), (4) and (6)). All specifications include time dummies to control for the macroeconomic evolution of dividends as shown in Figure 1. Also, the estimated coefficients for the year t, which are also shown in Figure 2, correspond well to the difference in income changes between the control group and the treatment group between 2011 and the year t.

In addition to the 2013 reform, several other important tax reforms were adopted during the period covered by this study that affected the wealthiest taxpayers in particular (Aghion et al., 2019). However, as it is likely in the light of the Table 4 that these reforms affect taxpayers in the treated group more than those in the control group, one may wonder whether our results

do not in fact reflect the effect of these concomitant reforms, rather than the effect of the 2013 reform. This is why we have included in the list of control, the following variables $X_{i,t}$:

- the interactions between the temporal indicators and an indicator indicating whether the taxpayer i at the date t was declaring labor income in excess of 1 000 000 € to capture the effects of the 75% tax studied by Guillot (2019). We thus allow taxpayers exposed to the 75% tax to see their income undergo a specific trend.
- the interactions between the temporal indicators and an indicator equal to 1 if the Reference Tax Income exceeds the threshold of 250 000 for a single person and 500 000 for a couple in order to capture the effects of the implementation of the Exceptional Contribution on High Income (CEHR). We thus allow taxpayers exposed to the CEHR to see their income undergo a specific trend.
- the interactions between the temporal indicators and an indicator equal to 1 if the family quotient the year t is greater than 150 000 to capture the household's exposure to the creation of the 45% tax bracket.
- interactions between temporal indicators and temporal indicators with indicators by type of tax household (a single tax filer with one child, two tax filers with 1, 2 or 3 children) in order to apprehend the effect of decrease of the ceiling of the tax advantage due to children studied by Pacifico (2019).

Examination of columns (3) and (4) indicates that the addition of these control variables does not alter our results: while the common trend assumption is formally rejected in 2008 and 2009, notably because of the narrow confidence intervals, the dynamics of capital income of taxpayers in the treated group diverge significantly from those of the control group from 2012 onwards, suggesting that the end of the PFL had a causal effect on the amount of dividends received by taxpayers.

A plausible hypothesis to explain the divergence in capital dynamics after 2012 between the two groups of taxpayers would be that the treated group includes taxpayers for whom the share of dividends in capital income is particularly high. This observation is based in particular on the comparison of dividends and capital income in the control group and in the group treated in 2011 (see table 4). Thus, if it was the firms that had decided to distribute fewer dividends to their shareholders after 2012, and if the composition of the capital income of the treated group includes more dividends, then *mechanically*, the capital income of the treated group should decrease more than that of the control group, without this discrepancy being explained by behavioral responses from the taxpayers. However, if this hypothesis were to be verified, there should not be any significant divergence between the dividends received by the shareholders of the control group and those of the treated group after the 2013 reform, since the dividend dynamics would then be determined by companies independently of the recourse of their shareholders to the PFL. However, columns (5) and (6) of the table 5 as well as the green curves of the graphs in Figure 2 indicate that the reduction in dividends after 2013 is much more pronounced in the treated group than in the control group, reaching an order of magnitude of 70% in 2013[22]. This figure is significantly higher for dividends than for total capital income, which invalidates the assumption that the response would come only from companies and not from taxpayers. Compared to the dividends received by taxpayers in the control group, the decrease in dividends received by taxpayers who declared dividends to the PFL in 2008, 2009, 2010 and 2011 is significantly higher.

In light of these results, one would be tempted to predict that only dividends would have been affected by the 2013 reform. To test this assumption, we would therefore like to re-estimate

[22] $-0.70 \simeq \exp(-1.219) - 1$.

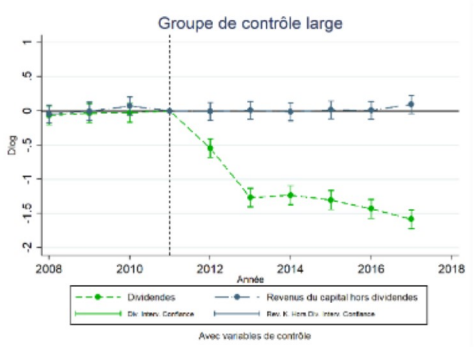

Figure 3: Results of estimating the β_k coefficients of the equation (1), with controls for the subsample of taxpayers that earn dividends and fixed capital incomes. 99% confidence intervals. (Result table in appendix **??**)

the equation (1) by taking as explanatory variables capital income excluding dividends. However, doing so requires removing from our sample those taxpayers whose capital income would consist entirely of dividends. The log-linear specification of the equation (1) therefore obliges us to construct a slightly smaller cylindrical panel and to re-estimate also on this sample the equation (1) with controls for capital income and for dividends. The results are shown in Figure 3.

The trend differences between the treatment and control groups are remarkably similar for dividends or other capital income prior to 2011. In particular, the common trends assumption seems plausible. On the other hand, the two curves diverge sharply from 2012, which would suggest that the increase in the taxation of dividends from 2013 could have been anticipated in the election year of 2012. In particular, while dividends are sharply reduced after 2012, and to a degree comparable to Figure **??**, there is no divergence in the dynamics of other capital income between the group of treated taxpayers and the control group after 2012. We are therefore led to reject the hypothesis that dividend scaling has had a causal impact on the dynamics of other capital income.

IV.3.b No significant labor incomes responses to capital marginal tax rates, even for self-employed

A plausible *a priori* mechanism that could explain the significant behavioral responses of capital income and dividends would be the decisions to shift taxpayers' remuneration as dividends (*income shifting*), especially for taxpayers who are self-employed. Indeed, self-employed receive both labor income from their activity and dividends from the capital they have invested in their activity. Such mechanisms of income-shifting have been empirically demonstrated in Israel (Romanov, 2006), Norway (Alstadsæter and Wangen, 2010), Finland (Pirttilä and Selin, 2011, Harju and Matikka, 2016) or Sweden (Edmark and Gordon, 2013, Alstadsæter and Jacob, 2016). It is therefore legitimate to wonder whether the sharp reduction in dividends observed in France after 2012 has been reflected in higher wages for self-employed.

Columns (1) and (2) of the table 5 and the red curves of the figure 2 allow to answer this question. While the results without control variables suggest the existence of an increase in labor income, an increase of a much more limited magnitude than the decrease in dividends [23], the results with control variables suggest that the income-shifting hypothesis should be refuted.

[23] It should be noted that according to the table 4, the taxpayers in the treatment group have, on average, capital income y_2 and even dividends y_{2div} almost twice as much as their labor income y_{15}

To ensure that capital income responses are not the consequence of income-shifting behavior, we re-estimated the equation (1) on the sample of self-employed taxpayers. Indeed, the self-employed are deemed to have more latitude to adjust their earned income than employees (see for example Saez (2010)). Here we use a "strict" definition of self-employed, selecting from this sub-sample those taxpayers who were independent at all dates. According to Table 6, this leads us to a control group receiving more labor income but less capital income and fewer dividends. The treated group is also characterized by more labor income, but also more capital income and dividends. Re-estimation of the equation (1) on this subsample qualitatively leads to the same results in Figure 4 as in Figure 2. In particular, it does not appear that the labor income of the self-employed persons treated has shown a more favourable trend than the labor income of the self-employed persons of the control group. This result leads us once again to reject the hypothesis of a dividend response that would be explained by the income-shifting of self-employed persons.

	N	y_{15}	y_2	y_{2div}
Mean	Treatment group			
Always self-empl.	240	409 836	218 858	195 195
Never self-empl.	1 046	253 895	502 669	473 479
	Control group			
Always self-empl	7 593	294 424	24 751	16 773
Never self-empl.	9 496	176 502	94 000	78 886

Table 6: Average incomes of control and treatment group on the subsamples on self-employed in 2011

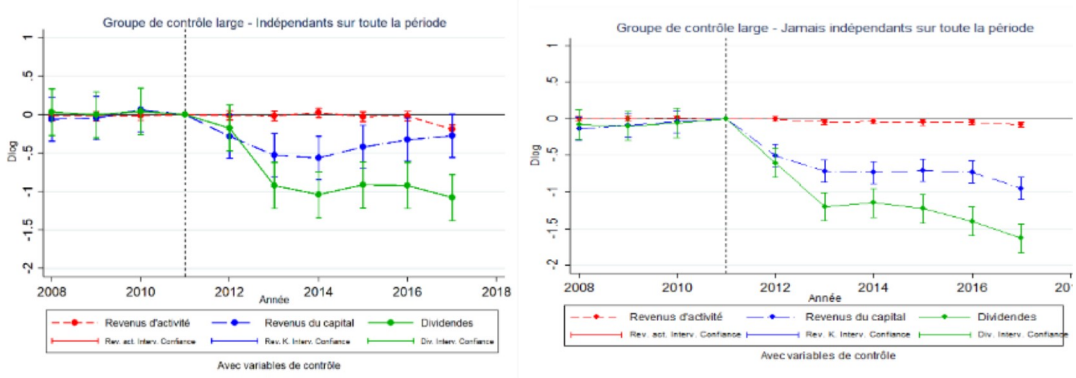

Figure 4: Results of the estimation of coefficient β_k of equation (1), without (left) and with controls (right) on the subsample on self-employed . 99% Confidence Intervals.

These results are similar to those of Yagan (2015), which found that the reduction in the taxation of dividends in the United States in 2003 led to a sharp increase in dividends in the following years, with no effect on labor income. Rather than a income-shifting effect on self-employed income, it could instead be an intertemporal substitution effect (Korinek and Stiglitz, 2009), with dividend holders reserving their dividends pending the return of more favourable dividend taxation. Other possible explanations could be arbitrage with share buybacks, portfolio arbitrage, or principal-agent effects (Chetty and Saez, 2010).

IV.3.c Robustness checks

We now explore the heterogeneity of behavioral responses. For this purpose, we identify the sub-population of taxpayers liable to the Wealth Solidarity Tax (ISF) and those who are not.

The table 7 shows the average incomes of the control and treatment groups.

Mean	Control group				Treatment group			
	N	y_{15}	y_2	y_{2div}	N	y_{15}	y_2	y_{2div}
ISF	9 653	259 953	95 994	77 048	1 148	309 966	538 437	502 020
No ISF	15 838	228 490	48 155	39 838	819	282 444	361 043	342 473

Table 7: Average incomes in 2011 of control and treatment group by sub-population of taxpayers liable or not to ISF

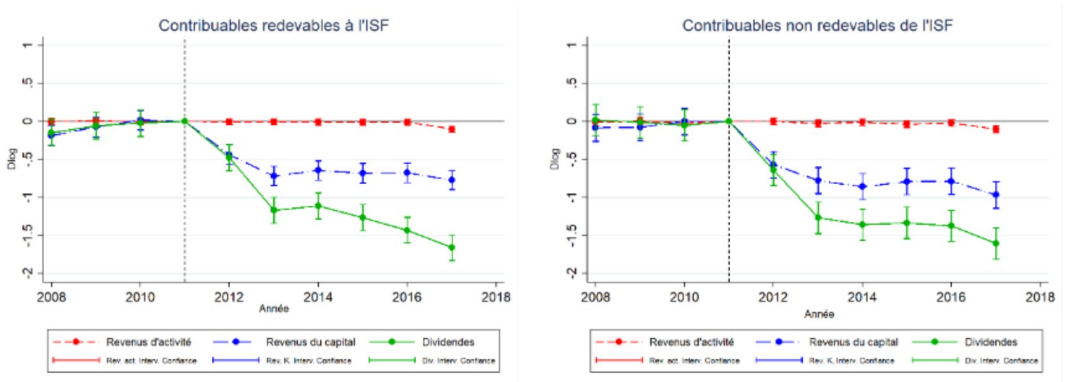

Figure 5: Results of the estimation of coefficient β_k of equation (1) with controls sub-population of taxpayers liable or not to ISF. 99% Confidence Intervals.

Re-estimation of the equation (1) on these sub-samples (Figure 5) produces results that are very close to those for the entire population described in Figure 2. The results are similar between the two samples. From these two results we can conclude : (i) the results presented in the first part are not affected by potential optimization strategies to pay less ISF, and (ii) ISF taxpayers, and therefore very high net worth individuals, would not have reacted more to the reform than other tax households.

V Instrumental Variable Approach

The Difference-in-Differences method is, in our view, particularly convincing in terms of internal validity to demonstrate the existence or not of a causal effect. But it only applies to one. Indeed, we are only evaluating here the re-inclusion of dividends in the income tax base from 2013 onwards, which does not allow us to conclude whether or not the other reforms of capital income taxation may or may not have generated behavioral responses. For this, an instrumental variable method is needed that takes into account the changes in marginal tax rates generated by all the reforms over the period 2008-2017. In the following section, we detail this method, then the sample on which we apply it, before giving our results.

V.1 The Method

To estimate the elasticity of income k to the marginal net-of-tax rate (MNTR) of labor income $1-\tau^1$ and to the MNTR of capital income $1-\tau^2$, we estimate the following equation:

$$\ln\left(\frac{y^k_{i,t}}{y^k_{i,t-1}}\right) = \alpha + \beta^1 \ln\left(\frac{1-\tau^1_{i,t}}{1-\tau^1_{i,t-1}}\right) + \beta^2 \ln\left(\frac{1-\tau^2_{i,t}}{1-\tau^2_{i,t-1}}\right) + \mu_{i,t} \tag{2}$$

This (log) difference specification has the advantage of eliminating individual fixed effects that capture heterogeneities between taxpayers that are invariant over time. Nevertheless, ordinary least squares estimation of the (2) equation will result in coefficients that reflect not only the effects of tax variables on income, which we estimate, but also the effect of different types of income on the marginal tax rates faced by taxpayers given the progressivity of taxes. To correct for these simultaneity biases, an two stage least squares estimator is used, using the instrumentation strategy originally proposed by Auten and Carroll (1999) and popularized by Gruber and Saez (2002). The instruments correspond to the changes in the (log) MNTR that would have occurred if the taxpayer's income between the dates $t-1$ and t had not been changed (in real terms), also called mechanical MNTR i.e.

$$\ln\left(\frac{1-\overline{\tau}_{i,t}^{k}}{1-\tau_{i,t-1}^{k}}\right) \qquad \text{où} \qquad \overline{\tau}_{i,t}^{k} \overset{\text{def}}{\equiv} \frac{\partial T_t(y_{i,t-1}^{1}, y_{i,t-1}^{2})}{\partial y^{k}} \tag{3}$$

where $\overline{\tau}_{i,t}^{k}$ represents the partial derivative of the tax scale of the year t compared to the k^{eme} income, evaluated at the income of the year $t-1$. It is therefore the mechanical variation of the (log of the) marginal net-of-tax rate that is only caused by changes in tax scales, and not the variations in MNTR that would appear as a result of changes in income that wouldn?t be caused by responses to the tax reforms. However, two problems can bias the estimates: the problems of mean reversion (classic in panel data) and heterogeneous trends between different income groups. The first problem causes a negative correlation between the level of income and its variation in the following period. The second problem proved particularly daunting on US data given the context of persistent increases in inequality. Thus, when the wealthiest taxpayers experience both faster income growth and a sharp decline in their marginal tax rate, how can one distinguish between faster income growth caused by tax reforms and that caused by trends towards income divergence and increased inequality? To answer this question, Auten and Carroll (1999) proposed to add in the right-hand side of the equation (2) the log of the income in $t-1$ while Gruber and Saez (2002) proposed to add a richer nonparametric specification based on splines per deciles of income. Kopczuk (2005) and Saez et al. (2012) have, however, shown how, on American data, the results are extremely sensitive to the specifications used to control these phenomena, which casts serious doubt on the reliability of the results. It is therefore essential to check the robustness of the results to a change in specification. In this study, we use different functions of the reference tax income (RFR) of the year $t-1$ to control for these phenomena. Finally, we believe it is essential to add temporal indicators in the control variables to control for macroeconomic effects. Also, we estimate by the 2SLS method:

$$\ln\left(\frac{y_{i,t}^{k}}{y_{i,t-1}^{k}}\right) = \beta^{1}\ln\left(\frac{1-\tau_{i,t}^{1}}{1-\tau_{i,t-1}^{1}}\right) + \beta^{2}\ln\left(\frac{1-\tau_{i,t}^{2}}{1-\tau_{i,t-1}^{2}}\right) + \Phi\left(RFR_{i,t}\right) + \sum_{k=2008}^{2016}\delta_{k}\,\mathbb{1}_{t=k} + \mu_{i,t} \tag{4}$$

where $\Phi(\cdot)$ is either the log function as in Auten and Carroll (1999) or the specification originally proposed by Gruber and Saez (2002) which consists of introducing a 10 piece spline in log first period RFR.

V.2 Data Selection

For this estimation method, we select the households in our panel that have reported labor income, capital income and dividends over the entire study period (2008-2017). However, unlike the selection made for the Difference-in-Differences estimation method, no restriction is done to households in the upper range of the income tax. This allows us, on the one hand, to broaden our field of study and, on the other hand, to keep the households concerned by changes in bracket that enrich our sources of identification. We remove from our sample only the extreme values in terms of annual changes in capital income.

The fewest restrictions necessary for this estimation method allow us to follow a much larger sample of taxpayers than with the Difference-in-Differences method. Indeed, in our base sample, we follow 2.8 million tax households each year. From this point of view, this method generates results that we think are more easily generalizable. In addition to taking into account the changes in marginal rates generated by the reforms over the period, our estimates using the instrumental variable method do not focus solely on the households most affected by the 2013 reform. We therefore believe that the external validity of this method is more convincing than the Difference-in-Differences method.

V.3 The Instrumental Variable Method Results

The results of the estimations of the equation (4) are transcribed in the table (8). These results are obtained by the two stage least squares method, using the instruments given by the equation (3).

	$\frac{\partial \ln y^1}{\partial \ln(1-\tau^1)}$ (a)	$\frac{\partial \ln y^2}{\partial \ln(1-\tau^1)}$ (b)	$\frac{\partial \ln y^1}{\partial \ln(1-\tau^2)}$ (c)	$\frac{\partial \ln y^2}{\partial \ln(1-\tau^2)}$ (d)
(1) Baseline	0.0549^{***} (0.0039)	-0.3936^{***} (0.0152)	0.1109^{***} (0.0016)	0.6654^{***} (0.0061)
(2) Direct elasticities	0.1569^{***} (0.0038)	$\emptyset$	$\emptyset$	0.6538^{***} (0.0060)
(3) Symmetry stress	0.1041^{***} (0.0037)	0.2972^{***} (0.0117)	0.0249^{***} (0.0009)	0.6010^{***} (0.0060)
(4) Splines de $\ln RFR_{t-1}$	0.0549^{***} (0.0039)	-0.3936^{***} (0.0152)	0.1109^{***} (0.0016)	0.6654^{***} (0.0061)
(5) Retirees	$-0,017^{***}$ (0,003)	$-0,252^{***}$ (0,024)	$0,031^{***}$ (0,002)	$0,876^{***}$ (0,015)
(3) Retirees (direct elasticities)	$0,003$ (0,003)	$\emptyset$	$\emptyset$	$0,857^{***}$ (0,015)

Table 8: Equation (4) Estimates

The first row of the table 8 shows the equation (4) estimates results on our sample. Column (a) corresponds to the elasticity of labor income (and pensions) at their own marginal net-of-tax rate (MNTR). We get an estimate of 0.05 which is very accurately estimated. This estimate is significantly lower than the elasticity of 0.3 obtained by Lehmann et al. (2013) or the elasticity of 0.26 obtained by Sicsic (2019) for the responses of earned income to the MNTR of income tax alone, both studies using French data. On the other hand, our estimate is in the same orders of magnitude as the elasticity of 0.08 obtained by Sicsic (2019) for all transfers (income tax and benefits) or by Kleven and Schultz (2014) on Danish data.

Column (d) is the estimate of the capital income elasticity y_2 to their own MNTR. We find a particularly high elasticity around 0.66. This elasticity, which is ten times higher than the corresponding elasticity for labor income, is consistent with the results obtained by difference-in-differences, which suggested a high sensitivity of capital income to its own MNTR. Kleven and Schultz (2014) obtain from Danish data an elasticity of capital income at their own MNTR that is three times higher than that of labor income. Hermle and Peichl (2018, Table 2) obtain on the contrary the same elasticity for labor income and for capital income on German data using the method of Gruber and Saez (2002), but twice as high an elasticity for capital income using the method of Weber (2014). Our result of a significantly higher elasticity of capital responses suggests that it would be desirable to adapt a specific scale for capital income in order to limit the distortions that progressive taxation can generate when applied to a tax base that is too elastic. It corresponds to what Jacquet and Lehmann (2020) describes as a *Ramsey* effect.

An argument often raised against the application of a specific scale for capital income is the cross-answer. In particular, if it is easy for taxpayers to shift their income so that it is subject to

more favorable taxation, then applying scales that are too different to labor income and capital income creates strong incentives to income shifting. Such a risk has been empirically documented in Israel (Romanov, 2006), Norway (Alstadsæter and Wangen, 2010), Finland (Pirttilä and Selin, 2011, Harju and Matikka, 2016) and Sweden (Edmark and Gordon, 2013, Alstadsæter and Jacob, 2016). On the other hand, we have seen that such an effect has been refuted in France by Boissel and Matray (2019), by Ben Jelloul et al. (2019) and by our Difference-in-Differences results. Columns (b) and (c) provide additional lighting.

Column (c) shows the labor income elasticity estimate at the capital income MNTR around 0.11, which is statistically significant at 1%. The low estimated elasticity is in line with our results obtained by Difference-in-Differences. Moreover, we obtain a positive cross elasticity while the mechanism of income-shifting predicts on the contrary a negative elasticity. A decrease in the marginal tax rate on income from capital implies an increase in the marginal net-of-tax rate τ_2 on capital income. The income-shifting mechanism predicts that taxpayers will react to this increase in the MNTR of capital income by shifting labor income into capital income, which would *increase* capital income (i.e. $\frac{\partial \log y_2}{\partial \log \tau_2} > 0$) and *decrease* the labor income (i.e. $\frac{\partial \log y_1}{\partial \log \tau_2} < 0$). Thus, this result supports our conclusion that there are no income-shifting effects following a change in the marginal rate of capital. On the other hand, column (b) indicates that we obtain a negative, statistically significant and economically high elasticity of capital income at the MNTR of labor income. Thus, only the taxation of income from activity would create a income-shifting in France, unlike the taxation of income from capital. We still need to understand the reasons for this asymmetry between the cross-elasticities.

Row (2) of table 8 seeks to verify that our estimates of direct elasticities $\frac{\partial \log y_1}{\partial \log \tau_1}$ and $\frac{\partial \log y_2}{\partial \log \tau_2}$ are not contaminated by the estimated $\frac{\partial \log y_2}{\partial \log \tau_1}$ and $\frac{\partial \log y_1}{\partial \log \tau_2}$ cross-effects. For this we estimate in row (2) of the table 8 the equation (4) for the capital income by imposing the restriction $\beta_1 = 0$ and we estimate the equation (4) for the labor income by imposing the restriction $\beta_2 = 0$. The elasticity of capital income at its own MNTR (column (d)) is remarkably unchanged, while the elasticity of labor income at its own marginal rate is tripled to a level close to 0.15.

The method of Auten and Carroll (1999) and Gruber and Saez (2002) for estimating income elasticity at it marginal net-of-tax rate has been the subject of intense criticism in the literature Saez et al. (2012). The difficulty is that this method has often been used in a context where the wealthiest taxpayers have benefited at the same time from the largest reductions in marginal tax rates and have experienced faster income growth than other taxpayers (Weber, 2014). It is therefore generally particularly difficult to distinguish in this difference in income growth between what is due to tax reforms and what is due to a trend of increasing inequality. Kopczuk (2005) showed in particular how estimates on U.S. data were particularly sensitive to the specification of income controls (the $\Phi(\cdot)$ function in the equation (4)). Therefore, in row (4) of the table 8, we re-estimated the equation (4) assuming a log-linear 10-piece splines of the previous year taxable income (per decile of RFR), as in Gruber and Saez (2002). The fact that the estimates in lines (1) and (4) are so close reassures us about the reliability of our results. This can be explained by the fact that since inequalities are much less dynamic in France, the problem of heterogeneity of trends by income groups is much less likely to contaminate the estimation of the (4) equation. Moreover, since we are dealing with an increase in marginal tax rates, ignoring the effects of a possible increase in inequality would tend to underestimate the effects.

Given the average age of our taxpayers and the fact that retirement pensions are included in the income aggregate y_{15} (see Table 2), we may wonder whether the low elasticity of labor income at their own MNTR may not be due to an over-representation of retirees in our sample. Row (5) of Table 8 then shows the results of the estimation of the equation (4) by restricting itself to a sub-sample of retirees tax households. Such a restriction leads to very close results.

VI Conclusion

In this paper, we have used two different approaches to study the behavioral responses of taxpayers' incomes to capital taxation.

The first method uses the 2013 reform, which include dividends with the personal income tax base, to study the responses of the wealthiest tax households to a change in the taxation of capital using the difference-in-differences method. To do this, we examine the tax returns of tax filers who were taxed at the top of the income tax bracket from 2008 to 2011. We show that, compared to the other tax households in this sample, households that declared dividends to the PFL from 2008 to 2011 experienced a significant drop in their capital income and dividends. On the other hand, their labor income developed in a similar way to the taxpayers belonging to the control group. These findings hold true when we restrict our study sample to different sub-populations, including the self-employed. This suggests that an increase in the taxation of capital would lead, at least in the short term, to a contraction of the tax base, which would not be explained by the income-shifting of dividends as business income.

The second method using instrumental variables makes it possible to estimate behavioral elasticities by taking into account not only the 2013 reform but also all other tax reforms that have taken place since 2008. Another advantage of this method is that it is based on a larger population. We obtain a 0.65 elasticity of capital income at its marginal net-of-tax rate, an estimate that proves to be robust. Moreover, the cross-elasticity of labor income to the marginal net-of-tax rate (MNTR) of capital income is weakly positive, confirming the results of the first method on the absence income-shifting of dividends into income from activities by the self-employed. On the other hand, we obtain a negative, statistically significant and economically high elasticity of capital income with respect to the MNTR of labor income, suggesting that only the taxation of labor income would create income shifting behaviors in France, unlike the taxation of capital income. We explain that the elasticity of capital income at its MNTR is lower than that obtained by Bach et al. (2019) because the response after 2013 would reflect a reaction to the set of reforms that have increased marginal rates of capital income since 2008. The elasticity of 0.65 that we obtain thus seems more relevant for an ex-ante evaluation of another capital tax reform, or to calibrate the macroeconomic consequences of the behavioral responses highlighted by our results.

These initial results deserve to be developed further in several directions. First of all, the effects of the 2013 reform be studied for other sub-populations should. We would also like to extend our analysis to more recent data, particularly after the 2018 reform of the Prélèvement forfaitaire unique (PFU). The difference-in-differences approach could be improved by focusing on taxpayers in the control and treatment groups with closer incomes. All of these tracks are an integral part of our research program. Finally, we would like to better understand the economic mechanisms that would allow asymmetric estimates of cross-elasticities to be accounted for.

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