The Firm as Tax Shelter

Micro Evidence and Aggregate Implications of Consumption Through the Firm

David Leite *

Paris School of Economics

March 2024

Link to most recent version here

I present direct evidence that firms serve as tax-free consumption vehicles. Drawing on a unique combination of data from an electronic invoicing program in Portugal (e-Fatura), I show that individuals who control firms shift 36% of their monthly personal expenditures to firms and 31% of their household expenditures. The effects are driven by owner-managers of small closely held firms through expenditure categories on the border between business and final consumption but are widespread among business managers across the whole income distribution. My results suggest that the government revenue losses due to consumption through the firm amount to 1% of GDP. Reallocating the tax savings and personal expenditures hidden within firms to the reported household income of business managers increases the Gini by one percentage point and the top 1% income share by half a percentage point.

Keywords: Corporate payout; Business tax; Tax evasion; Firm behavior.

JEL codes: G35, H25, H26, O16.

*David.Leite[at]psemail.eu. Paris School of Economics, 48 Bd Jourdan, Paris 75014, France. I am extremely grateful to my advisor Antoine Bozio for his guidance and encouragement on this project. I further thank Annette Aldsaeter, Miguel Almunia, Laurent Bach, Samantha Eyler–Driscoll, Wojtek Kopczuk, Francisco Lima, Thomas Piketty, Francisco Queiró, Pedro Raposo, Sofia Rodrigues, and Gabriel Zucman for helpful comments and seminar participants of the CESifo Public Economics Conference 2024, CEPR Policy Forum 2023, EU Tax Observatory/Universitat de Barcelona Workshop on the Economics of Taxation 2023, and PSE Applied Economics Lunch Seminar 2022. I gratefully acknowledge financial support from FCT. I thank Statistics Portugal for providing support with novel data access and construction. The data that I use are part of Statistics Portugal's project to make administrative data from the Portuguese tax authority and other public agencies available for statistical production and research. The views expressed in this article are those of the author and do not reflect any official views. I welcome any comments, and any errors are my own.

1 Introduction

The nontaxation of inputs is a general principle in economics based on the seminal work of Diamond and Mirrlees (1971). However, if individuals who control firms can disguise personal expenditures as inputs, this prevents business income from being taxed as a distribution – either as dividends or wages – and inflates firm costs. Consumption through the firm allows the main taxes in modern tax systems to be circumvented, regardless of differences in tax rates between labor and capital and irrespective of how broadly the tax bases are designed. In addition, it does not require sophistication and is hard to audit given the wide range of expenditures that lie on the border between business and personal consumption.

The existence of a personal component in firm demand distorts resource allocation. Depending on its extent, consumption through the firm might also have implications for the measurement of the scale of tax evasion and income inequality, and it might distort the measurement of households' final consumption and firms' intermediate consumption and result in undervaluation of GDP. However, despite these potential implications, consumption through the firm has not been well studied.

The contribution of this paper is to present the first direct evidence of consumption through the firm and its implications. I use a unique combination of data on monthly personal expenditures from electronic invoices in Portugal – linked to social security records and personal income tax – to empirically estimate the proportion of personal expenditures shifted to firms and the impacts on government revenue loss and inequality.

I take advantage of two unique institutional features in Portugal. The first is an electronic invoicing software system adopted by the Portuguese government to fight value-added tax (VAT) fraud called e-Fatura. The data generated by e-Fatura cover the universe of business-to-business transactions and a large share of final consumption expenditures because the government incentivizes consumers to ask for an invoice with their taxpayer number at the time of purchase. The second feature of this research setting is the existence in Portugal of two distinct, but mandatory, social security regimes: one for employees and another for individuals who control firms, typically business owner-managers. Therefore,

I can observe in social security records the month and year in which individuals switch from being employees to being business managers.

My empirical approach exploits the variation in the flexibility to treat some forms of personal consumption as business expenditures that accompanies the employee-to-manager transition, controlling for the evolution of income and changes in household structure. In particular, I use linked data from electronic invoices and social security records to follow the final consumption of "switchers" – and their household members – in the periods before and after they transition to being business managers. As individuals could switch in any period from January 2016 to December 2019, I exploit the panel nature of my dataset using a differences-in-differences estimator with multiple time periods and comparing individuals who switched in later periods with those who switched in earlier ones.

I show that the reported consumption expenditure of switchers drops 19% one month after they switch. Among couples with one switcher, the reported expenditure of the switcher's spouse also drops by 7%, although I consider only spouses whose own switcher status does not change throughout the estimation period. One year later, business managers report 36% less expenditure than in the period when they worked as employees, while their spouses report 12% less expenditure. Combined household expenditure drops by 31%. I show that these effects are driven by owner-managers in small closely held firms.

I interpret the drop in consumption expenditures as the counterpart of the portion of personal expenditures shifted to the firm in the form of business expenditures. This is supported by the fact that average household taxable income drops 3.7% in the switching year but recovers to the pre-switch level one year later while reported household consumption remains 31% below its pre-switch level. I allocate the retained earnings within the firm to household taxable income for the 75% of switchers who are owner-managers: this comprehensive measure of owner income increases 4.4% in the switching year. Moreover, I show that *the decline in reported consumption is driven entirely by borderline expenditures while hard-to-shift expenditures do not react*. Empirically, I find that the most responsive categories are expenditures on wholesale and retail trade – e.g., supermarkets, clothing, fuel – followed closely by expenditures on hotels and restaurants and, to a lesser

extent, accounting and legal services. In contrast, I find that expenditures on housing utilities, expenditures in the private sector on nonessential healthcare services, and expenditures on private education services do not react. I further show that, to a lesser extent, spouses also decrease purchases in borderline expenditure categories, leaving purchases in "hard-to-shift" categories unaffected.

The practical importance of consumption through the firm depends, ultimately, on how prevalent it is among the universe of business managers. The use of business resources for private consumption is often perceived as strategy of "poor" owner-managers, and, as such, of minor economic importance relative to the impact of other margins of tax evasion. However, I find that *consumption through the firm is spread all over the income distribution*. I estimate that the proportion of consumption expenditures shifted to the firm varies between 20% and 30% among switchers in the top quintile of the income distribution. Among the top 1% – individuals who earn on average 173k euros per year – the transition to business manager causes a drop in monthly expenditures of 17.9%. These effects are magnified because switchers concentrate toward the top of the income distribution.

I am also interested in understanding how personal consumption motives affect the pattern of business expenditures. Hence, in a second empirical exercise, I use the population of owner-managers to estimate how firm monthly expenditures react to birthdays of the owner-manager and her spouse. I find that business expenditures on hotels and restaurants significantly increase by 9.8% in the birthday month of the owner-manager and by 6.1% in the birthday month of the owner-manager's spouse (only owner-managers whose spouse does not work in the same firm are considered). Only expenditures on hotels and restaurants react to the birthdays, and I find no evidence of changes in the pattern of business expenditures around the birthdays of employees. I interpret these results as additional evidence of consumption through the firm from the angle of business expenditures among the population of owner-managers.

I find that the government revenue loss in personal income tax (PIT) and VAT due to consumption through the firm amounts to approximately 1% of GDP. To assess the redistributive impacts of consumption through the firm, I use my micro estimates to relabel as reported household income the share of personal consumption "hidden" within

the firm plus the tax savings on PIT and VAT. I find that the Gini coefficient increases approximately one percentage point while the top 1% income share increases by half a percentage point. These impacts on inequality result from the fact that business managers concentrate toward the top of the income distribution.

Related literature. My work contributes to the literature in three main ways. First, I present first estimates of the incidence of consumption through the firm, which has been suggested – albeit without direct empirical evidence so far – to be a payout strategy of individuals who control firms (Bach *et al.*, 2019; Kopczuk and Zwick, 2020; Alstadsæter *et al.*, 2014; Clotfelter, 1983).[1] Second, my analysis shows that the magnitude of government revenue loss due to consumption through the firm is large, even relative to that attributable to other margins of tax evasion documented in the literature, such as cross-border tax evasion by individuals (Zucman, 2017). Third, my work relates to the literature documenting income shifting from personal to corporate tax bases (Smith *et al.*, 2021; Alstadsæter *et al.*, 2021; Miller *et al.*, 2020; Harju and Matikka, 2016; Gordon and Slemrod, 2000). These papers typically investigate the flexibility of owner-managers to chose how to label business income to minimize taxes at payout (labor vs. capital income) and the use of firms as tax-free saving vehicles through strategic earnings retention. I contribute to this literature by highlighting the role of firms as tax-free consumption vehicles.

While I use Portuguese data, I believe that my main points apply broadly. I believe that the institutional features of my setting – notably the vagueness of the "ordinary and necessary" criteria in the tax code combined with the difficulty of distinguishing between expenditures incurred to earn income and expenditures that should be more properly classified as final consumption – are common across, and therefore of interest in, many countries.

[1] In particular, following a reform that increased dividend taxes in Norway, Alstadsæter *et al.* (2014) find some evidence that retained earnings were disproportionally invested in durable goods and may have substituted for private consumption; the authors specifically note, "While all categories of assets grow, the increase in durable asset categories that include company cars, planes, and boats is particularly striking". There is also some anecdotal evidence from the press. For example, in 2020, *Libération* reported that the ex-CEO of Nissan-Renault, Carlos Ghosn, used the company's money to pay for both his own and his wife's birthday parties (link). In addition, Américo Amorim, Portugal's richest man at the time of his death in 2017, was accused by the Portuguese tax administration of using corporate money to finance his personal consumption expenditures on items ranging from private jets, hotels, and massages to birthday parties for family members (link).

Organization of the paper. The rest of paper is organized as follows. Section (2) presents the institutional setting and the data. Section (3) presents micro evidence of consumption through the firm using the reported consumption expenditures of switchers and business expenditures of owner-managers. Section (4) discusses the implications of consumption through the firm in terms of government revenue loss and income inequality. Section (5) concludes.

2 Background and data

This section describes the specific institutional features that allow me to present micro evidence of consumption through the firm. I start by discussing the tax system and the incentives to disguise personal consumption as business expenditures.

2.1 Consumption through the firm: Tax system and incentives

Consumption through the firm allows almost all the main taxes in modern tax systems to be avoided, regardless of how large the tax bases are. Consider the case of an owner-manager who decides to pay herself in the form of dividends and faces a dividend tax rate of $\tau = 28\%$ and a VAT rate of $\gamma = 23\%$ on consumption expenditures. On the margin, the owner-manager saves $1/(1-\tau)(1-\gamma) - 1 = 1/0.55 - 1 \approx 0.80$ for each euro of personal consumption that she is able to label as a business expenditure. Otherwise, she would have to pay herself 1.80 euros to have a net-of-tax income that would allow her to enjoy equivalent personal expenditure outside the firm. The tax savings could be even higher if we consider the reduction in corporate income tax that arises from deductible business expenditures being inflated with personal expenditures. In addition, there are tax savings on personal income tax and social security contributions on the part of business income that would have been distributed in the form of wages.

Conceptually, Portuguese law follows international standards in the tax treatment of business expenditures, defining them as "*necessary expenditures incurred with a view to obtaining or securing income*".[2] However, a persistent problem in administering the law –

[2]European Commission, Proposal for a Council Directive on a Common Consolidated Corporate Tax Base (CCCTB), p. 24, 2011: " *Deductible expenses shall include all costs of sales and expenses net of deductible value added incurred by the taxpayer with a view to obtaining or securing income, including costs of research and development costs incurred in raising equity or debt for the purposes of the business*".

and one that is common across countries – is the wide range of "borderline" expenditures, i.e., expenditures that may have both business and consumption components (e.g., cars, fuel, air travel, hotels, restaurants). This dual character of some expenditure invites abuse and makes generalized audits unfeasible. Online Appendix (C.3) provides a more comprehensive presentation of the tax system and the tax treatment of business expenditures.

2.2 Electronic invoices and employee-to-manager transitions

Consumption through the firm is hard to measure: it is a payout does not appear as such in firm administrative data, and it is usually not possible to observe the nature of the goods purchased to infer which part of business expenditures are in fact enjoyed as final consumption. To estimate the amount of personal expenditures shifted to firms, I take advantage of two institutional features in Portugal. The first is a system of electronic invoices called e-Fatura and the second the existence of two distinct, but mandatory, social security regimes: one for employees and another for business managers.

e-Fatura. The e-Fatura system is an electronic invoicing software system adopted by the Portuguese government in January 2013 to fight VAT fraud. Decree-law 198/2012 requires electronic reporting of invoices to the tax authority and covers all individuals or legal entities with a headquarters, stable establishment, or tax domicile in Portugal. The data generated by e-Fatura cover all business-to-business transactions. For final consumers, the government provides a set of incentives for them to ask for an invoice with their taxpayer number at the time of purchase.[3] The data generated by e-Fatura cover between 70% and 75% of the net-of-VAT consumption in the national accounts. Almost all goods and services are included in e-Fatura, with the notable exception of housing rent invoices issued by individual landlords. Durable goods such as cars, mobile phones, and computers are included, but it is not possible to separate purchases of durable and non-durable goods because I do not have access to itemized invoices that specify the nature

[3]These incentives are weekly public debt lotteries and deductions on income tax, up to a limit, for expenditures on health, education, nursing homes and general household spending. The government also rebates 15% of the VAT on expenditures on public transportation passes, hotels and restaurants, hairdressers, and car repair. In addition, invoices for expenditures on utilities (e.g., telecommunications, gas, electricity and water supply) and expenditures in retailers where the consumer possesses a loyalty card are automatically issued with the consumer taxpayer number.

of the goods. In my data, individual monthly expenditures are aggregated by seller taxpayer number, so I proxy the expenditure type by economic activity of the seller. Online Appendix (C.1) provides additional details on the data generated by the e-Fatura system.

Social security records. In my setting, there are two distinct, but mandatory, social security regimes: one for employees and another for individuals who control firms, typically owner-managers. Decree-law 122/2009 requires commercial registry services to report to social security the members of the governing body of firms, who are automatically enrolled in the social security regime for managers. For example, someone who creates a firm is enrolled in the manager regime from the date of business registration. The pool of individuals in the manager social security system represents 6.5% of the employed population, and each firm has an average of 1.15 business managers. The typical individual in the manager social security regime is an owner-manager of a closely held nonfinancial corporation with fewer than 10 workers and operating in the retail, consultancy, hotels and restaurant, construction, or manufacturing sector; these characteristics mirror the firm size and industry composition of the economy overall. The typical manager is richer than average and tends to fall toward the top of the income distribution. Appendix (C.2) describes thoroughly the two social security regimes. Tables (4)–(5) present descriptive statistics on the population business managers. Appendix Figures (A13)–(A17) display a detailed characterization of the population of business managers in terms of firm size, industry, income and expenditure.

2.3 Analysis datasets

My event studies use two datasets constructed from deidentified administrative data from electronic invoices (e-Fatura) between January 2016 and December 2019. The first dataset is a panel of monthly consumption expenditures of individuals who switch from being employees to being business managers. The second dataset is a panel of monthly business expenditures of owner-managers. I supplement this information with administrative data from social security records, annual personal income tax declarations (IRS) and a panel of company accounts data (IES). The datasets were accessed via the safe center of Statistics Portugal, and all the data work was done on its servers. Online Appendix (D) provides

further details on the construction of the analysis datasets and a in-depth description of the data sources. I describe below two datasets used in the analysis.

Panel of monthly consumption expenditures of switchers. The panel construction follows three steps. First, I use data from social security records to identify individuals who switched from being employees to being business managers between January 2016 and December 2019 (every year, approximately 0.2% of the employed population makes such a switch). Second, I link switchers to their annual PIT to identify spouses and children, demographic characteristics (dates of birth, gender, etc.) and household taxable income. Third, I link this information to the monthly final consumption expenditures from electronic invoices (e-Fatura) to follow consumption spending in the months before and after the transition to business manager. I exclude individuals whose spouse also switches to become a business manager or whose household composition changes during the estimation period. I exclude individuals whose firms are classified as inactive in the business registry. The final panel contains 71,480 people – 29,677 switchers and household members – and 2,882,402 person–month observations between January 2016 and December 2019; 75% of the individuals appear in the panel for all 48 months. Table (1) describes the panel, and Table (2) provides summary statistics.

The switchers are richer than average and tend to concentrate toward the top of the income distribution; 75% of the switchers create their own firm, 20% become business managers of existing firms, and 5% become business managers in the firm where they used to work as employees. Approximately 58% used to work as employees in firms with fewer than ten workers, and 96% become business managers of firms of this size. Appendix (B.1) provides supplemental statistics on the panel of switchers.

Panel of monthly business expenditures linked to owner-managers. The construction of the panel follows three steps. First, I use data from social security records to identify firm owner-managers between January 2017 and December 2019. Second, I link owner-managers to their annual personal PIT to identify spouses, demographic characteristics (dates of birth, gender, etc.) and taxable income. Third, I link this information with the firm monthly expenditures reported on electronic invoices (e-Fatura). I exclude

firms whose owner-manager's spouse works in the same firm as either a manager or an employee. In addition, I exclude firms classified as inactive in the business registry during the estimation period. The panel contains 145,038 firms and 1,416,656 firm–month observations in 2019; approximately 89% of the firms appear in the panel for 12 months. Table (3) describes the monthly panel for 2017, 2018 and 2019 and provides summary statistics. The typical firm is a small firm (93% have fewer than 10 workers), with a single owner-manager (average 1.15 owner-managers per firm), a value of assets around 500K–600K euros, sales between 245K and 250K euros per year, profits between 9K and 10K euros per year, and business expenditures between 14K and 15K euros per month.

3 Consumption through the firm: Micro evidence

3.1 Personal expenditures after the switch to business manager

My goal is to estimate how much personal expenditures are shifted to the firm. I estimate how monthly personal expenditures evolve after an individual chooses to switch from being an employee to being a business manager with an event study:

$$C_{it} = \sum_{k \in \{-9+,\ldots,-1,0,1,2,\ldots 12+\}} \delta_k \mathbf{1}(t = k) + \alpha_i + \lambda_t + \varepsilon_{it} \tag{1}$$

where C_{it} is the switcher's log monthly personal expenditures reported on electronic invoices (e-Fatura), those of her spouse or total household expenditures; $\mathbf{1}(t = k)$ is an indicator that assumes value 1 in the months after switching to business manager and 0 in the months as employee; and δ_k represents the coefficients of interest on the event time indicators. The analysis dataset corresponds to the panel described in Section (2.3) of monthly consumption expenditures of switchers. It includes monthly expenditures of 71,480 individuals, among them 29,677 switchers plus their household members, and 2,882,402 person–month observations from between January 2016 and December 2019. Tables (1)–(2) provide descriptives.

In Figure (1), I plot raw averages of monthly personal expenditures centered on the event time. This figure displays an abrupt decline in average personal expenditures after a switch. It also shows that the average expenditure of cohorts who switched in later periods evolves in parallel with that of cohorts who switched in earlier periods.

To account for the heterogeneity in treatment timing, I estimate the event study using the estimator from Callaway and Sant'Anna (2020). Specifically, I implement the inverse probability–weighted estimator with event study–type parameters δ_k aggregated by relative time. Standard errors are computed with a multiplier bootstrap procedure. Appendix Figure (A4) plots estimates derived with the estimators of De Chaisemartin and D'Haultfoeuille (2020) and Borusyak *et al.* (2021). The results are invariant to the specification choice.

My estimates suggest that a substantial share of personal expenditures is shifted to firms and would have been reported as household final consumption had individuals not switched to working as business managers. Figure (2) estimates the effects on monthly personal expenditures separately for total household expenditure, personal expenditure of the switcher, and personal expenditure of the switcher's spouse. The switcher's reported personal expenditure drops 19% in the first month after she switches. In the case of couple households, the personal expenditure of the spouse drops 7% (recall that spouses' status does not change during the estimation period), while combined household expenditure drops 17% in the first month after the switch. To transform these event studies into a post-switch estimate, I define $\overline{\delta}$ as the average of δ_k for the post period $k \in \{9, 10, 11, 12\}$.[4] I estimate the average drops to be 36% for switchers, 12% for spouses, and 31% for household expenditures.

I interpret the drop in reported consumption expenditures as attributable to the flexibility to treat some forms of personal consumption as firm expenditures rather than to responses to an income shock. This interpretation is supported by the fact that only expenditures that lie on the business-consumption borderline adjust while hard-to-shift expenditures do not react to the switch. Figure (3) shows an immediate decline in expenditures in retail trade (supermarkets, fuel, repair and sale of cars), hotels and restaurants, information and communication (telecommunications), and technical services (lawyers, accountants, etc.). It is worth noting that, to a lesser extent, spouses' expenditures also decline, even expenditures that do not involve couple coordination of leisure time (spouses may use the firm's credit card and give the firm's taxpayer number). In contrast, Figure (4)

[4] I choose these post periods because the expenditure gap deepens until period $k = 9$ and flattens out thereafter and hence my including all the periods after the switch would bias the average effect downward.

shows no reaction of household spending on nonessential health and education services provided by the private sector (dentistry, therapy, tutoring, sports and cultural activities) or household utilities (water, electricity, gas, and air conditioning), expenditures that are unambiguously final consumption and can hardly be shifted to the firm.[5]

The second reason to interpret the drop in reported consumption as consumption through the firm is how income evolves around the switch. Figure (6a) plots the evolution of average household taxable income around the switch: it drops 3.7% in the switch year but recovers to its pre-switch level one year after, increasing thereafter (while one year after, household expenditures remain 32% below the pre-switch level).

Reported incomes subject to personal taxes are usually not an accurate measure of owners' true pay because owner-managers have substantial tax advantages to retain earnings within the firm and use it as a tax-free saving vehicle.[6] Hence, I construct a more comprehensive measure of income: I focus on the 75% of switchers in my sample who are owner-managers, and I allocate retained earnings to household taxable income subject to personal taxes. Figure (6b) plots the evolution of household taxable income vs. household taxable income plus retained earnings (a measure of true owner income). There is an immediate divergence between the two income concepts. Indeed, average owner income actually increases 4.4% after the switch, following the trend of reported household taxable income before it.[7]

[5]Figure (5) plots the average event-time coefficients for all categories, and Appendix Figure (A1) plots the shares in total expenditure. Expenditures in retail trade represent the largest share of the total household expenditures reported in e-Fatura. The composition of expenditures in retail trade suggests that the decline is driven mostly by expenditures in nonspecialized stores (supermarkets), followed by expenditures in specialized stores selling clothing and shoes, household equipment, food and beverages, fuel and car repair. Expenditures on information and communication comprise mostly expenditures on mobile phone contracts and internet, television and other telecommunication services. Nonessential health expenditures comprise mostly nonurgent medical services provided by the private sector, namely, dentistry and therapy (expenditures in pharmacies are recorded as part of retail trade expenditures). In my setting, health and education services could be view as nonessential discretionary spending because access to health and education in Portugal is granted to every resident individual and funded by taxes and social security contributions.

[6]Appendix Figure (A17a) presents the distribution of the pool of managers by percentile of the taxable income distribution, showing that managers of nonfinancial corporations bunch at the percentiles at which personal income tax becomes payable, possibly withdrawing the remainder by consuming within the firm or engaging in strategic profit retention.

[7]Appendix Section (**??**) describes my approach to allocating retained earnings from company accounts data (IES) to taxable income from personal income tax (IRS) among the switchers whom I identify as owner-managers. The divergence between personal income and owner pay suggests that firms are likely being used as tax-free saving vehicles, which is common across countries and has been documented in Smith *et al.* (2021) and Miller *et al.* (2020).

3.2 Firm size, ownership and industry

To estimate effect heterogeneity by firm characteristics, I divide switchers and spouses into groups based on firm size, firm ownership and firm industry. In the case of firm size, I partition firms into three groups based on number of workers: fewer than 10 (small firms), between 10 to 50 (medium firms), and more than 50 (large firms). Business managers in small, medium and large firms account for 83%, 8% and 7% of the total individuals enrolled in the social security system for managers, respectively. Appendix Figures (A5)–(A7) report the estimates by firm size for switchers, their spouses and total household expenditures. Appendix Figure (A8) and Figure (A9) report estimates by ownership and industry, respectively.

The scope for consumption through the firm is greater among small closely held firms but is almost uniform across industries. Reported household expenditures drop approximately 34% for switchers in firms with fewer than 10 workers vs. 12% for switchers in firms with 10 to 50 workers. The discrepancy in effect sizes increases when I divide the groups by firm ownership: reported household expenditures of switchers who are owner-managers drop 38% vs. 15% for nonowners. On the other hand, the consumption expenditures of individuals who become business managers of large firms do not react. My results also show declines only in the personal expenditures of spouses of switchers to small and closely held firms, while those of spouses of switchers to medium and large firms and spouses of nonowner switchers do not decline after the switch.

3.3 How widespread is consumption through the firm?

The use of business resources for private consumption is often perceived as a strategy of minor economic importance relative to the effects from other margins of tax evasion that require higher levels of sophistication. To understand whether consumption through the firm is limited to "poor" business managers or rather is a widespread phenomenon, I estimate the effects by ventile of household taxable income (using income in the year of the switch).

Figure (7) shows that consumption through the firm is spread across the whole income distribution. The proportion of household expenditures shifted to the firm varies between 20% and 30% among switchers in the top quintile of the income distribution. Among the

top 1% – i.e., switchers who earn approximately 173K euros – household expenditures drop 17.9% after the switch to business manager.[8] The U-shaped pattern of the effects by income ventile might give the impression that the scale of consumption through the firm decreases as we move toward the top of the income distribution. However, bear in mind that switchers – as well as the population of business managers – are concentrated toward the top of the income distribution, which magnifies the final effect on consumption through the firm, even though the magnitude of the coefficients for the top of the income distribution is smaller than that of the estimates for the middle of the distribution.[9]

That consumption through the firm is a widespread phenomenon has important implications for the mapping of micro estimates to aggregate quantities, in particular the amount of government revenue loss due to consumption through the firm and its distributional implications. I will come back to this issue in Section (4).

3.4 Business expenditures and life events

In this section, I estimate how much personal consumption motives affect the pattern of business expenditures. Specifically, I estimate how monthly business expenditures react to life events of the business owner-manager or her spouse with the following event study:

$$F_{it} = \sum_{k \in \{-5+,\ldots,-1,0,1,\ldots 5+\}} \beta_k \mathbf{1}(t = k) + \theta_i + \lambda_t + \varepsilon_{it} \tag{2}$$

where F_{it} denotes log monthly business expenditures reported in electronic invoices (e-Fatura), $\mathbf{1}(t = k)$ is an indicator that assumes value 1 if there is a life event that affects personal consumption motives, and β_k represents the coefficients of interest on the event-time indicators. The analysis dataset corresponds to the panel of monthly business expenditures linked to owner-managers described in Section (2.3). For 2019, the panel includes the monthly business expenditures of 128,514 firms and 1,416,656 firm–month observations. Table (3) presents summary statistics and a description of the panels for 2017, 2018 and 2019.

My results suggest that variations in the personal consumption motives of owner-managers, such as on their own and their spouses' birthdays, significantly impact the

[8] Appendix Figures (A10)–(A11) present plots with the effects by decile and percentile, respectively.

[9] There are approximately 5 times more switchers and managers in the top 10% of the income distribution than in the bottom 10%, as shown in Tables (2) and (4).

pattern of borderline business expenditures, particularly on hotels and restaurants. While business expenditures on hotels and restaurants are an integral part of many business operations, they are also the most important class of expenditures that lie on the border between business and personal consumption. Hence, I estimate how monthly business expenditures on hotels and restaurants evolves around the birthday month of the owner-manager and the owner-manager's spouse.

Figure (8) plots raw averages of monthly business expenditures on hotels and restaurants around birthday months. There is a peak around the birthday month of the owner-manager and her spouse (spouses who work in the same firm are not included). I do the same exercise for the birthday month of a randomly selected employee in the same firm and observe no such increase on hotels and restaurants. As in Section (3.1), I estimate the event study using the approach of Callaway and Sant'Anna (2020).

Figure (9) shows that business expenditures on hotels and restaurants significantly increase by 9.8% in the birthday month of the owner-manager and by 6.1% in the birthday month of her spouse while they do not react to the birthdays of employees in the same firm or those of their spouses.[10] Figure (10) displays estimates for all business expenditure categories and confirms that the increase in firm expenditures on hotels and restaurants around the birthday months is not a statistical quirk that would apply to any expense item, as none of the other categories display an increase around birthday months.

4 Aggregate implications

Adjusting household consumption. To map my micro estimates to aggregate quantities, I start with the household consumption expenditures reported on electronic invoices by business manager households, as described in Tables (4) and (5). I estimate the "true" final consumption expenditures of business manager households by adjusting the reported household consumption ($\bar{c}$) by the share of final consumption shifted to the firm in the form of business expenditures (δ). Hence, for each household j, I compute $\bar{c}_j/(1-\hat{\delta})$ using the absolute value of the coefficient $\hat{\delta} = 0.3123$ estimated in Section (3.1). To account for income heterogeneity of business managers, I also use the shifting parameters

[10] Appendix Figure (A12) displays the estimates for the years 2016, 2017 and 2018, and the conclusions remain the same.

by income percentile, $\hat{\delta}_p$, estimated in Appendix Figure (A11). For instance, for the average consumption expenditure of business manager households in 2019, my adjustment adds to the reported consumption $\Delta\text{Cons} = 21,264/(1-0.3123) - 21,264 = 9,656$ euros of additional consumption expenditures hidden within the firm. The aggregate quantities that result from the sum of these adjustments to the reported expenditure distributions of business manager households are reported in the first and second columns of Table (6) Panel (b).

I estimate that allocating the consumption expenditures shifted to firms to households would increase the final consumption of resident households by 2,778 million euros, which corresponds to 1.30% of GDP in 2019. If I consider the parameters estimated by income percentile, consumption expenditures would increase by 2,672 million euros, which amounts to 1.25% of GDP in 2019.[11]

Government revenue loss in PIT and VAT. Consumption through the firm prevents money from being taxed as a distribution. I start by assuming that business incomes are distributed in the form of dividends and taxed at a flat dividend rate of τ. In this scenario, the government revenue losses in PIT are given by $\tau/(1-\tau)\cdot\Delta\text{Cons.}$, where ΔCons denotes the amount of final consumption hidden within the firm. When I take the values of ΔCons computed above and a flat rate $\tau = 28\%$, the amount of government revenue loss in PIT amounts to $0.28/0.72 \times 2,778$ million euros $= 1,080$ million euros, which corresponds to 0.50% of GDP in 2019 (0.48% when I use the coefficients by income percentile), as reported in Table (6) Panel (c).

However, by consuming through the firm, the owner-manager not only saves the amount of PIT due at distribution but also the amount of money taxed as VAT that she would have to pay to enjoy an equivalent amount of consumption outside the firm. Hence, the combined savings in PIT and VAT are given by $[1/(1-\tau)(1-\gamma) - 1] \times \Delta\text{Cons}$. If I take a dividend tax rate of $\tau = 28\%$ and a VAT rate of $\gamma = 23\%$, the amount of tax savings in PIT and VAT is given by $[1/(1-0.28)(1-0.23) - 1] \times 2,778 = 2,233$ million euros, which amounts to 1% of GDP in 2019. I obtain similar orders of magnitude when I consider the estimates by income percentile and for the remaining years.

[11] The estimates for the previous years, reported in Appendix Tables (B5)–(B5), are in line with these magnitudes.

Government revenue losses of 1% of GDP due to consumption through the firm might seem large, especially in comparison to the losses attributable to other tax evasion strategies.[12] Nonetheless, I believe that my estimate represents a lower bound on the amount of government revenue losses. In my calculations, I assume that business income is paid in the form of dividends subject to a 28% tax rate, but part of business incomes might also be paid in the form of salaries, which are subject to both personal income tax (at a top marginal rate of 48%) and social security contributions (with a contribution rate of 23.75% for the employee and 11% for the employer). A second, and probably more important, reason is the fact that this estimate of government revenue loss does not take into account the tax savings on corporate income tax that arise from the firm's deductible costs being inflated with personal expenditures.

Adjusting household income. The Haig–Simons measure defines personal income as the sum of consumption opportunities over a time period. Following this standard approach, I allocate to the reported taxable income the amount of personal consumption hidden in firms gross of PIT and VAT, i.e., $\Delta\text{Cons}\left[1/(1-\gamma)(1-\delta)\right]$. I can obtain this amount directly by adding the estimate of consumption through the firm reported in Table (6) Panel (c) to the tax savings in PIT and VAT reported Table (6) Panel (d), which gives $2,778 + 2,233 = 5,011$ million euros in 2019 (2.34% of GDP). How does this amount of (untaxed) income change the population's income distribution? To answer this question, I first compute $\Delta\text{Cons}_j\left[1/(1-\gamma)(1-\delta)\right]$, with $\gamma = 0.23$ and $\delta = 0.28$, for each business manager household j. Second, I add back this amount to the reported taxable income of business manager households, obtaining an adjusted income distribution.

My results suggest that my adjusting the income distribution by reallocating the equivalent amount of income that would allow the same amount of consumption outside the firm has important consequences at the top of the income distribution, increasing horizontal inequity. Both the Gini coefficient and top income shares significantly increase, as displayed in Figure (11) and Table (7). For 2019, adjusting the distribution increases the Gini of taxable income from 0.4698 to 0.4822, while the top 1% income share increases by

[12] For example, Zucman (2017) estimates that cross-border tax evasion by individuals represents 0.62% of GDP in Portugal, which is in line with the findings for France, Belgium, Spain and Greece (link).

approximately half a percentage point.[13] The regressive effects of consumption through the firm are consistent with two empirical facts documented in this paper: (i) business managers are richer than average and tend to be concentrated toward the top of the income distribution, and (ii) consumption through the firm is widespread throughout the income distribution.[14]

5 Conclusion

This paper combines monthly consumption expenditures from electronic invoices in Portugal with information on employee-to-manager transitions to present the first evidence of consumption through the firm as tax-minimizing strategy for payout of business income by firm owner-managers. Drawing on this unique combination of data, I estimate that business managers shift approximately 36% of their consumption expenditures to the firm and 31% of their combined household expenditures. The shift is driven by expenditures on the border between business and personal consumption (e.g., retail trade, hotels and restaurants), while "hard-to-shift" expenditures do not react (e.g., those on nonessential health services and private education). The scope for consumption through the firm is greater among small closely held firms, which comprise more than 80% of firms in the economy. With firm data, I confirm that the pattern of business expenditures is affected by personal consumption motives. Business expenditures on hotels and restaurants increase 9.8% in the birthday month of the owner-manager and 6.1% in the birthday month of the owner-manager's spouse (who does not work in the firm).

Consumption through the firm is widespread throughout the income distribution, which has strong implications. I find that the government revenue loss in personal income taxes and VAT due to consumption through the firm amounts to approximately 1% of GDP. Reallocating to reported income the share of personal consumption hidden within the firm plus the tax savings increases the Gini coefficient by one percentage point, while the top 1% income share increases by half a percentage point.

[13] The calculations for the previous years are in line with these orders of magnitude, as shown in Appendix Tables (B5)–(B5).

[14] See Table (4) and Appendix Figure (A17), which display the position of business managers along the income distribution. See also Figure (7) and Appendix Figures (A10)–(A11), which display the coefficients of the amount of personal consumption expenditures shifted to firms by income percentile.

References

Alstadsæter, A., Jacob, M., Kopczuk, W. and Telle, K. (2021). Accounting for Business Income in Measuring Top Income Shares: Integrated Accrual Approach Using Individual and Firm Data from Norway.

—, Kopczuk, W. and Telle, K. (2014). Are Closely Held Firms Tax Shelters? *Tax Policy and the Economy*, **28** (1), 1–32.

Bach, L., Bozio, A., Fabre, B., Guillouzouic, A., Leroy, C. and Malgouyres, C. (2019). *Follow the money! Combining household and firm-level evidence to unravel the tax elasticity of dividends*. Tech. rep.

Borusyak, K., Jaravel, X. and Spiess, J. (2021). Revisiting event study designs: Robust and efficient estimation.

Callaway, B. and Sant'Anna, P. H. C. (2020). Difference-in-differences with multiple time periods. *Journal of Econometrics*.

Clotfelter, C. T. (1983). Tax-induced distortions and the business-pleasure borderline: the case of travel and entertainment. *The American Economic Review*, **73** (5), 1053–1065.

De Chaisemartin, C. and D'Haultfoeuille, X. (2020). Two-way fixed effects estimators with heterogeneous treatment effects. *American Economic Review*, **110** (9), 2964–2996.

Diamond, P. A. and Mirrlees, J. A. (1971). Optimal taxation and public production II: Tax rules. *The American Economic Review*, **61** (3), 261–278.

Gordon, R. H. and Slemrod, J. B. (2000). Shifting Between Corporate and Personal Tax Bases? *Does Atlas Shrug?: The Economic Consequences of Taxing the Rich*, p. 240.

Harju, J. and Matikka, T. (2016). The elasticity of taxable income and income-shifting: what is "real" and what is not? *International Tax and Public Finance*, **23**, 640–669.

Kopczuk, W. and Zwick, E. (2020). Business incomes at the top. *Journal of Economic Perspectives*, **34** (4), 27–51.

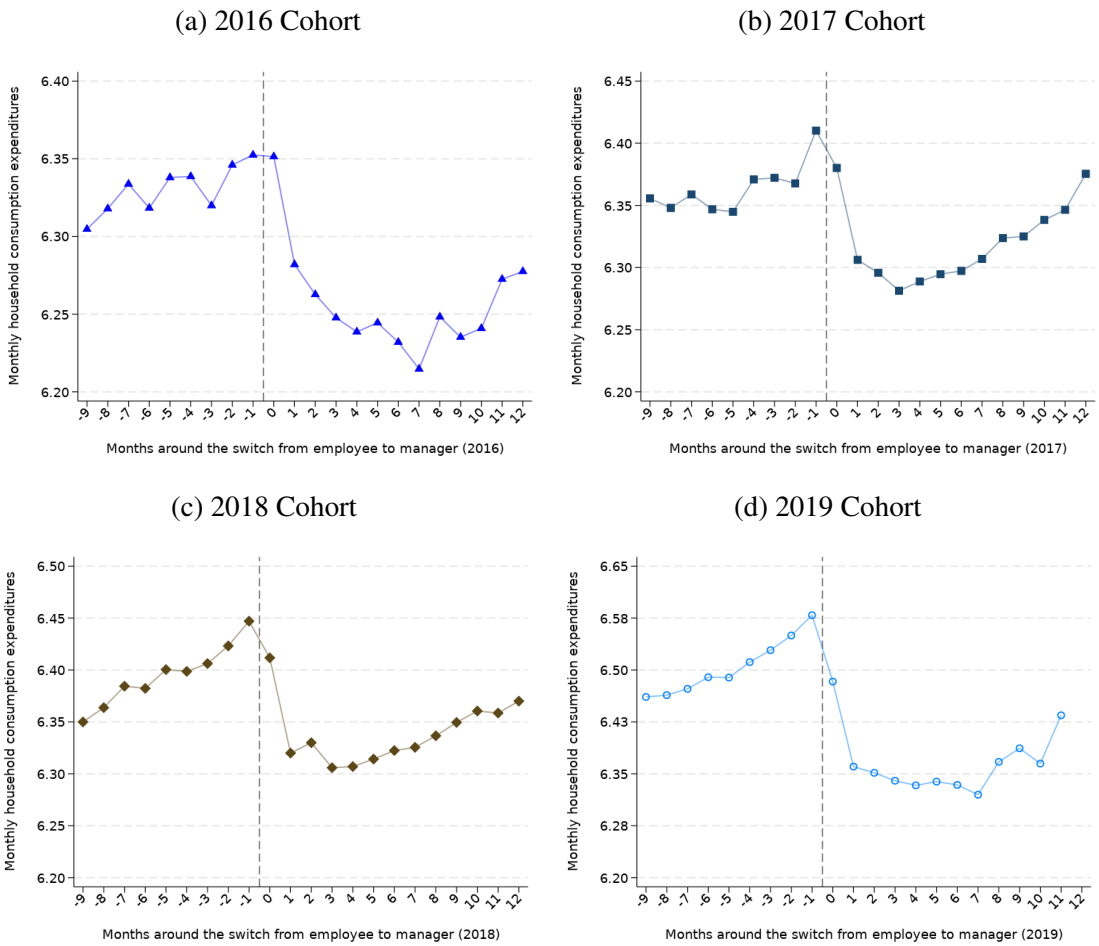
Miller, H., Pope, T. and Smith, K. (2020). Intertemporal income shifting and the taxation of business owner-managers. *The Review of Economics and Statistics*, pp. 1–45.

Naritomi, J. (2019). Consumers as tax auditors. *American Economic Review*, **109** (9), 3031–3072.

Smith, M., Yagan, D., Zidar, O. M. and Zwick, E. (2021). *The Rise of Pass-Throughs and the Decline of the Labor Share*. Tech. Rep. 29400, National Bureau of Economic Research.

Zucman, G. (2017). *La richesse cachée des nations. Enquête sur les paradis fiscaux.* Le Seuil.

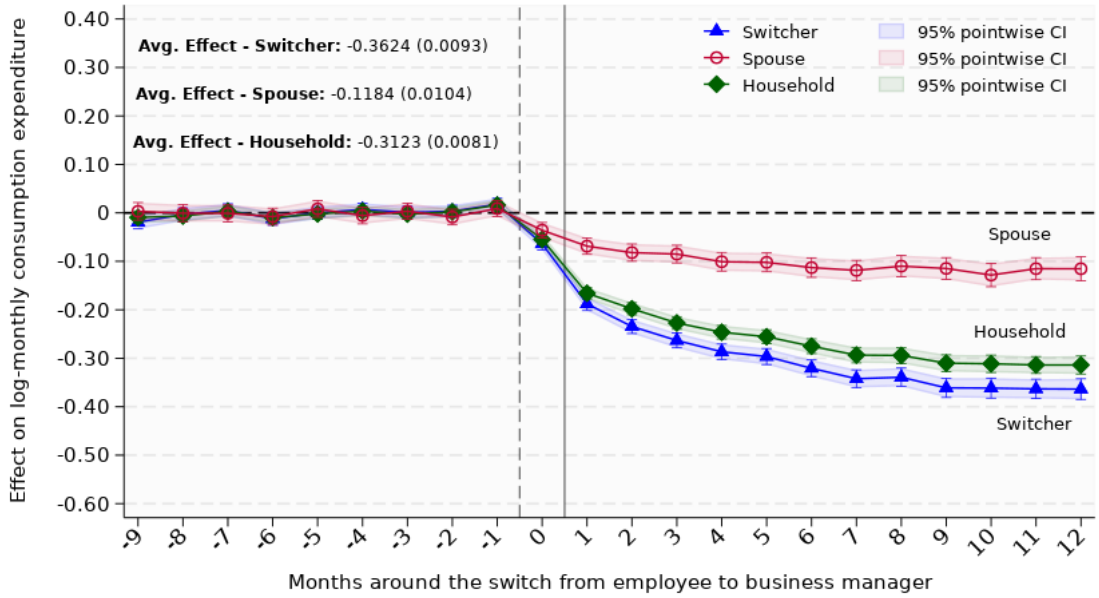
Figure 1: Raw averages of monthly personal expenditures of switchers centered on the month when individuals switch from being an employee to being a business manager



Notes: This figure displays average monthly personal expenditures reported in electronic invoices (e-Fatura) centered on the month when individuals switch from being an employee to being a business manager. There is an abrupt decline in average personal expenditures after the switch. The average expenditures of cohorts who switched in later periods evolve in parallel with the average expenditure of cohorts who switched in earlier periods. Panels (a), (b), (c) and (d) depict the average consumption of individuals who switched during the years 2016, 2017, 2018 and 2019, respectively. Section (2.3) describes the construction of the dataset, and Tables (1) and (2) provide summary statistics.

Sources: Calculations based on administrative datasets of e-Fatura, IRS, social security records, 2016–2019.

Figure 2: Effects on reported monthly personal consumption expenditures after an employee switches to being a business manager

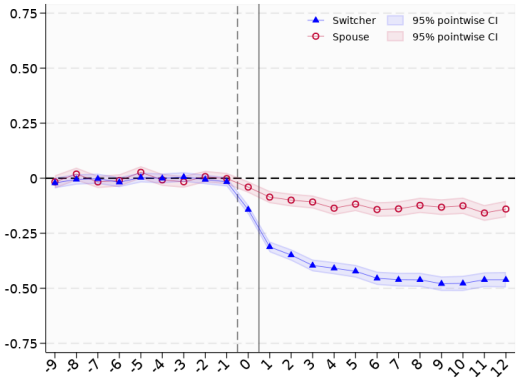


Notes: This figure displays the estimates of the effects on reported monthly personal consumption expenditures of switchers. We present separate estimates for total household expenditure, personal expenditure of the switcher, and personal expenditure of the switcher's spouse. The post-switch estimate for personal expenditures ("Avg. Effect") is defined as the average of the event-study coefficients for the post periods $k \in \{9, 10, 11, 12\}$. The sample is the panel of monthly consumption expenditures of switchers from 2016 to 2019 described in Section (2.3). Tables (1)–(2) provide summary statistics. The event-study estimates are obtained with the estimator from Callaway and Sant'Anna (2020) as described in Section (3.1). Appendix Figure (A4) displays alternative results derived with the estimators of De Chaisemartin and D'Haultfoeuille (2020) and Borusyak *et al.* (2021). The estimates suggest that a substantial share of personal expenditures is shifted to firms and would have been reported as final consumption had the individuals not switched to being business managers. Personal expenditures of switchers drop 19% in the first month after their switch. For couple households, the personal expenditures of switchers' spouses drop 7% in the first month after the switch (note that spouses' switcher status does not change in the estimation period). Combined household expenditures drop 17% in a month. On average, personal expenditures drop 36% for switchers, 12% for their spouses and 31% for combined household expenditures.

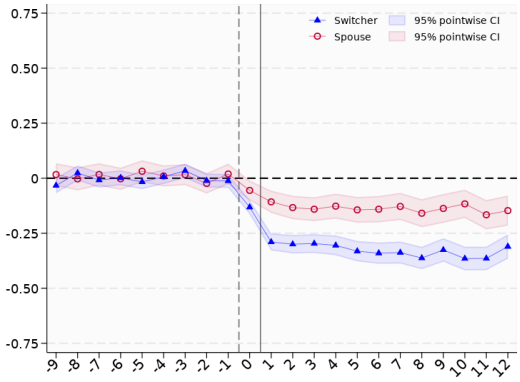
Sources: Calculations based on administrative datasets of e-Fatura, IRS, social security records, 2016–2019.

Figure 3: Effects on "borderline" consumption expenditures, i.e., expenditures on the border between consumption and business expenditure

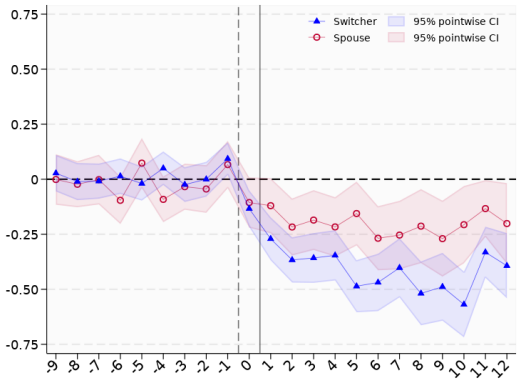
(a) Wholesale & retail trade; car repair



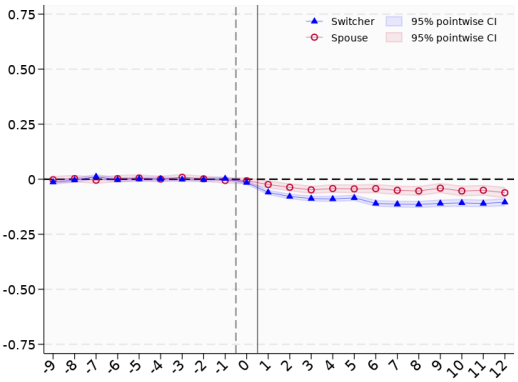
(b) Hotels & restaurants



(c) Technical activities



(d) Information & communication



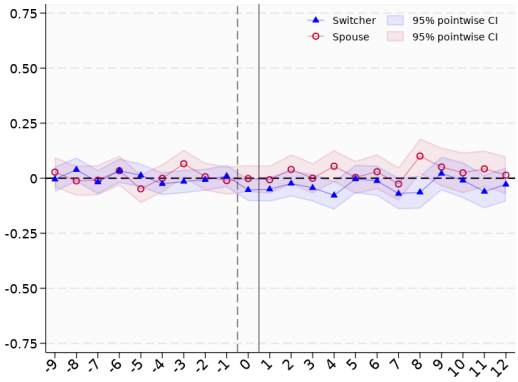
Notes: This figure displays the effects on reported monthly personal consumption expenditures of switchers and their spouses by expenditure category (I do not observe products; I instead proxy expenditure categories by the NACE industry code of the seller). The sample is the panel of monthly consumption expenditures of switchers from 2016 to 2019 described in Section (2.3). Tables (1)–(2) provide summary statistics. The estimates are obtained with the estimator from Callaway and Sant'Anna (2020) as described in Section (3.1).

There is an immediate decline after the switch in consumption expenditures that lie on the business–consumption borderline. Expenditures in wholesale and retail trade and car repair (Panel (a), which corresponds to sellers with NACE code G) represent the largest share in total household expenditures reported in e-Fatura (Appendix Figure A1). The composition of expenditures in retail trade suggests that the decline is driven mostly by expenditures in nonspecialized stores (supermarkets), followed by expenditures in specialized stores selling clothing and shoes, household equipment, food and beverages, fuel and car repair. There are also a substantial drops in expenditures in hotels and restaurants (Panel (b), NACE code I), technical activities (Panel (b), NACE code M, comprising mostly services from lawyers, accountants and tax advisors), and information and communication (Panel (d), NACE code J, comprising mostly expenditures on mobile phone contracts and internet, television and other telecommunication services). Note that we also observe declines in spouses' personal expenditures, even the kind of expenditures that do not involve couple coordination in leisure time, such as technical activities, retail trade and telecommunications.

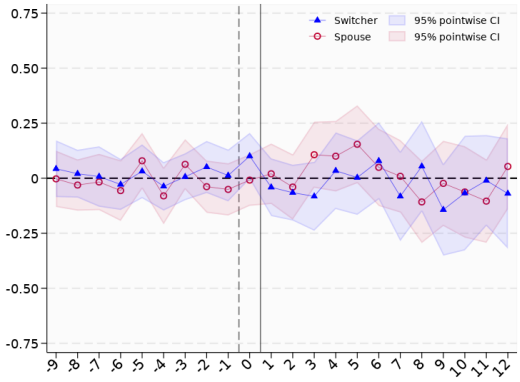
Sources: Calculations based on administrative datasets of e-Fatura, IRS, social security records, 2016–2019.

Figure 4: Effects on "hard-to-shift" consumption expenditures, i.e., purely personal expenditures

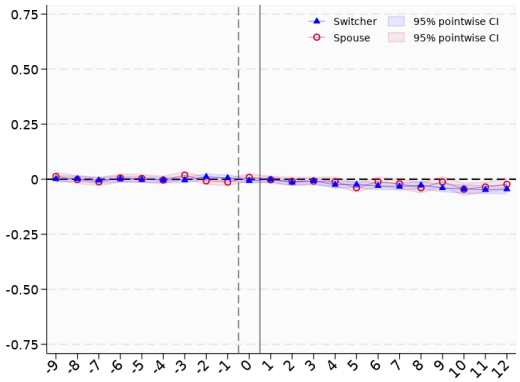
(a) Nonessential health services



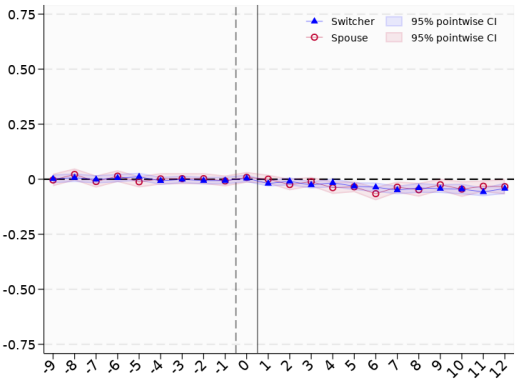
(b) Private education



(c) Water distribution



(d) Electricity, gas & air conditioning



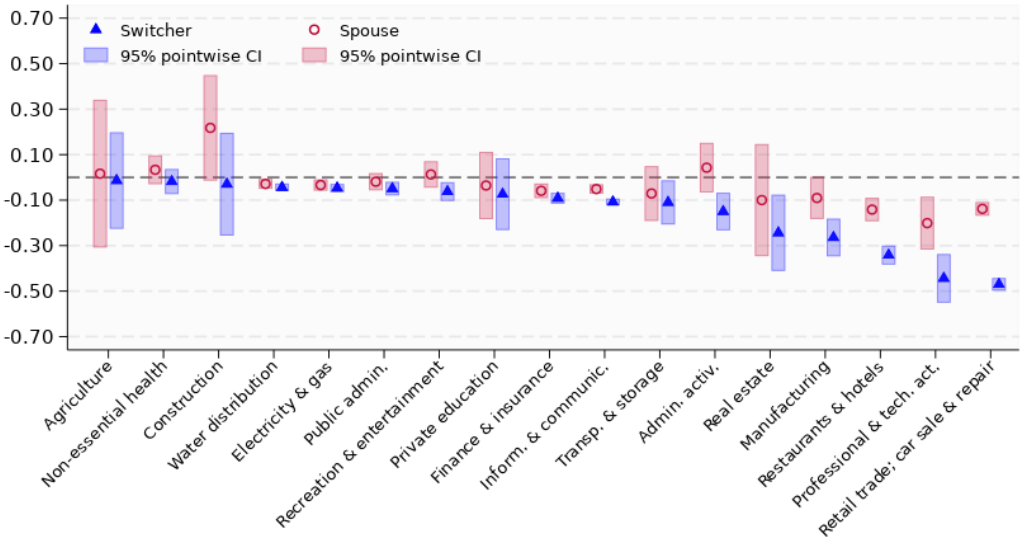
Notes: This figure displays the effects on reported monthly personal consumption expenditures of switchers and their spouses by expenditure category (I do not observe products; I instead proxy expenditure categories by the NACE industry code of the seller). The sample is the panel of monthly consumption expenditures of switchers from 2016 to 2019 described in Section (2.3). Tables (1)–(2) provide summary statistics. The estimates are obtained with the estimator from Callaway and Sant'Anna (2020), as described in Section (3.1).

This figure illustrates a lack of reaction of "hard-to-shift" expenditures, i.e., consumption expenditures that are unambiguously final consumption and can hardly be shifted to the firm in the form of business expenditures: in particular, nonessential health services (Panel (a), which corresponds to sellers with NACE code Q), comprising mostly nonurgent medical services provided by the private sector, namely, dentistry and therapy (expenditures in pharmacies are recorded as retail trade expenditures); and private education (Panel (b), NACE code P), which comprises education services provided by the private sector, namely, private tutoring and sports and cultural activities. Expenditures on nonessential health and private education account for approximately 10% of total consumption expenditure in e-Fatura (Appendix Figure A1). However, they can be viewed as nonessential expenditures because access to health and education in Portugal is granted to every resident individual and funded by taxes and social security contributions. Finally, household utilities such as water distribution (Panel (c), NACE code E) and electricity, gas and air conditioning (Panel (d), NACE code D), which represent approximately 9% of total consumption expenditure in e-Fatura, also do not react to the switch.

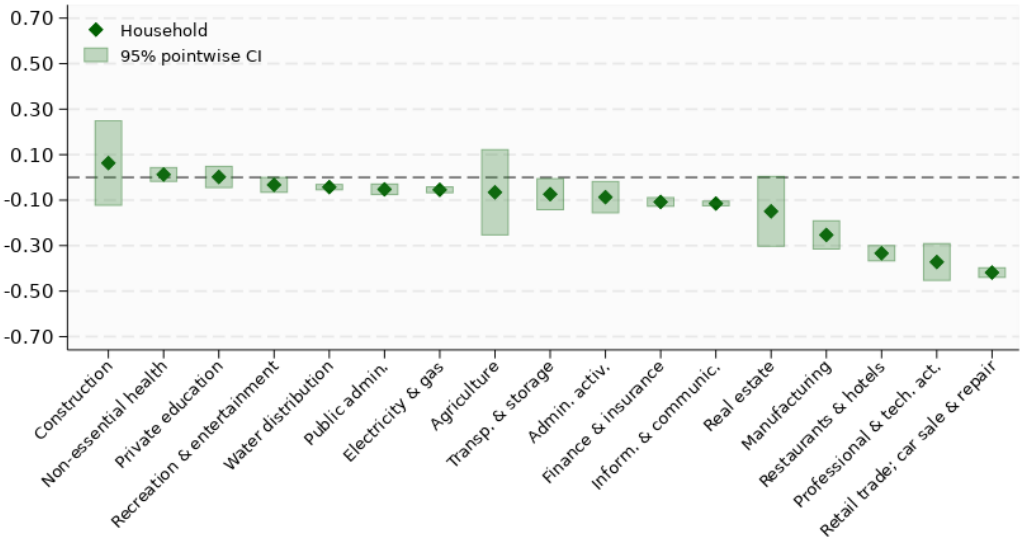
Sources: Calculations based on administrative datasets of e-Fatura, IRS, social security records, 2016–2019.

Figure 5: Average effects by category of consumption expenditure

(a) Switcher and spouse



(b) Household



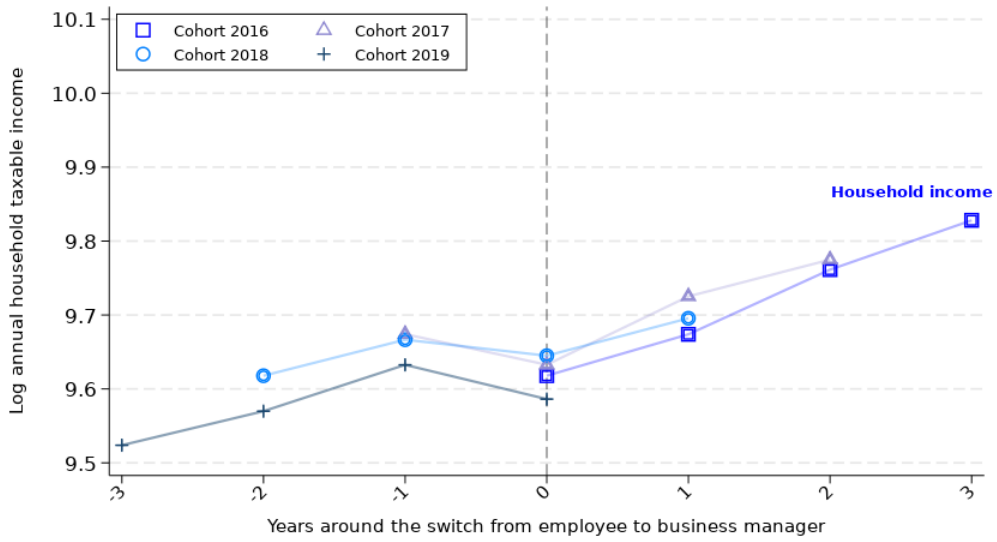
Notes: This figure plots the average effects on reported personal consumption expenditures of switchers, their spouses and household expenditures for all expenditure categories. The sample and estimation method are the same as described in the notes to Figures (2)–(4).

Expenditures that lie on the business–consumption borderline react strongly upon an employee's switch to being a business manager, while hard-to-shift expenditures do not react. Household expenditures in retail trade (supermarkets, fuel, car repair and car sales) drop on average 42%, while expenditures on hotels and restaurants drop on average 33%. The average effect on expenditures in nonessential health or private education is not significantly different from zero.

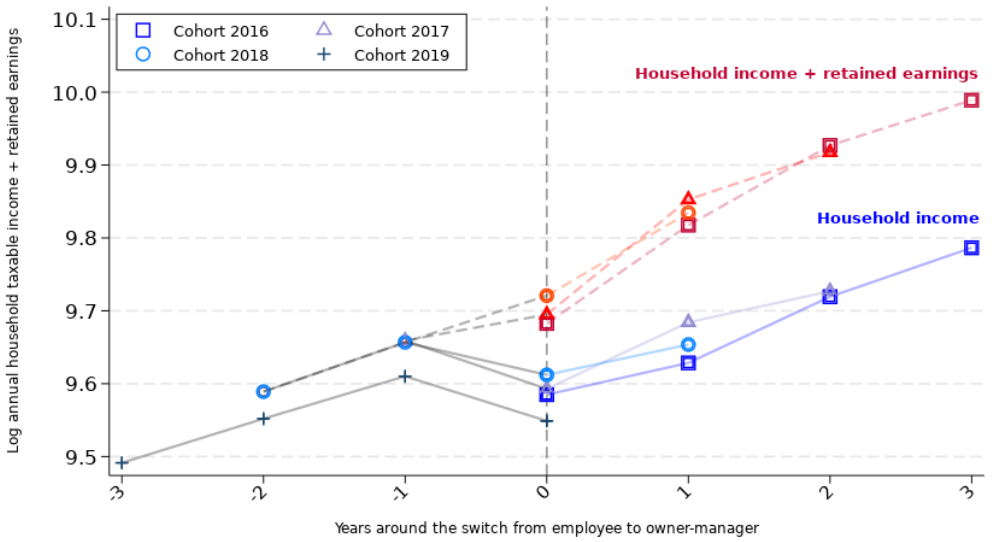
Sources: Calculations based on administrative datasets of e-Fatura, IRS, social security records, 2016–2019.

Figure 6: Average household taxable income and firm retained earnings around the year of an employee's switch to being a business manager

(a) Household taxable income subject to PIT, all switchers



(b) Household taxable income subject to PIT plus firm retained earnings, only switchers who become firm owner-managers (75% of the sample)

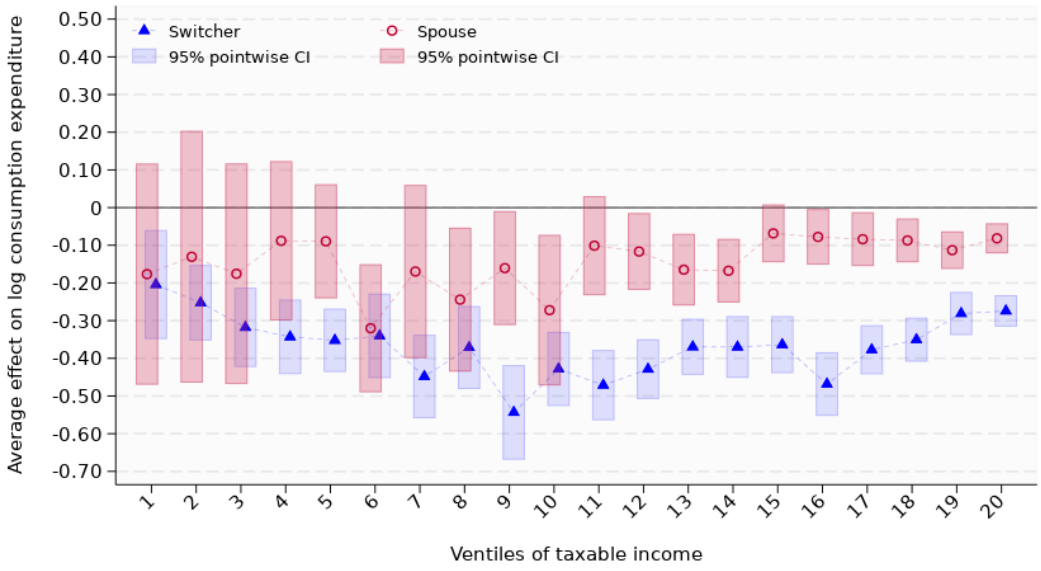


Notes: This figure displays the evolution of household income subject to personal income taxes (PIT) and firm retained earnings around the switching year for the panel of switchers from 2016 to 2019 described in Tables (1)–(2), merged with company accounts data (IES). Panel (a) displays the evolution of average household taxable income reported in the PIT annual declaration (IRS) of switchers. Average incomes drop 3.7% in the year of the switch but recover to their pre-switch level one year after, increasing thereafter, while household expenditures remain 31.2% below their pre-switch level one year after the switch (Figure 2). Owner-managers have significant tax advantages to retain incomes within the firm. Hence, Panel (b) displays the evolution of a more comprehensive measure of income: I allocate firm retained earnings to household taxable income subject to PIT to the 75% of switchers in my sample who are owner-managers. There is an immediate divergence between reported income subject to PIT and reported income plus retained earnings. Under this comprehensive measure, owner income actually increases 4.4% after the switch, following the trend of household income reported before it.

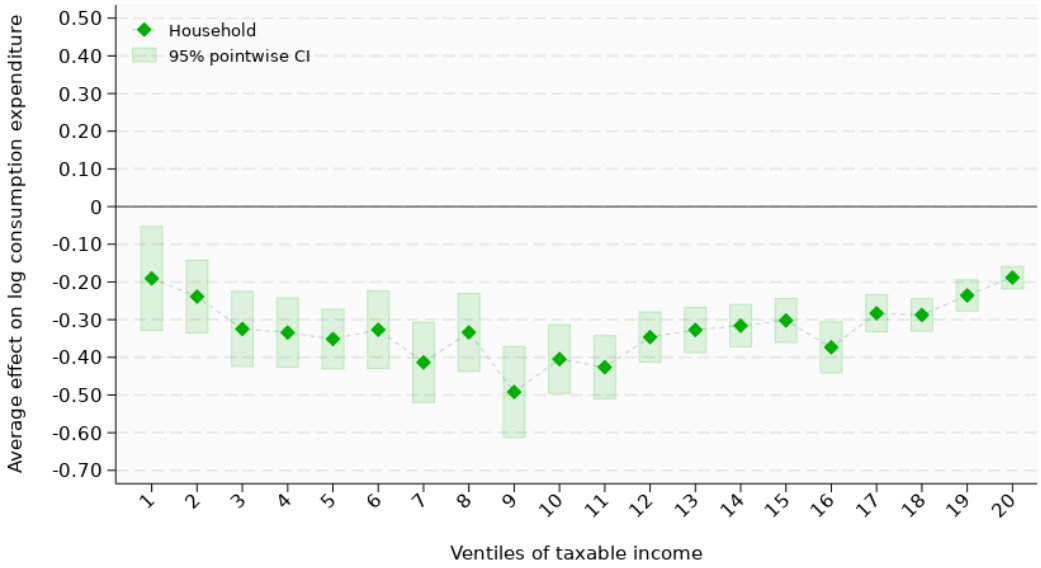
Sources: Calculations based on administrative datasets of e-Fatura, IRS, social security records, 2016–2019.

Figure 7: Effects by ventile of household taxable income

(a) Switcher and spouse



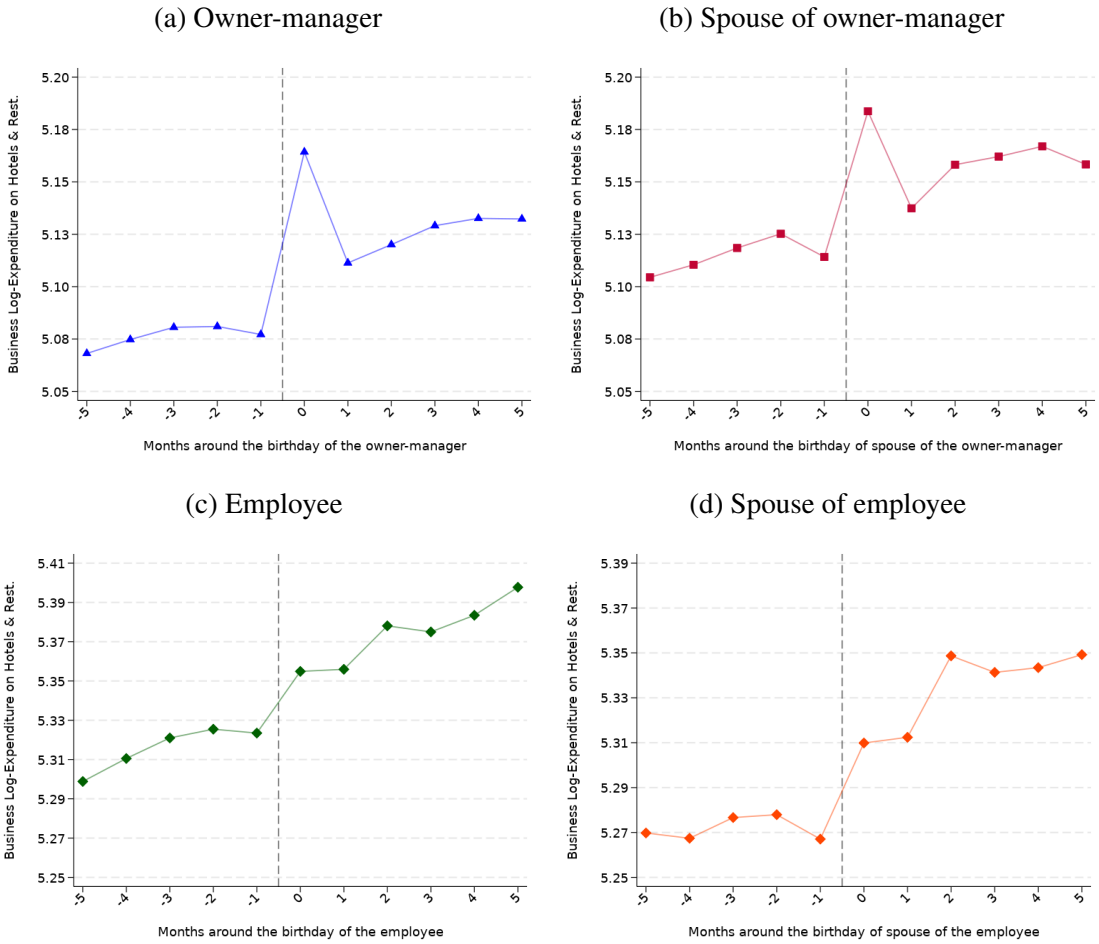
(b) Household



Notes: This figure displays the average effects on reported personal consumption expenditures of switchers, their spouses and combined household expenditure by ventile of household taxable income. The sample and estimation method are the same as described in the notes to Figures (2)–(4). This figure shows that consumption through the firm is spread all over the income distribution and is driven by taxpayers in the distribution's top half. The proportion of household expenditures shifted to the firm varies between 20% and 30% among switchers in the top quintile of the income distribution. Among the top 1% – i.e., switchers who earned approximately 173K euros in the switch year – household expenditures drop on average 17.9%. Appendix Figure (A10) and Figure (A11) present plots with the effects by decile and percentile, respectively. The U-shaped pattern of the effects by income ventile might give the impression that the scale of consumption through the firm decreases as we move toward the top of the income distribution, but switchers are concentrated toward the top of the distribution, which magnifies the final effect (e.g., there are approximately 5 times more switchers and business managers in the top 10% of the income distribution than in the bottom 10%, as shown in Tables 2 and 4).

Sources: Calculations based on administrative datasets of e-Fatura, IRS, social security records, 2016–2019.

Figure 8: Raw averages of monthly business expenditures on hotels and restaurants centered on birthday months, 2019

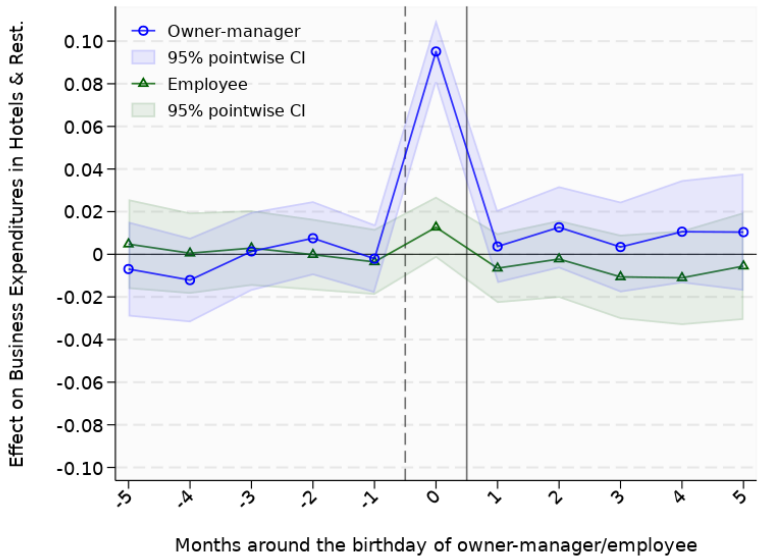


Notes: This figure displays average monthly *business* expenditures on hotels and restaurants reported in electronic invoices (e-Fatura) centered on birthday months of the owner-manager and her spouse (Panels (a)–(b)) and a randomly selected employee working in the same firm and her spouse (Panels (c)–(d)). The sample is the panel of monthly business expenditures linked to owner-managers described in Section (2.3). Table (3) provides summary statistics. Appendix Table (B3) provides supplemental summary statistics. There is a clear peak in average business expenditures on hotels and restaurants around the birthday months of the owner-manager and her spouse (note that owner-managers' spouses who work in the same firm are not included in the sample).

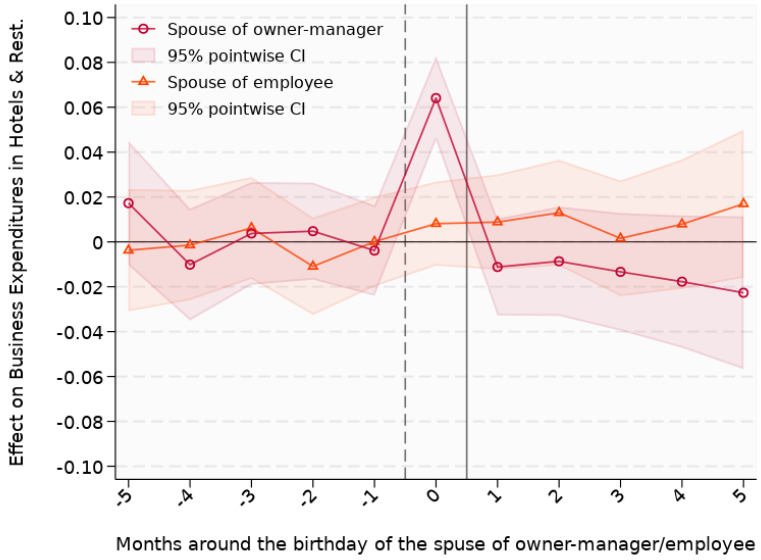
Sources: Calculations based on administrative datasets of e-Fatura, IRS, social security records, 2016–2019.

Figure 9: Effect on business expenditures on hotels and restaurants of owner-manager and spouse birthdays vs. the birthday of a randomly selected employee in the same firm, 2019

(a) Birthday of owner-manager vs. birthday of employee



(b) Birthday of spouse of owner-manager vs. spouse of employee

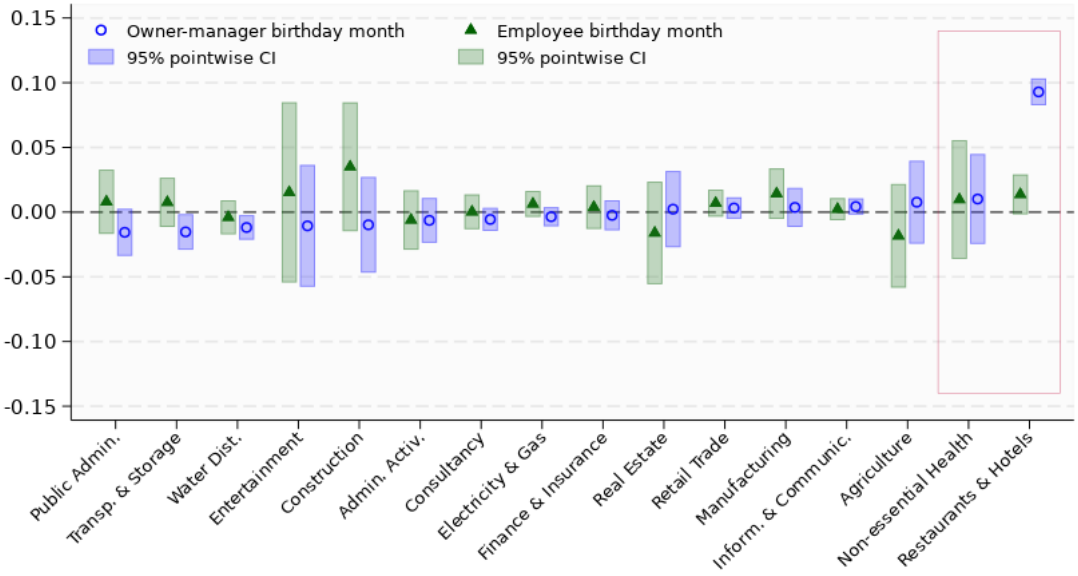


Notes: This figure displays the estimates of the effects on monthly business expenditures on hotels and restaurants centered on the birthday months of the owner-manager and the owner-manager's spouse (note that the sample excludes spouses who work in the same firm) and of a randomly selected employee working in the same firm and her spouse. The sample is the panel of monthly business expenditures linked to owner-managers for the year 2019 (Section 2.3). The event-study estimates are obtained with the estimator from Callaway and Sant'Anna (2020), as described in Section (3.4). Table (3) provides summary statistics. Appendix Table (B3) provides supplemental summary statistics. Appendix Figure (A12) presents the estimates for 2016–2018. The results suggest that variations in the personal consumption motives of owner-managers significantly affect the pattern of business expenditures on hotels and restaurants, which increase by 9.8% and 6.1% in the birthday month of the owner-manager and owner-manager's spouse, respectively. In contrast, business expenditures do not react to birthdays of employees or employees' spouses.

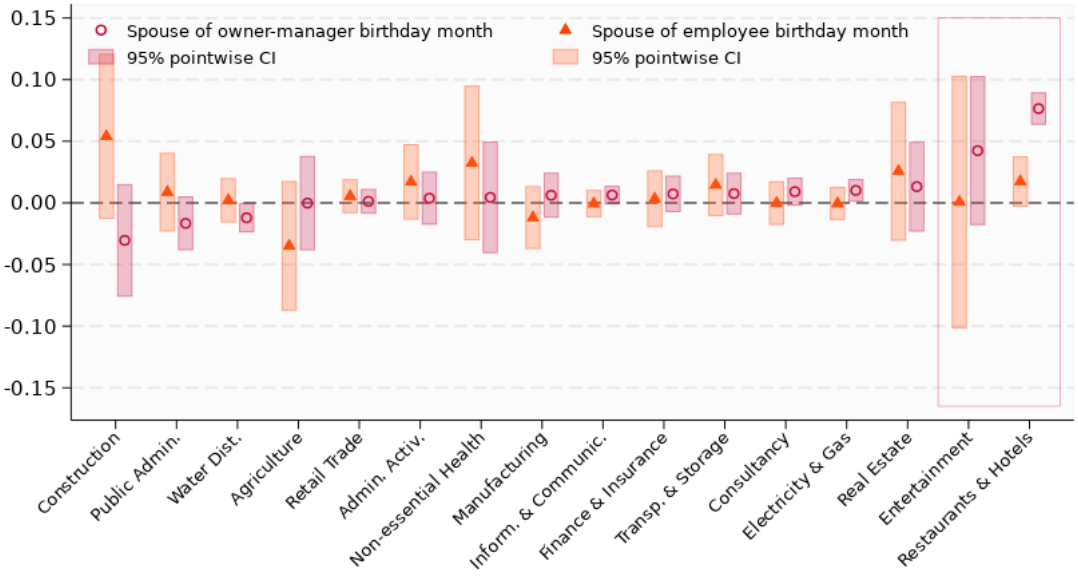
Sources: Calculations based on administrative datasets of e-Fatura, IRS, social security records, 2016–2019.

Figure 10: Effect of birthdays on business expenditures in birthday month, all business expenditure categories, 2019

(a) Birthday of owner-manager vs. birthday of employee



(b) Birthday of spouse of owner-manager vs. spouse of employee

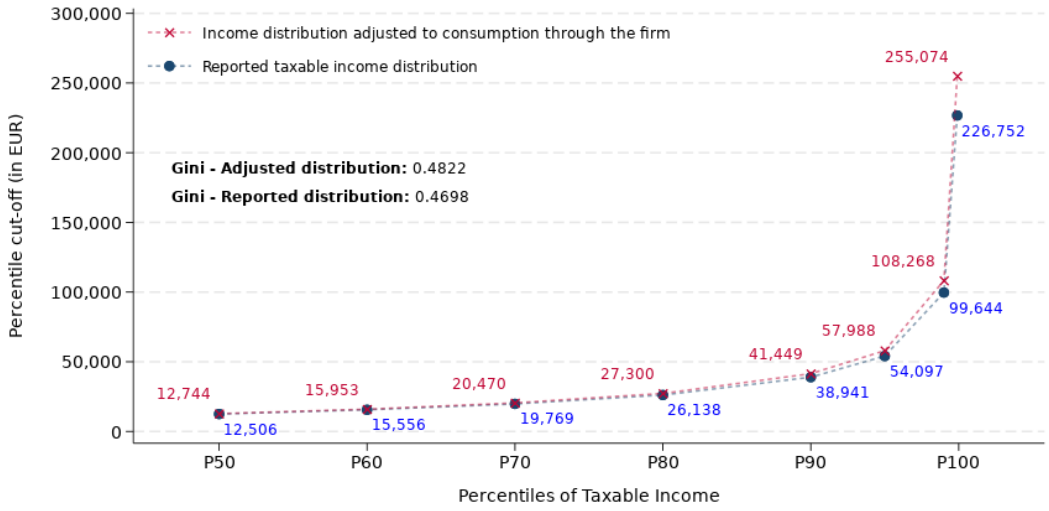


Notes: This figure displays the average estimates of the effects on monthly business expenditures centered on the birthday months of the owner-manager and the owner-manager's spouse and a randomly selected employee working in the same firm and her spouse. The sample and the estimation method are the same as described in the notes to Figure (9). This figures shows that the peak in the firm's expenditures on hotels and restaurants around the birthday months of the owner-manager and her spouse is not a statistical quirk that applies to other expenditure items, as none of the other expenditure categories show any significant increase in the birthday month.

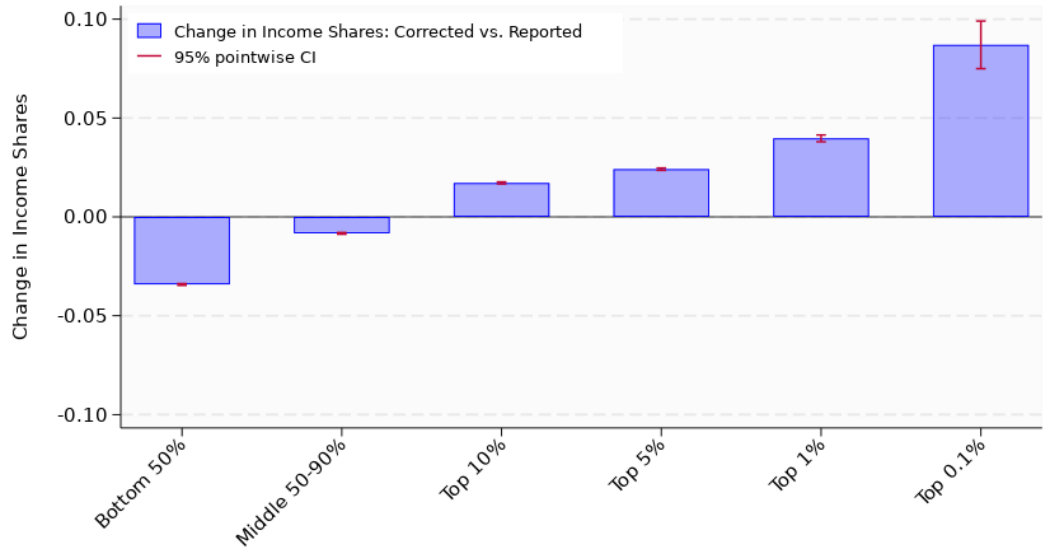
Sources: Calculations based on administrative datasets of e-Fatura, IRS, social security records, 2016–2019.

Figure 11: Redistributive implications of consumption through the firm: Reported vs. adjusted income distribution, 2019

(a) Implications for Gini and income percentiles: Reported vs. adjusted distribution



(b) Implications for top income shares: Reported vs. adjusted distribution



Notes: This figure compares the reported income distribution to an adjusted income distribution that allocates to business managers the equivalent amount of income that would allow the same consumption opportunities outside the firm, as described in Section (4) and Table (6). Appendix Tables (B5)–(B5) present the same exercise for 2017 and 2018, respectively. Tables (4)–(5) present summary statistics on the subpopulation of business managers. The Gini coefficient increases by approxiamtely one percentage point, while the top 1% share increases by approximately half a percentage point. These effects on inequality are consistent with business managers being concentrated toward the top of the income distribution (Table 4 and Appendix Figure A17) and with consumption through the firm being widespread throughout the income distribution (Figure 7).

Sources: Calculations based on administrative datasets of e-Fatura, IRS, social security records, 2016–2019.

Table 1: Panel of monthly consumption expenditures of switchers: Number of switchers and their household members

	(1) Cohort 2016	(2) Cohort 2017	(3) Cohort 2018	(4) Cohort 2019	(5) Panel 2016–19
A. Switchers and their household members					
Switchers	6,973	7,272	7,418	8,014	29,677
Spouse/partner	4,032	4,075	3,896	3,991	15,994
Children/others	6,514	6,503	6,294	6,498	25,809
All individuals	17,519	17,850	17,608	18,503	71,480
B. Matched with monthly expenditure data					
Switchers	318,536	328,607	327,086	339,324	1,313,553
Spouse/partner	185,565	186,927	175,737	176,005	724,234
All household members	723,919	729,879	707,405	721,199	2,882,402
C. Share of balanced observations by cohort					
Stay 48 months in the sample	0.82	0.78	0.72	0.68	0.75
6 months around the event	0.40	0.88	0.89	0.53	0.68
12 months around the event	0.00	0.82	0.83	0.00	0.41

Notes: This table presents the panel of switchers' monthly consumption expenditures described in Section (2.3). The panel is constructed from the sample of individuals who switched from being an employee to being a business manager between January 2016 and December 2019 from Social security records and linked to spouses and other household members by means of personal income tax declarations (IRS) and consumption expenditures from electronic invoices (e-Fatura). It excludes individuals whose spouse also switched to being a business manager, whose household composition changed during the estimation period, or whose firms are classified as inactive in the business registry. The panel comprises 71,480 people, 29,677 switchers plus household members, and 2,882,204 person–month observations (Column 5). Approximately three-quarters of the individuals stay in the panel for 48 months.

Sources: Calculations based on administrative datasets of e-Fatura, IRS, social security records 2016–2019.

Table 2: Summary statistics for the panel of monthly consumption expenditures of switchers

	(1) Cohort 2016	(2) Cohort 2017	(3) Cohort 2018	(4) Cohort 2019	(5) Panel 2016–19
A. Demographics					
Age	39.80	40.02	39.81	39.72	39.84
Male	0.66	0.68	0.68	0.69	0.68
Married	0.57	0.56	0.53	0.50	0.54
Household size	2.47	2.41	2.33	2.27	2.37
B. Distribution of household taxable income of switchers					
Mean	25,659	26,859	26,370	25,659	25,587
P10	4,770	4,934	5,040	4,770	4,899
P50	14,981	14,999	14,686	14,981	14,625
P90	53,067	53,713	53,794	53,067	52,062
Top 1%	175,148	192,713	180,623	175,148	173,726
C. Position in household taxable income distribution					
[0; 7,000[	0.28	0.26	0.77	0.38	
[7,000; 20,000[	0.55	0.56	0.19	0.42	
[20,000; 40,000[	0.14	0.14	0.03	0.15	
[40,000; 80,000[	0.03	0.03	0.01	0.04	
[80,000; 250,000[	0.00	0.00	0.00	0.01	
¿ 250,000	0.00	0.00	0.00	0.00	
D. Number of observations					
Switchers	6,973	7,272	7,418	8,014	29,677
Spouse/partner	4,032	4,075	3,896	3,991	15,994
Children/others	6,514	6,503	6,294	6,498	25,809
All individuals	17,519	17,850	17,608	18,503	71,480

Notes: This table presents descriptive statistics on the socioeconomic characteristics of the panel of monthly consumption expenditures of switchers described in Section (2.3) and Table (1). The panel is comprised mostly of married men with an average age of 39 years old. The position of switchers in the population's income distribution is similar to the position of established business managers (Table 4). Switchers tend to concentrate toward the top of the household taxable income distribution, with approximately 20% of business managers belonging to the top 10% and 4% to the top 1%. We divide household taxable income by two for couple households who opt for joint taxation. Appendix Figures (A17)–(A1) present supplemental summary statistics on the income and the expenditure distribution of switchers. Appendix Table (B3) presents additional statistics on the firm characteristics of switchers.

Sources: Calculations based on administrative datasets of e-Fatura, IRS, social security records 2016–2019.

Table 3: Panel of monthly business expenditures linked to owner-managers

	(1) Panel 2017	(2) Panel 2018	(3) Panel 2019
A. Firm size (in percentage)			
Fewer than 10 workers	93.25	93.26	93.39
Between 10 to 50 workers	6.35	6.36	6.22
More than 50 workers	0.40	0.38	0.39
B. Average assets, sales and profits (in EUR)			
Sales	256,428	252,909	244,779
Assets	602,431	556,565	512,923
Profits	9,809	10,466	8,693
C. Average monthly business expenditures (in EUR)			
Agriculture	467	403	393
Mining & quarrying	31	29	30
Manufacturing	2,492	2,414	2,123
Electricity & Gas	262	227	205
Water dist.	179	141	114
Construction	926	892	931
Retail trade	7,154	6,918	6,675
Transp. & storage	486	456	463
Restaurants & hotels	300	311	308
Inform. & communic.	366	356	274
Finance & insurance	650	736	708
Real estate	217	251	228
Consultancy	615	637	597
Admin. activ.	605	644	609
Public admin.	59	52	49
Private education	34	34	35
Nonessential health	140	128	119
Entertainment	99	105	98
Other service act.	79	81	80
Total	15,162	14,815	14,038
D. Observations			
Owner-managers	125,628	134,626	145,882
Owner-managers' spouses	78,854	83,719	90,085
Individuals	204,482	218,345	235,967
Firms	108,804	117,397	128,514
E. Firm–month observations			
Share of balanced obs.	0.90	0.90	0.89
Firm–month obs.	1,201,697	1,291,436	1,416,656

NOTES: This table presents the panel of monthly business expenditures linked to owner-managers described in Section (2.3). The panel uses business owner-managers from social security records from 2017 to 2019, linked to spouses from personal income tax declarations (IRS) and business expenditures from electronic invoices (e-Fatura). It excludes firms whose spouses work in the same firm. For 2019, the panel contains 145,038 firms and 1,416,656 firm–month observations (Column 3).

SOURCES: Calculations based on administrative datasets of e-Fatura, IRS, social security records 2016–2019.

Table 4: Summary statistics on income of population of business managers reported in annual personal income tax declarations

	(1) Year 2016	(2) Year 2017	(3) Year 2018	(4) Year 2019
A. Distribution of household taxable income				
Proportion of business managers by percentile of the income distribution				
Bottom 10%	0.05	0.05	0.05	0.05
Bottom 20%	0.12	0.12	0.12	0.12
Middle 20%–80%	0.57	0.58	0.57	0.57
Top 20%	0.34	0.32	0.33	0.33
Top 10%	0.20	0.19	0.20	0.20
Top 1%	0.04	0.04	0.04	0.04
Distribution of business managers' income (in EUR)				
Mean	28,732	28,766	30,135	30,992
P10	6,360	6,684	6,960	7,200
P50	18,146	18,122	19,124	19,810
P90	59,161	58,549	61,104	62,410
Top 1%	167,936	167,853	175,375	175,255
B. Couples vs. singles				
# of household w/ singles	75,910	85,451	88,897	93,329
# of household w/ couples	160,513	189,090	190,842	194,541
# w/ both spouses managers	21,779	26,345	26,106	26,112
# of individuals	258,233	300,952	305,902	314,036
# of households	236,423	274,541	279,739	287,870

NOTES: This table shows the position in the income distribution of the population of business managers. It comprises the population of business managers reported in social security records and linked to household taxable income from annual personal income tax declarations (IRS). We exclude business managers of firms classified as inactive in the business registry and business managers classified as nonresidents in their IRS. Individual taxation of income is optional for married couples, so we divide by two the taxable income of married individuals who opt for joint taxation. Business managers tend to concentrate toward the top of the income distribution, with approximately 20% of managers belonging to the top 10% of the distribution and approximately 4% of the managers to the top 1%. Business managers in the top 1% earn approximately between 167K and 175K euros per year. Appendix Figure (A17) plots the share of business managers by percentile of the population's taxable income distribution.

SOURCES: Calculations based on administrative datasets of e-Fatura, IRS, social security records 2016–2019.

Table 5: Summary statistics on consumption expenditure of population of business managers reported in electronic invoices

	(1) Year 2016	(2) Year 2017	(3) Year 2018	(4) Year 2019
A. Distribution of expenditure (excl. housing)				
Proportion of managers by percentile of the expenditure distribution				
Bottom 10%	0.0234	0.0260	0.0267	0.0265
Bottom 20%	0.0572	0.0634	0.0659	0.0675
Middle 20%-80%	0.5620	0.5694	0.5649	0.5654
Top 20%	0.3995	0.3859	0.3877	0.3860
Top 10%	0.2432	0.2341	0.2364	0.2356
Top 1%	0.0335	0.0331	0.0342	0.0336
Distribution of managers' expenditure (in euros)				
Mean	19,131	19,999	20,875	21,264
P10	2,340	2,404	2,614	2,797
P50	9,642	9,994	10,850	11,419
P90	36,600	38,094	40,200	40,768
Top 1%	153,891	158,543	165,891	163,733
B. Consumption share by type of expenditure				
Retail trade	0.3313	0.3179	0.3200	0.3162
Finance & insurance	0.2208	0.2552	0.2256	0.2219
Water, electricity & gas	0.1534	0.0695	0.1407	0.1310
Inform. & communication	0.0682	0.0823	0.0695	0.0668
Human health	0.0824	0.0832	0.0832	0.0842
Education	0.1014	0.1051	0.1021	0.0988
Hotels & restaurants	0.0399	0.0410	0.0409	0.0407
Others	0.1527	0.1610	0.1672	0.1822
C. Couples vs. singles				
# of household w/ singles	75,910	85,451	88,897	93,329
# of household w/ couples	160,513	189,090	190,842	194,541
# w/ both spouses managers	21,779	26,345	26,106	26,112
# of individuals	258,233	300,952	305,902	314,036
# of households	236,423	274,541	279,739	287,870

NOTES: This table shows the position in the expenditure distribution of the population of business managers. It comprises the population of business managers reported in social security records and linked to annual personal income tax declarations (IRS) and electronic invoices (e-Fatura). We exclude business managers of firms that are inactive in the business registry and nonresident business managers. Business managers tend to concentrate toward the top of the expenditure distribution. Appendix Figure (A17) plots the share of business managers by percentile of the population's consumption expenditure.

SOURCES: Calculations based on administrative datasets of e-Fatura, IRS, social security records 2016–2019.

Table 6: Aggregate implications of consumption through the firm, 2019

	(1) $\widehat{\delta} = 0.3123$				(2) $\delta = \widehat{\delta}_p$			
	Million EUR		% of GDP		Million EUR		% of GDP	
A. Baseline household consumption								
Household expenditure								
(5.3 million households)	53,744		25.07					
Owner-managers' household expenditure								
(287.9 thousand households)	6,119		2.85					
B. Change in household consumption								
ΔCons. $= \bar{c}/(1-\hat{\delta}) - \bar{c}$	2,778		1.30		2,672		1.25	
	(2,577	2,989)	(1.20	1.39)	(1,238	5,598)	(0.58	2.61)
C. Aggregate loss in PIT and VAT								
Personal income tax (PIT)								
$\tau = 28\%$	1,080		0.50		1,039		0.48	
$\tau/(1-\tau) \cdot \Delta$Cons.	(1,002	1,162)	(0.47	0.54)	(482	2,177)	(0.22	1.02)
PIT + value-added tax (VAT)								
$\tau = 28\%$ and $\gamma = 23\%$	2,233		1.04		2,148		1.00	
$\left[\frac{1}{(1-\gamma)\cdot(1-\tau)} - 1\right] \cdot \Delta$Cons.	(2,071	2,402)	(0.97	1.12)	(995	4,499)	(0.46	2.10)
D. Change in pre-tax household income								
$\frac{1}{(1-\gamma)\cdot(1-\tau)} \cdot \Delta$Cons.	5,011		2.34		4,820		2.25	
	(4,648	5,391)	(2.17	2.51)	(2,233	10,097)	(1.04	4.71)

Notes: This table presents the aggregate implications of consumption through the firm for the year 2019, as discussed in Section (4). It displays how much reported household consumption would change if the personal expenditures shifted to firms were reclassified as final consumption expenditures (Panel B), the aggregate loss in personal income taxes (PIT) and value-added taxes (VAT) associated with consumption through the firm (Panel C), and the amount of income implicit in consumption through the firm, i.e., the amount of income that would allow the same consumption opportunities outside the firm (Panel D). We estimate the "true" final consumption expenditures of business manager households by adjusting reported household consumption ($\bar{c}$) to the share of final consumption shifted to the firm in the form of business expenditures (δ). Specifically, for each household j, we compute $\bar{c}_j/(1-\hat{\delta})$ using the absolute value of the coefficient $\hat{\delta}$ estimated in Section (3.1) and depicted in Figure (2) (Column 1). To account for income heterogeneity, we also use the shifting parameters by income percentile, $\hat{\delta}_p$, estimated in Section (3.3) and depicted in Appendix Figure (A11) (Column 2). We report in parentheses the lower and upper bounds of the aggregates using the 95% confidence intervals of the estimated coefficients. The orders of magnitude for the years 2017 and 2018 are similar to those of the estimates presented in this table, as shown in Appendix Tables (B5)–(B5).

Sources: Calculations based on administrative datasets of e-Fatura, IRS, social security records 2016–2019.

Table 7: Redistributive implications of consumption through the firm, 2018–2019

	(1) 2018		(2) 2019	
	Reported	Adjusted	Reported	Adjusted
A. Gini coefficient				
Gini of pre-tax household income	0.4736	0.4854	0.4698	0.4815
B. Income shares				
Bottom 50%	19.10	18.45	19.32	18.67
50%–90%	45.23	44.82	45.32	44.94
Top 10%	35.68	36.73	35.37	36.39
Top 5%	23.56	24.41	23.31	24.13
Top 1%	8.59	9.09	8.50	8.96
Top 0.1%	2.14	2.37	2.17	2.37

Notes: This table presents the redistributive implications of consumption through the firm for the years 2018–2019. It compares the "original" income distribution from personal income tax declarations with an adjusted income distribution that allocates to business managers the amount of income that would allow the same consumption opportunities outside the firm, as discussed in Section (4) and illustrated in Figure (11) and Table (6). In 2019, when I consider consumption through the firm as a form of remuneration, the Gini coefficient increases by approximately one percentage point, while the income share of the top 1% increases by approximately half a percentage point. Consumption through the firm has considerable effects on inequality, consistent with the fact that business managers concentrate toward the top of the income distribution and that consumption through the firm is widespread throughout the income distribution.

Sources: Calculations based on administrative datasets of e-Fatura, IRS, social security records 2016–2019.

(For Online Publication)

Appendix to

The Firm as a Tax Shelter

Micro Evidence and Aggregate Implications of Consumption Through the Firm

David Leite

[In Progress]

A Additional figures **A-2**

A.1 Additional descriptives on the switchers A-3

A.2 Robustness checks A-6

A.3 Effects by firm size, ownership and industry A-7

A.4 Effects by income decile and percentile A-12

A.5 Business expenditures and life events: additional results A-14

A.6 Additional descriptives on the population of business managers A-15

B Additional tables **A-20**

B.1 Panel of consumption expenditures of switchers A-21

B.2 Panel of business expenditures linked to owner-managers A-23

B.3 Implications of consumption through the firm A-24

C Additional details on the institutional setting **A-26**

C.1 The program of electronic invoices (e-Fatura) A-26

C.2 Social security regimes: employees vs. business managers A-31

C.3 Personal Income Tax [in progress] A-32

C.4 Corporate Income Tax [in progress] A-32

D Additional details on data [in progress] **A-32**

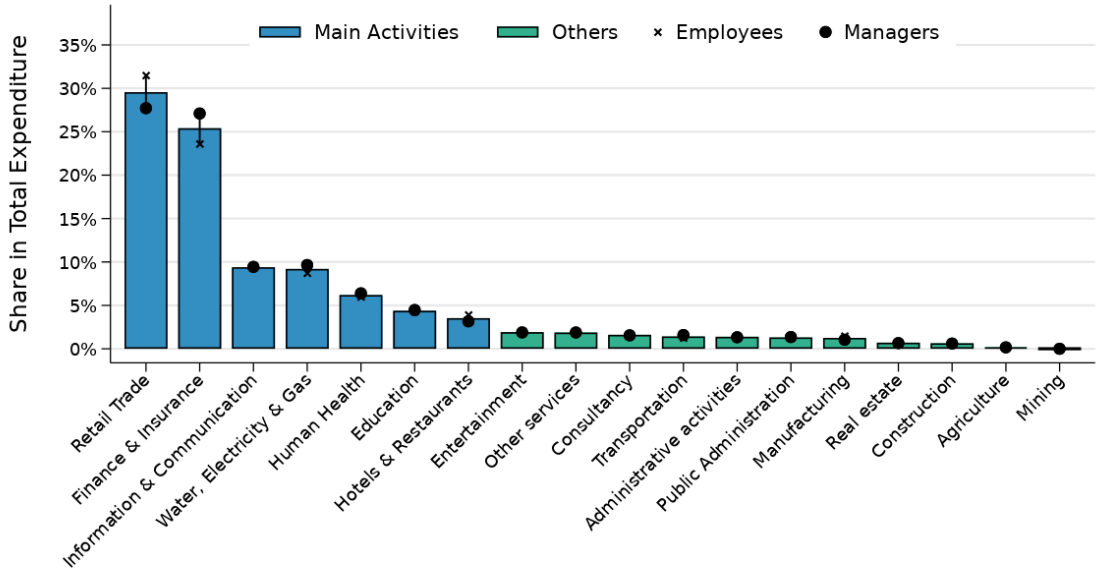
D.1 Individual and household-level data A-32

D.2 Firm-level data A-32

A Additional figures

A.1 Additional descriptives on the switchers

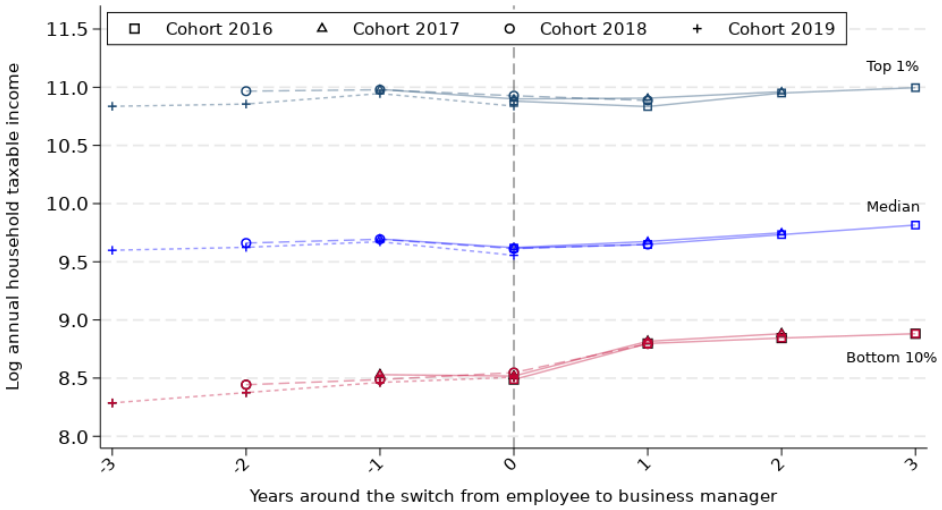
Figure A1: Household consumption shares of the switchers, 2016-2019



Notes: This figure displays the composition of the household consumption expenditures of switchers. We do not observe products in electronic invoices (e-Fatura), so we proxy expenditure categories by the industry code of the seller). The sample is the panel of monthly consumption expenditures of switchers from 2016-2019 described in Section (2.3). Tables (4)-(5) of the main paper present detailed summary statistics and additional information on this sub-population. Expenditures in retail trade (NACE code G) represent the largest share in total household expenditures reported in e-Fatura, but they lose importance in total expenditure once individuals switch to business managers. We abbreviate the designations of the industries of the sellers, such that "Retail Trade" denotes household expenditures in firms with the code NACE-G, similarly, Finance and Insurance (NACE-K); Water electricity and gas (NACE-D and NACE-E); Health (NACE-Q); Information and Communication (NACE-J); Education (NACE-P); Hotels and Restaurants (NACE-I); Consultancy (NACE-M); Other services (NACE-S); Administrative activities (NACE-N); Manufacturing (NACE-C); Public Administration (NACE-O); Real estate (NACE-L); Entertainment (NACE-R); Transportation (NACE-H); Agriculture (NACE-A); Mining (NACE-B).

Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

Figure A2: Evolution of top 1%, median and bottom 10% of household taxable income subject to personal income tax (PIT) around the year of switching from employee to business manager

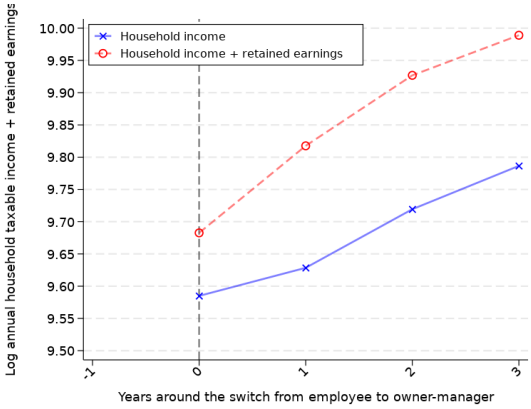


Notes: This figure displays the evolution of top 1%, median and bottom 10% of household income subject to personal income taxes (PIT) around the switching year for the panel of switchers from 2016-2019 described in Tables (1)-(2).

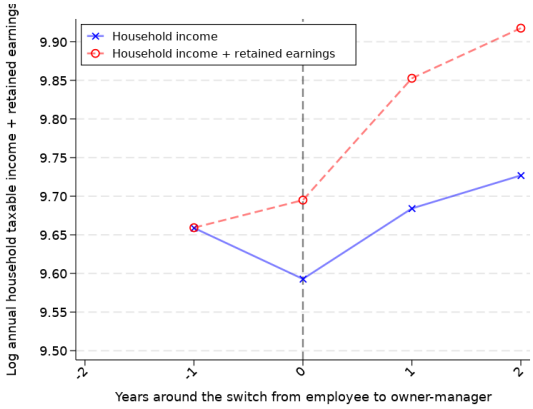
Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

Figure A3: Evolution of average household taxable income subject to PIT plus retained earnings for switchers who are firm owner-managers by cohort

(a) Cohort 2016



(b) Cohort 2017



(c) Cohort 2018



(d) Cohort 2019

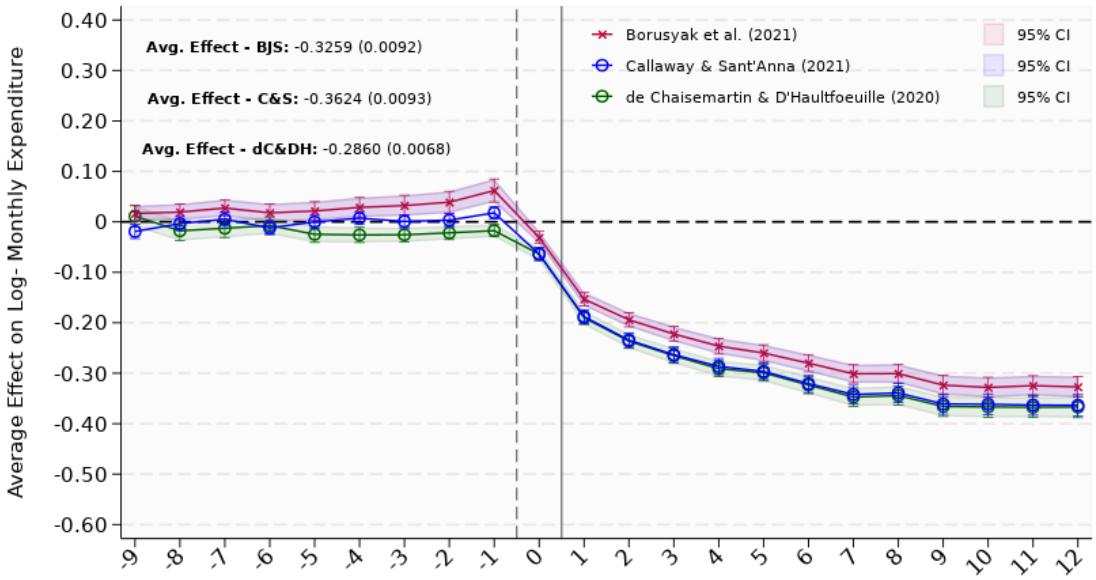


Notes: This figure displays the evolution of household income subject to personal income taxes (PIT) and firm retained earnings by switching cohort for the panel of switchers from 2016-2019 described in Tables (1)-(2), merged with company accounts data (IES)

Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

A.2 Robustness checks

Figure A4: Effect on monthly personal consumption expenditures of switching from employee to business manager using additional event-study estimators



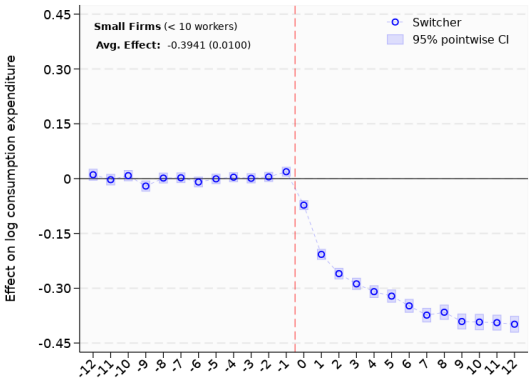
Notes: This figure displays the estimates of the effects on reported monthly personal consumption expenditures of switchers. The post-switch estimate of personal expenditures ("Avg. Effect") is defined as the average of the event-study coefficients for the post periods $k \in \{9, 10, 11, 12\}$. The sample is the panel of monthly consumption expenditures of switchers from 2016-2019 described in Section (2.3). Tables (1)-(2) provide summary statistics. The event-study estimates were obtained using the estimators by Callaway and Sant'Anna (2020), De Chaisemartin and D'Haultfoeuille (2020) and Borusyak *et al.* (2021).

Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

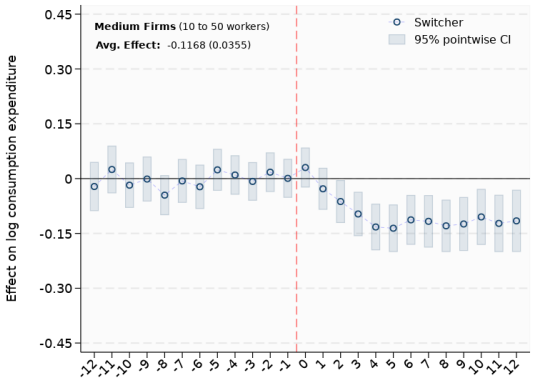
A.3 Effects by firm size, ownership and industry

Figure A5: Effects by small, medium and large firms - **Switcher**

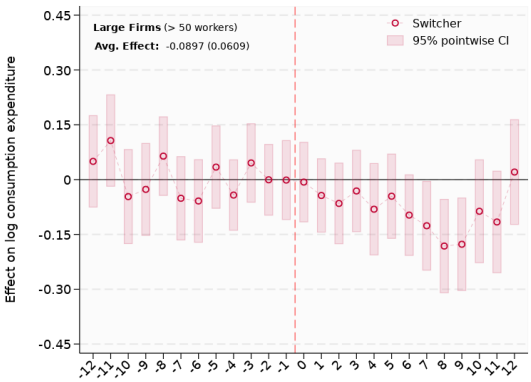
(a) Small firms (less than 10 workers)



(b) Medium firms (10 to 50 workers)



(c) Large firms (more than 50 workers)

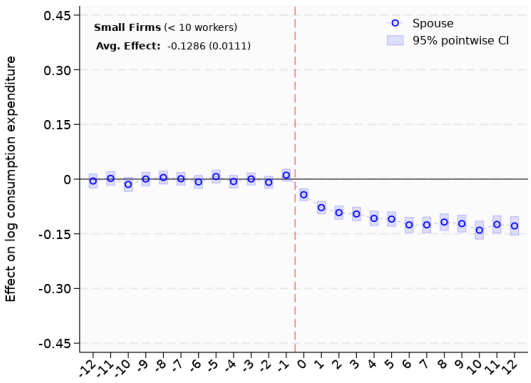


Notes: This figure displays the effects on reported monthly personal consumption expenditures of switchers by firm size in terms of number of workers. The sample is the panel of monthly consumption expenditures of switchers from 2016-2019 described in Section (2.3). Tables (1)-(2) provide summary statistics. Appendix Table (B1) provide supplemental summary statistics on the characteristics of switcher's firms. The estimates were obtained using Callaway and Sant'Anna (2020) as described in Section (3.1). As discussed in Section (3.2) of the main paper, scope for consumption through the firm is greater among firms with less than 10 workers, which are able to shift by about 39.4% of their personal expenditures (business managers in small firms account for 83% of the universe, as reported in Appendix Figure A14). On the other hand, individuals who switch from employees to business managers of medium firms shift approximately 11.7% of their personal expenditures, while for large firms estimates are not statistically significant.

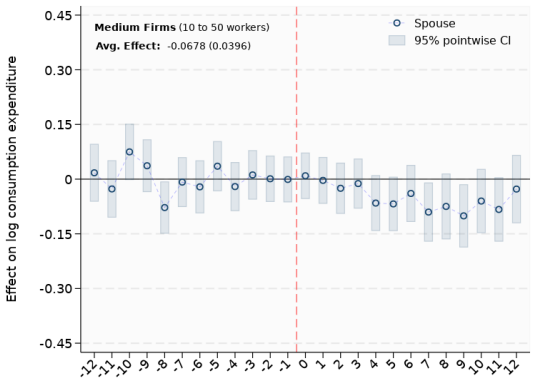
Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

Figure A6: Effects by small, medium and large firms - **Spouse**

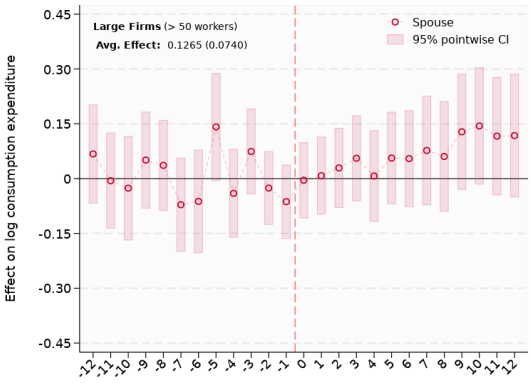
(a) Small firms (less than 10 workers)



(b) Medium firms (10 to 50 workers)



(c) Large firms (more than 50 workers)

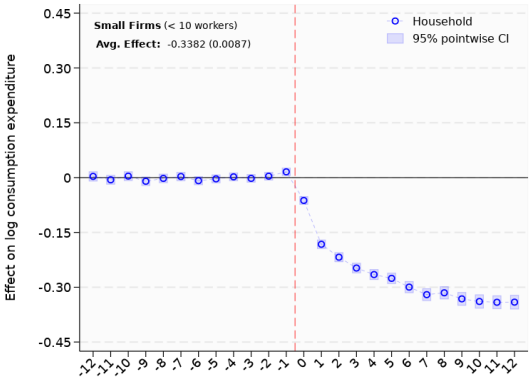


Notes: This figure displays the effects on reported monthly personal consumption expenditures of switcher spouses' by firm size in terms of number of workers. The sample is the panel of monthly consumption expenditures of switchers from 2016-2019 described in Section (2.3). Tables (1)-(2) provide summary statistics. Appendix Table (B1) provide supplemental summary statistics on the characteristics of switcher's firms. The estimates were obtained using Callaway and Sant'Anna (2020) as described in Section (3.1). Spouses of switchers in small firms shift by about 12.7% of their personal expenditures, while the estimates for the spouses of switchers of medium and large firms are not statistically significant (business managers in small firms account for 83% of the universe, as reported in Appendix Figure A14).

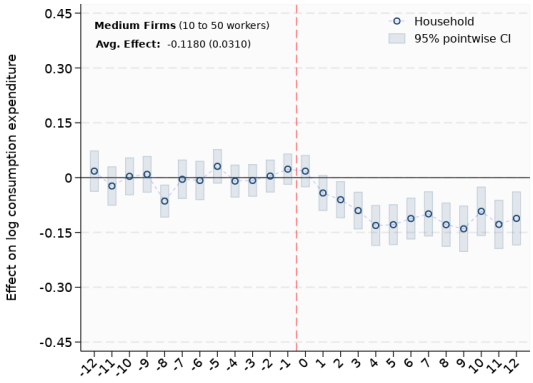
Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

Figure A7: Effects by small, medium and large firms - **Household**

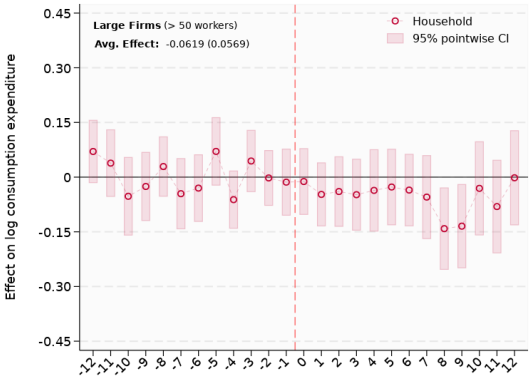
(a) Small firms (less than 10 workers)



(b) Medium firms (10 to 50 workers)



(c) Large firms (more than 50 workers)

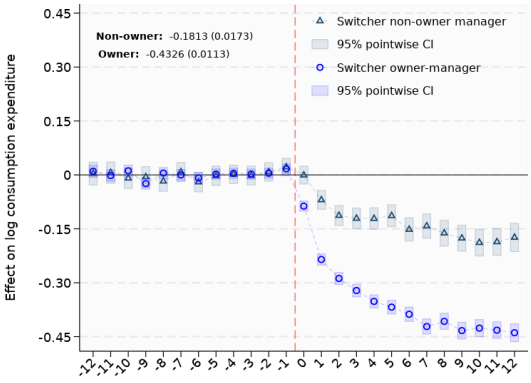


NOTES: This figure displays the effects on reported monthly personal consumption expenditures of switcher household by firm size in terms of number of workers. The sample is the panel of monthly consumption expenditures of switchers from 2016-2019 described in Section (2.3). Tables (1)-(2) provide summary statistics. Appendix Table (B1) provide supplemental summary statistics on the characteristics of switcher's firms. The estimates were obtained using Callaway and Sant'Anna (2020) as described in Section (3.1). As discussed in Section (3.2) of the main paper, scope for consumption through the firm is greater among firms with less than 10 workers, which are able to shift by about 33.8% of their household expenditures (business managers in small firms account for 83% of the universe, as reported in Appendix Figure A14). On the other hand, households of switchers of medium firms shift approximately 11.8% of their personal expenditures, while for large firms estimates are not statistically significant.

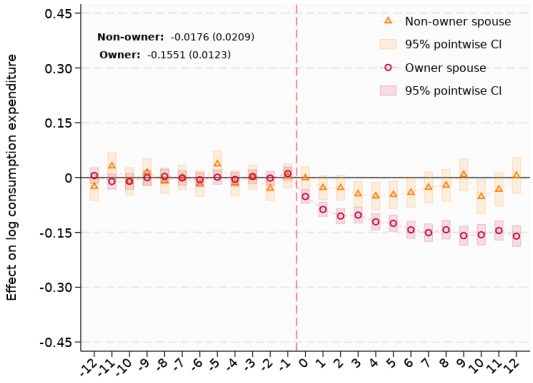
SOURCES: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

Figure A8: Effects by firm ownership

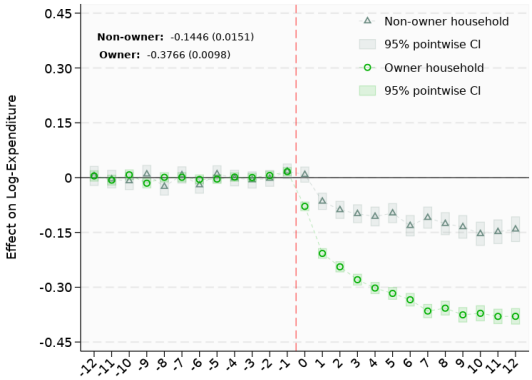
(a) Switcher



(b) Spouse



(c) Household

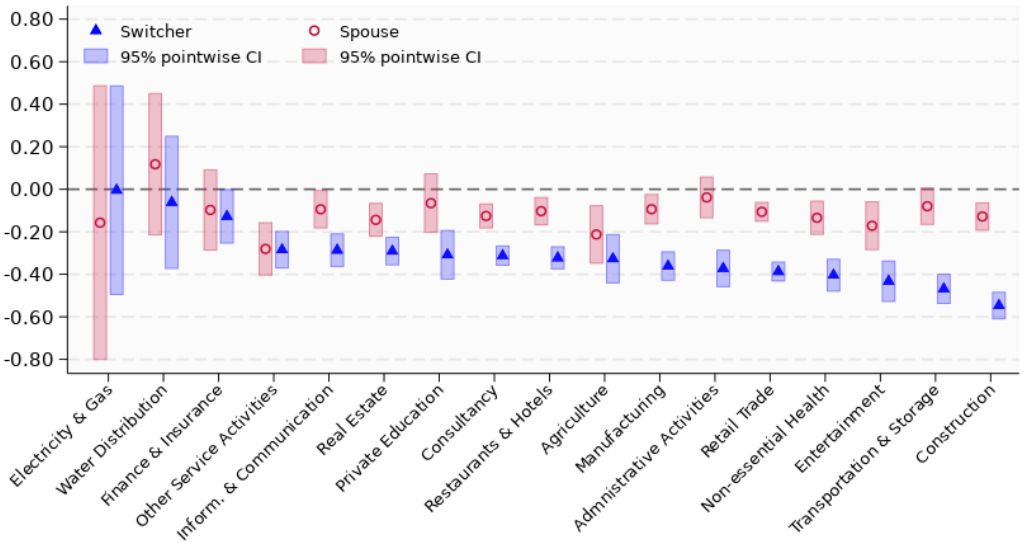


Notes: This figure displays the effects on reported monthly consumption expenditures of switchers, spouses and combined household expenditures by firm ownership (Appendix Section **??** describes our approach to identify switchers who become owner-managers). The sample is the panel of monthly consumption expenditures of switchers from 2016-2019 described in Section (2.3). Tables (1)-(2) provide summary statistics. The estimates were obtained using Callaway and Sant'Anna (2020) as described in Section (3.1). Scope for consumption through the firm is greater among closely held firms, i.e., firms in which the switcher is the firm owner-manager. Our results suggest that switchers who are owner-managers shift by about 43.3% of their personal expenditures to the firm (Panel a), 15.5% of their spouses (Panel b), and 37.7% of their combined household expenditures (Panel c). In contrast, switchers who are non-owners are able to shift approximately 18.1% of their personal expenditures (Panel a) and 14.5% of their household expenditures (Panel c), while estimates of non-owner spouses' are not statistically significant (Panel b).

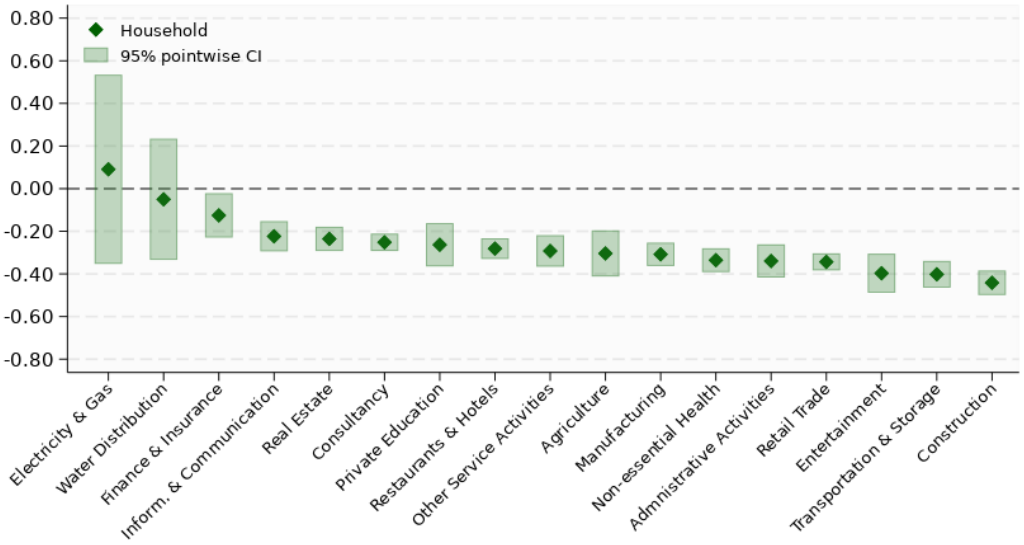
Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

Figure A9: Average effects by industry

(a) Switcher and spouse



(b) Household



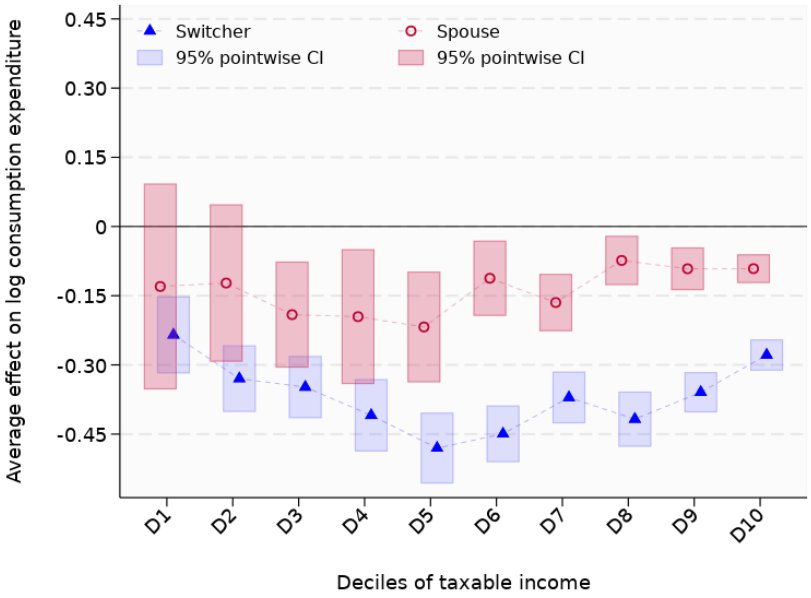
Notes: This figure displays average effects on reported monthly consumption expenditures of switchers, spouses and combined household expenditures by firm ownership The sample is the panel of monthly consumption expenditures of switchers from 2016-2019 described in Section (2.3). Tables (1)-(2) provide summary statistics. Appendix Table (B3) reports descriptive statistics on the distribution of switchers by industry The estimates were obtained using Callaway and Sant'Anna (2020) as described in Section (3.1). Estimates by firm industry do not reveal substantial differences among industries. Nonetheless, scope for consumption through the firm is greater among firms operating in construction (NACE code C), transportation and storage (NACE code H), recreation and entertainment (NACE code R), and retail trade (NACE code G).

Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

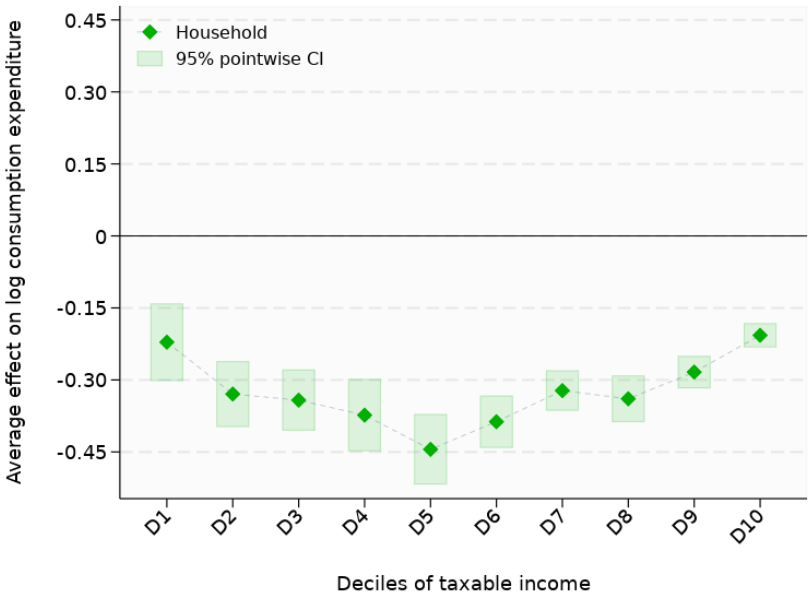
A.4 Effects by income decile and percentile

Figure A10: Effects by decile of household taxable income

(a) Switcher and spouse



(b) Household

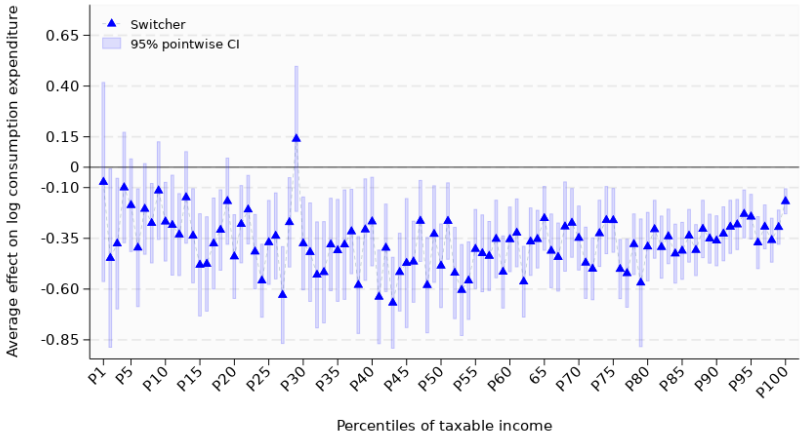


Notes: This figure displays the average effects on reported personal consumption expenditures of switchers, spouses and household expenditures by deciles of household taxable income. The sample is the panel of monthly consumption expenditures of switchers from 2016-2019 described in Section (2.3). Tables (1)-(2) provide summary statistics.

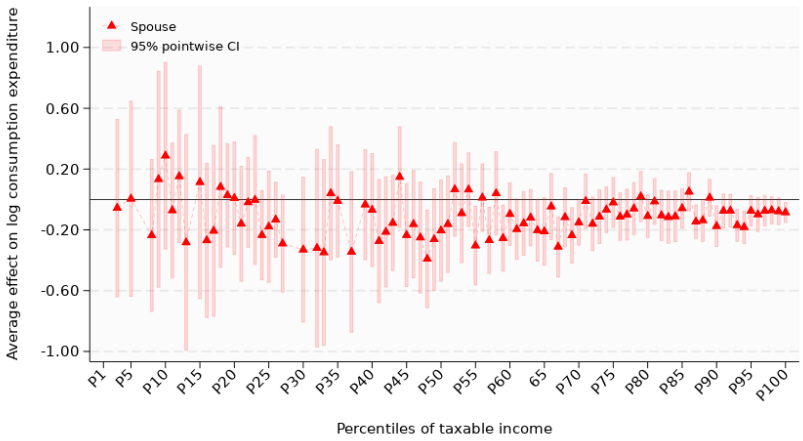
Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

Figure A11: Effects by percentile of household taxable income

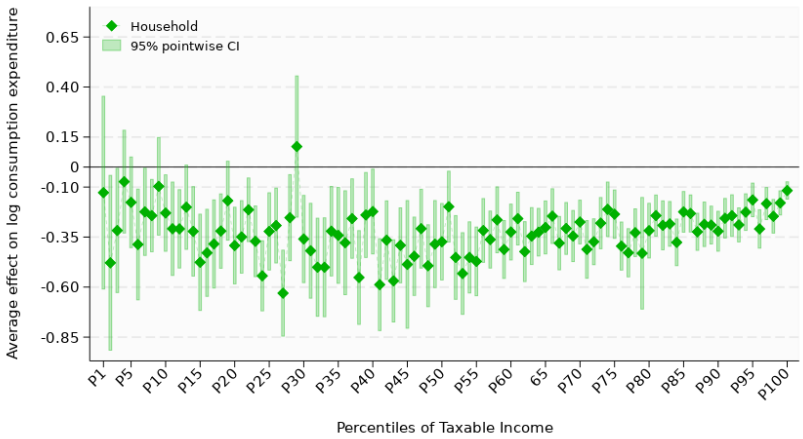
(a) Switcher



(b) Spouse



(c) Household



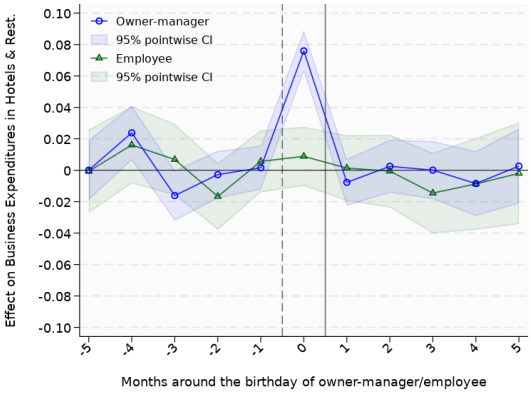
NOTES: This figure displays the average effects on reported personal consumption expenditures of switchers, spouses and household expenditures by percentiles of household taxable income. The sample is the panel of monthly consumption expenditures of switchers from 2016-2019 described in Section (2.3). Tables (1)-(2) provide summary statistics.

SOURCES: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

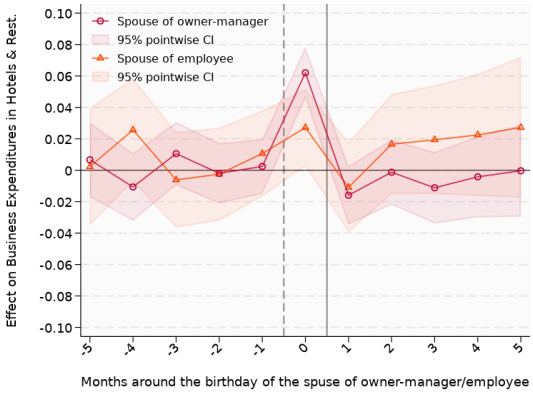
A.5 Business expenditures and life events: additional results

Figure A12: Effect of owner-manager and spouse birthdays on business expenditures in hotels and restaurants, 2016-2018

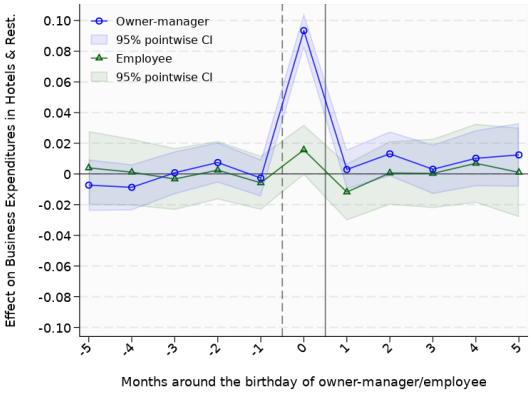
(a) Owner-manager vs. employee, 2016



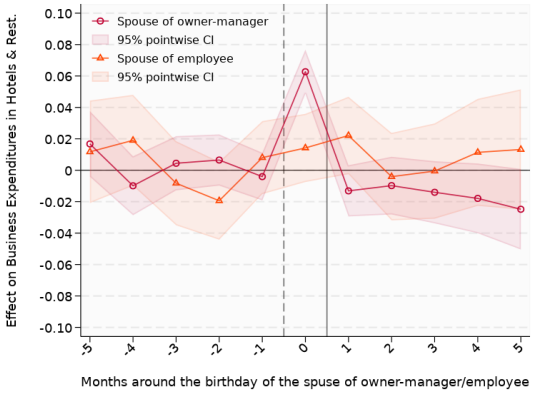
(b) Owner spouse vs. employee spouse, 2016



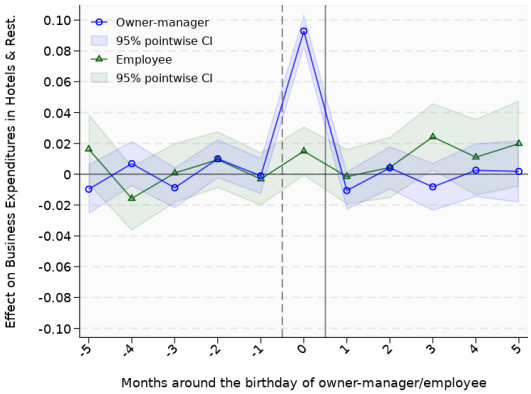
(c) Owner-manager vs. employee, 2017



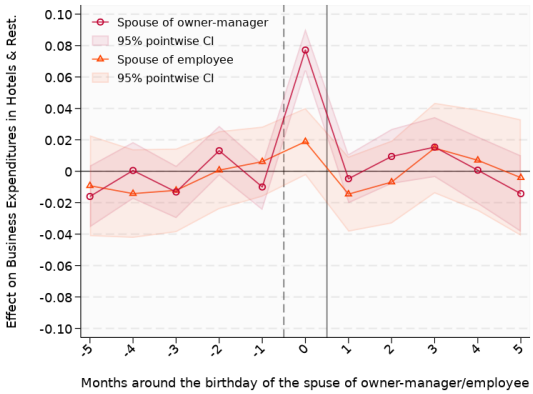
(d) Owner spouse vs. employee spouse, 2017



(e) Owner-manager vs. employee, 2018



(f) Owner spouse vs. employee spouse, 2018

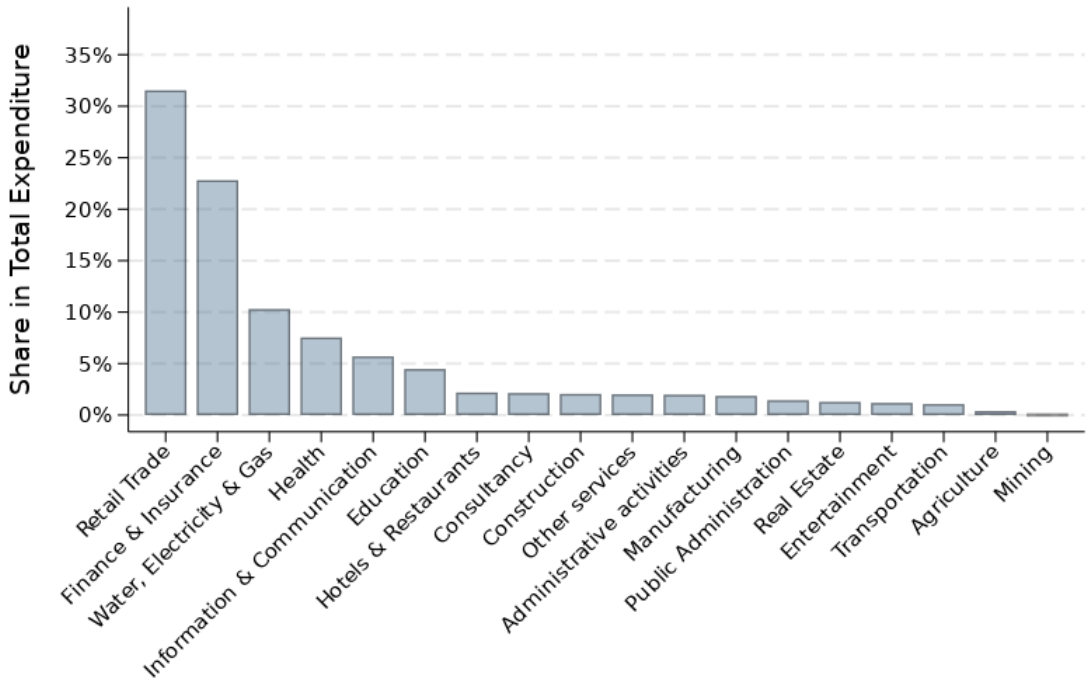


Notes: This figure displays the estimates described in Figure (9) of the main paper for the years 2016-2018. There is a peak in the firm's expenditures in hotels and restaurants around the birthday months in 2016-2018 with the similar orders of magnitude as in 2019.

Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

A.6 Additional descriptives on the population of business managers

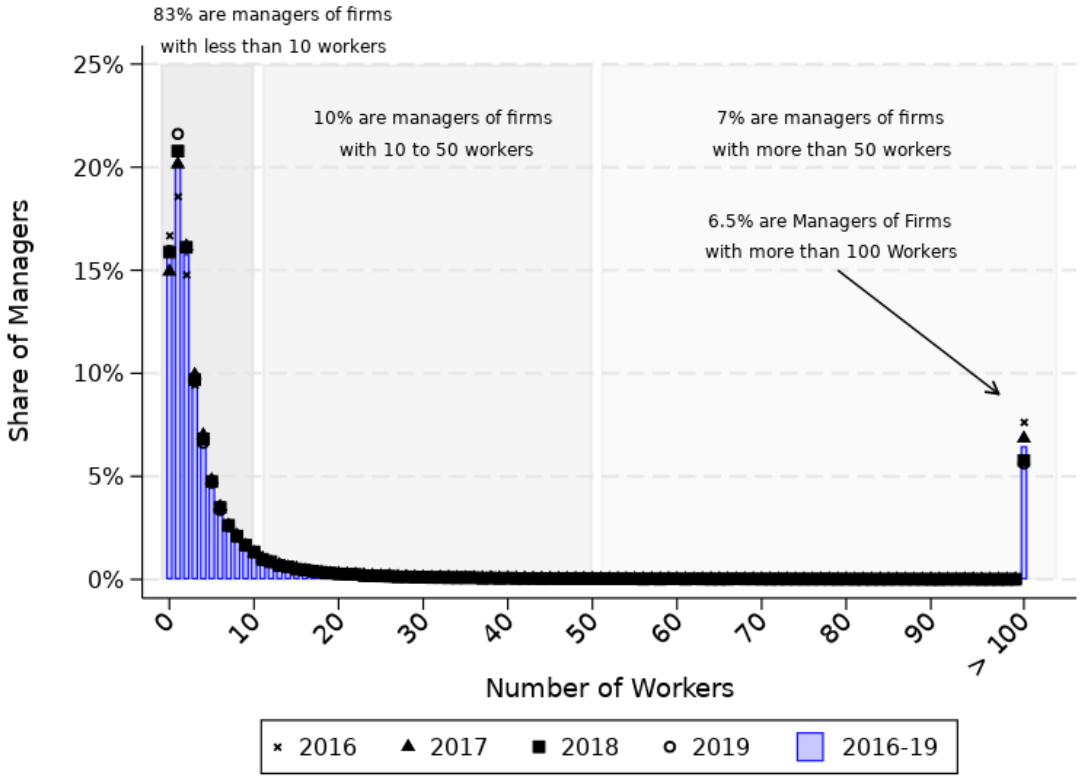
Figure A13: Household consumption shares of the population of business managers, 2016-2019



Notes: This figure displays the composition of the household consumption expenditures of the population of business managers. We do not observe products in electronic invoices (e-Fatura), so we proxy expenditure categories by the industry code of the seller. Tables (4)-(5) of the main paper present detailed summary statistics and additional information on this population. Expenditures in retail trade (NACE code G) represent the largest share in total household expenditures of business managers. We abbreviate the designations of the industries of the sellers, such that "Retail Trade" denotes household expenditures in firms with the code NACE-G, similarly, Finance and Insurance (NACE-K); Water electricity and gas (NACE-D and NACE-E); Health (NACE-Q); Information and Communication (NACE-J); Education (NACE-P); Hotels and Restaurants (NACE-I); Consultancy (NACE-M); Other services (NACE-S); Administrative activities (NACE-N); Manufacturing (NACE-C); Public Administration (NACE-O); Real estate (NACE-L); Entertainment (NACE-R); Transportation (NACE-H); Agriculture (NACE-A); Mining (NACE-B).

Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

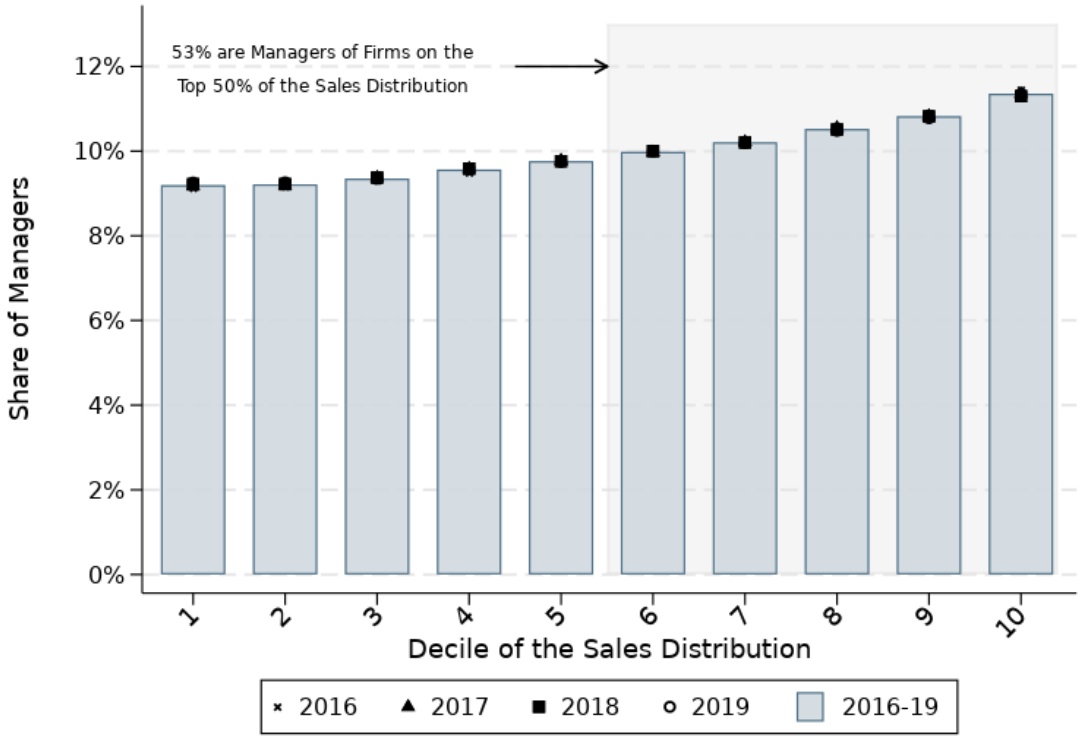
Figure A14: Distribution of the population of business managers by firm size, 2016-2019



Notes: This figure reports the distribution of the population of business managers by the firm size measured in terms of the number of workers for 2016-2019. Tables (4)-(5) of the main paper present detailed summary statistics and additional information on this population. By about 83% of the population of business managers belong to firms with less than 10 workers; 10% belong to firms with 10 to 50 workers; 7% belong to firms with more than 50 workers, and 6.5% belong to firms with more than 100 workers. This reflects the firm composition of the economy as a whole, which is there is a preponderance of small firms.

Sources: Calculations based on administrative datasets of Social security records and IES, 2016-2019.

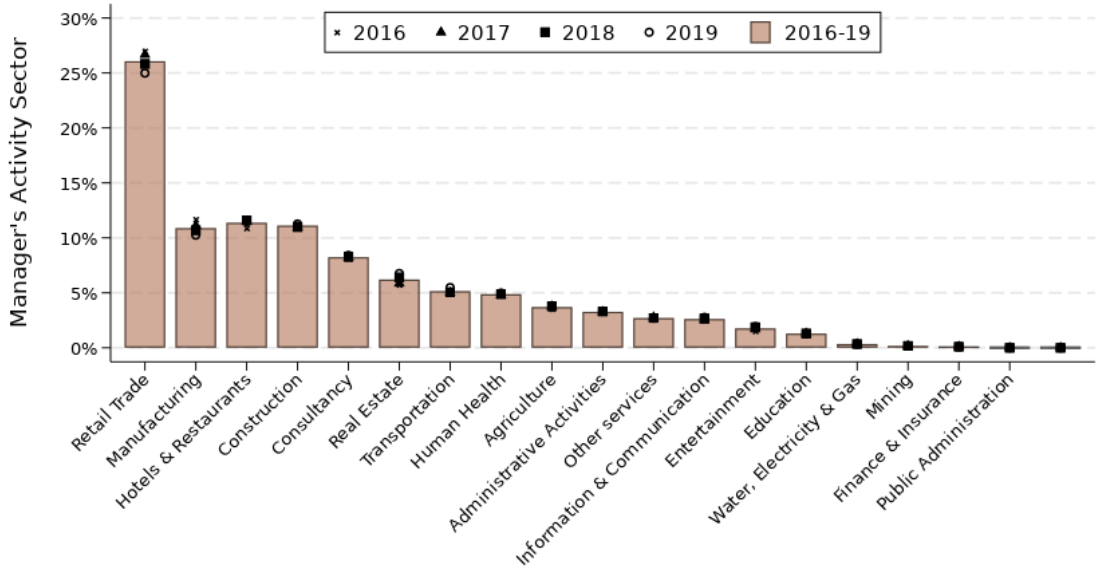
Figure A15: Distribution of the population of business managers by firm size in terms of sales, 2016-2019



Notes: This figure reports the distribution of the population of business managers by the firm size measured in terms of sales for 2016-2019. Tables (4)-(5) of the main paper present detailed summary statistics and additional information on this population. Business managers tend to concentrate slightly more in firms that belong to the top half of the distribution of firm sales. This is consistent with the fact that larger firms tend to have more business managers than smaller ones, which typically have a single owner-manager (there is an average of 1.15 business managers per firm).

Sources: Calculations based on administrative datasets of Social security records and IES, 2016-2019.

Figure A16: Distribution of the population of business managers by industry, 2016-2019

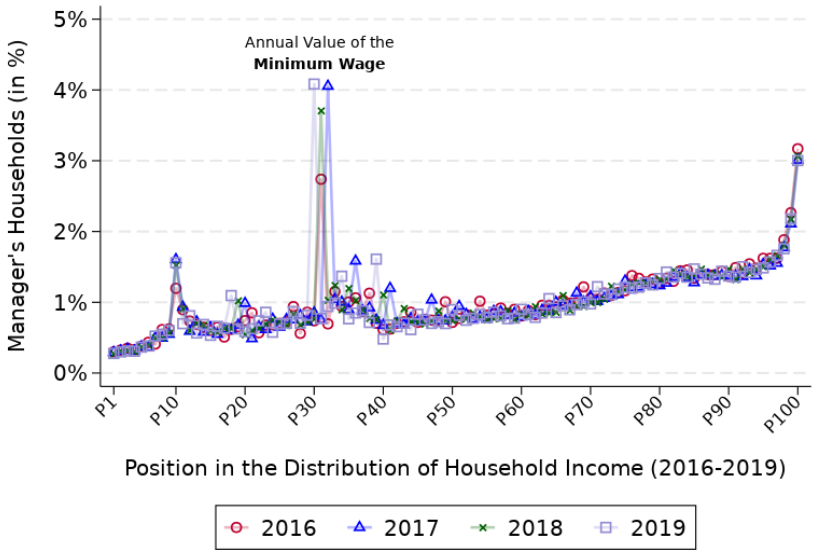


Notes: This figure reports the distribution of the population of business managers by the firm size measured in terms of sales for 2016-2019. Tables (4)-(5) of the main paper present detailed summary statistics and additional information on this population. By about 2/3 of the population of business managers belong to firms operating in retail trade, manufacturing, hotels and restaurants, construction and professional and technical activities (which we abbreviate to "consultancy"). The distribution of business managers by activity sectors mirrors the industry composition of firms in economy, in which 23% of the firms operate in the retail trade sector, 8.8% in manufacturing, 10.2% in hotels and restaurants, 10.3% in construction and 10.3% in professional and technical activities. We abbreviate the designations of the industries of the business manager's firms, such that "Retail Trade" denotes household expenditures in firms with the code NACE-G, similarly, Finance and Insurance (NACE-K); Water, electricity and gas (NACE-D and NACE-E); Health (NACE-Q); Information and Communication (NACE-J); Education (NACE-P); Hotels and Restaurants (NACE-I); Consultancy (NACE-M); Other services (NACE-S); Administrative activities (NACE-N); Manufacturing (NACE-C); Public Administration (NACE-O); Real estate (NACE-L); Entertainment (NACE-R); Transportation (NACE-H); Agriculture (NACE-A); Mining (NACE-B).

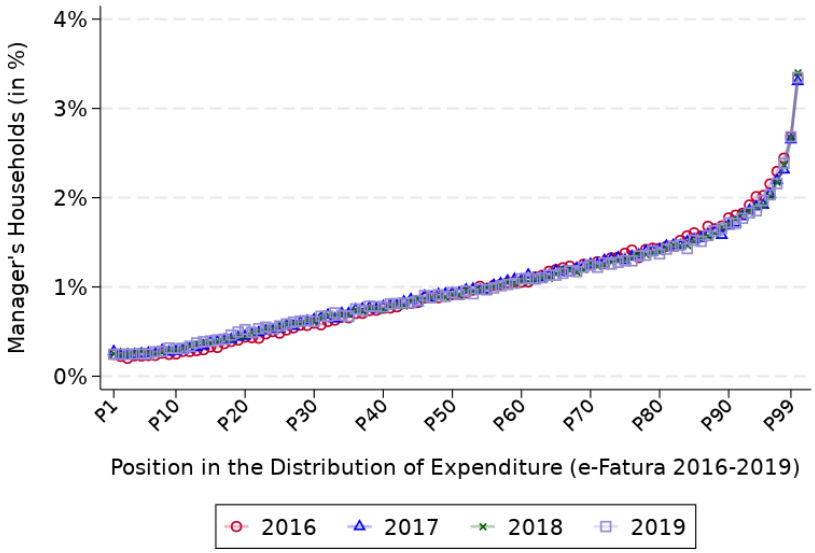
Sources: Calculations based on administrative datasets of Social security records, IES, 2016-2019.

Figure A17: Position of business managers in the distribution of household taxable income and expenditures reported in electronic invoices, 2016-2019

(a) Share of business managers by percentile of the income distribution



(b) Share of business managers by percentile of the expenditure distribution



Notes: This figure displays the share of business managers by percentile of the household taxable income distribution reported in the annual personal income tax declaration (divided by two in the case of couple households that opt by joint taxation) from 2016-2019. The sample is the same as described in Tables (4)-(5) of the main paper. By about 20% of business managers belong to top 10%, and by about 4% to the Top 1%. As shown in panel (a), business managers bunch around the percentiles of the annual value of the minimum wage, which corresponds to the point at which personal income taxes become payable. Panel (b) plots the share of business managers by percentiles of the household expenditure distribution reported in e-Fatura. Business managers also concentrate towards the top of the expenditure distribution, but contrary to income, they do not bunch at any specific point of the distribution.

Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

B Additional tables

B.1 Panel of consumption expenditures of switchers

Table B1: Firm characteristics of switchers

	(1) Role as Employee	(2) Role as Manager
Firm's age		
Non-existing firm	-	0.75
Time operating	16.22	2.12
Same firm	-	0.05
Type of firm		
Limited liability company	0.62	0.73
Single member company	0.13	0.20
Non-profit organization	0.03	0.04
Join-stock company	0.17	0.02
Others	0.05	0.01
Industry		
Retail Trade	0.21	0.19
Hotels & Restaurants	0.11	0.13
Construction	0.11	0.10
Manufacturing	0.13	0.08
Consultancy	0.08	0.09
Transportation	0.05	0.07
Human Health	0.05	0.05
Admnistrative Activities	0.06	0.04
Other Service Activities	0.03	0.05
Real Estate	0.03	0.05
Inform. & Communication	0.04	0.04
Entertainement	0.02	0.04
Other Sectors	0.08	0.06
Number of workers		
Average Number of Workers	113.95	7.31
$<$ 10 Workers	0.58	0.96
$\geq$ 10 and $<$ 50 Workers	0.23	0.03
$\geq$ 50 Workers	0.18	0.01
Assets, sales and profits (in thous.)		
Mean of Sales	13,762.39	659.01
Mean of Assets	19,814.19	1,766.86
Mean of Profits	392.19	42.13

Notes: This table describes the characteristics of the firms in which the treated individuals used to work as employee (Column 1) and become working as business managers (Column 2). The sample is the panel of monthly consumption expenditures of switchers from 2016-2019 described in Section (2.3). By about 42% of the individuals used to work as employees in firms with more than 10 workers, and 18% with more than 50 workers, operating in retail trade, manufacturing, construction and hotels and restaurants. After switching to business managers, 75% become owner-managers, 20% become business managers in pre-existing firms, and 5% become managers in the same firm where they used to work as employees; 96% of these firms have less than 10 workers, and operate mostly in retail trade, hotels and restaurants, construction and professional and technical activities (consultancy).

Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, IES, 2016-2019.

Table B2: Switcher's industry of origin (as employee) vs. destiny (as business manager), 2016-2019

Working as Employee (Origin)	**Working as Business Manager** (Destiny)																				
	Retail Trade	Restaurants & Hotels	Construction	Consultancy	Manufacturing	Transportation	Real Estate	Other Service Activities	Administrative Activities	Human Health	Entertainment	Inform. & Communication	Agriculture	Education	Financial & Insurance	Water Collection	Public Administration	Mining & Quarrying	Electricity & Gas	Extraterritorial Org.	**Total**
Retail Trade	10.64	1.85	1.00	1.14	0.96	0.87	0.85	0.73	0.64	0.22	0.34	0.52	0.33	0.16	0.25	0.03	0.02	0.00	0.02	0.00	20.57
Manufacturing	2.17	1.23	0.99	0.95	5.11	0.47	0.49	0.55	0.40	0.14	0.14	0.34	0.23	0.07	0.07	0.01	0.02	0.00	0.01	0.00	13.38
Construction	0.80	0.53	6.65	0.88	0.45	0.38	0.53	0.21	0.28	0.07	0.10	0.21	0.20	0.04	0.08	0.01	0.01	0.01	0.01	0.00	11.45
Restaurants & Hotels	0.92	6.27	0.35	0.29	0.21	0.64	0.32	0.32	0.32	0.14	0.08	0.33	0.11	0.04	0.01	0.01	0.00	0.00	0.00	0.00	10.39
Consultancy	0.87	0.56	0.38	3.73	0.27	0.18	0.59	0.35	0.34	0.14	0.41	0.20	0.09	0.10	0.10	0.01	0.01	0.00	0.02	0.00	8.37
Administrative Activities	0.67	0.60	0.51	0.44	0.23	0.54	0.25	0.29	1.37	0.11	0.18	0.35	0.16	0.05	0.03	0.01	0.01	0.00	0.00	0.00	5.81
Human Health	0.59	0.45	0.13	0.22	0.11	0.18	0.21	0.37	0.18	2.41	0.05	0.19	0.08	0.12	0.02	0.01	0.03	0.00	0.00	0.00	5.34
Transportation	0.43	0.31	0.19	0.13	0.12	2.78	0.10	0.08	0.17	0.02	0.05	0.22	0.05	0.01	0.02	0.01	0.01	0.00	0.00	0.00	4.71
Inform. & Communication	0.33	0.21	0.11	0.63	0.06	0.12	0.16	0.13	0.12	0.06	2.03	0.13	0.05	0.04	0.03	0.00	0.00	0.00	0.00	0.00	4.22
Other Service Activities	0.27	0.21	0.08	0.20	0.08	0.13	0.10	1.35	0.11	0.14	0.08	0.12	0.05	0.06	0.02	0.00	0.00	0.00	0.00	0.00	3.00
Real Estate	0.27	0.21	0.24	0.23	0.07	0.08	1.19	0.08	0.12	0.05	0.06	0.06	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.00	2.75
Education	0.20	0.25	0.05	0.23	0.07	0.07	0.13	0.29	0.10	0.21	0.11	0.22	0.02	0.71	0.03	0.01	0.01	0.00	0.00	0.00	2.72
Agriculture	0.24	0.12	0.08	0.10	0.07	0.09	0.06	0.08	0.10	0.03	0.00	0.06	1.21	0.01	0.01	0.00	0.00	0.00	0.00	0.00	2.26
Entertainment	0.19	0.20	0.05	0.12	0.04	0.11	0.12	0.09	0.08	0.07	0.05	0.65	0.04	0.04	0.01	0.00	0.00	0.00	0.00	0.00	1.87
Financial and Insurance	0.13	0.11	0.05	0.28	0.03	0.04	0.18	0.09	0.05	0.05	0.04	0.06	0.04	0.02	0.24	0.00	0.00	0.00	0.00	0.00	1.42
Public Administration	0.10	0.07	0.01	0.15	0.04	0.05	0.05	0.10	0.05	0.12	0.03	0.08	0.06	0.02	0.01	0.02	0.03	0.00	0.00	0.00	1.00
Water Collection	0.05	0.05	0.04	0.03	0.04	0.04	0.01	0.02	0.02	0.00	0.00	0.01	0.01	0.00	0.01	0.08	0.00	0.00	0.00	0.00	0.43
Mining & Quarrying	0.02	0.02	0.03	0.03	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.23
Electricity & Gas	0.01	0.01	0.01	0.02	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.10
Extraterritorial Org.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	18.91	13.29	10.96	9.80	7.99	6.77	5.35	5.15	4.43	4.00	3.75	3.75	2.77	1.53	0.97	0.22	0.18	0.08	0.07	0.00	100.00

Notes: This table presents the means on the industry of *origin* (firm industry where the switcher used to work as employee) and the industry of *destiny* (firm industry where the switcher used to work as employee). The sample is the panel of monthly consumption expenditures of switchers from 2016-2019 described in Section (2.3). The four largest activities as sectors of origin are retail trade, manufacturing, restaurants and hotels, and professional and technical activities (consultancy). In almost all cases, individuals tend to become business managers in firms that operate in the same activity sector as the one of the firms in which they worked previously as employees. Still, the ranking of the sectors of destiny is not exactly the same as the ranking of the sectors of origin. For example, manufacturing is the second largest sector of origin but becomes the fourth largest sector of destiny, in turn professional and technical activities gain prominence as sector of destiny, becoming the fourth largest sector of destiny.

Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, IES, 2016-2019.

B.2 Panel of business expenditures linked to owner-managers

Table B3: Panel of monthly business expenditures linked to owner-managers

	(1) Panel 2017	(2) Panel 2018	(3) Panel 2019
A. Firm Size (in percentage)			
Less than 10 workers	83.32	83.01	82.88
Between 10 to 50 workers	15.58	15.90	16.02
More than 50 workers	1.10	1.09	1.10
B. Average Assets, Sales and Profits (in EUR)			
Sales	572,895	590,584	586,251
Assets	576,378	563,095	573,320
Profits	23,779	19,582	21,414
C. Monthly business expenditures (in EUR)			
Agriculture	853	731	776
Mining & Quarrying	61	59	62
Manufacturing	4,999	5,247	4,772
Electricity & Gas	514	503	460
Water Dist.	197	218	186
Construction	1,503	1,533	1,565
Retail Trade	13,305	13,688	13,472
Transp. & Storage	1,102	1,090	1,093
Restaurants & Hotels	439	478	478
Inform. & Communic.	749	804	560
Finance & Insurance	1,144	1,357	1,374
Real Estate	466	462	491
Consultancy	1,131	1,117	1,169
Admin. Activ.	1,181	1,216	1,192
Public Admin.	105	100	98
Private Education	56	55	58
Non-essential Health	279	262	268
Entertainment	142	175	174
Other Service Act.	134	155	148
Total	28,362	29,249	28,397
D. Observations			
Employees	45,331	47,583	50,283
Employees spouses'	26,595	27,664	29,040
Individuals	71,926	75,247	79,323
Firms	45,331	47,583	50,283
E. Firm-month observations			
Share of balanced obs.	1.00	1.00	1.00
Firm-month obs.	543,436	570,522	602,887

NOTES: This table presents the panel of monthly business expenditures linked to owner-managers described in Section (2.3) and Table (3). We randomly select an employee of the same firm using the Social security records.

SOURCES: Calculations based on administrative datasets of e-Fatura, IRS, Social security records 2016-2019.

B.3 Implications of consumption through the firm

Table B4: Aggregate implications of consumption through the firm, 2017

	(1) $\widehat{\delta} = 0.3123$				(2) $\delta = \widehat{\delta}_p$			
	Million EUR		% of GDP		Million EUR		% of GDP	
A. Baseline household consumption								
Household expenditure (5.1 million households)	47,204		24.09					
Owner-manager's household expenditure (272.4 thousand households)	5,432		2.77					
B. Change in household consumption								
ΔCons. $= \bar{c}/(1-\hat{\delta}) - \bar{c}$	2,466		1.26		2,418		1.23	
	(2,288	2,653)	(1.17	1.35)	(1,112	5,136)	(0.57	2.62)
C. Aggregate loss in PIT and VAT								
Personal Income Tax (PIT)								
$\tau = 28\%$	959		0.49		940		0.48	
$\tau/(1-\tau) \cdot \Delta$Cons.	(890	1,032)	(0.45	0.53)	(433	1,997)	(0.22	1.02)
PIT + Value-added Tax (VAT)								
$\tau = 28\%$ and $\gamma = 23\%$	1,982		1.01		1,944		0.99	
$\left[\frac{1}{(1-\gamma)\cdot(1-\tau)} - 1\right] \cdot \Delta$Cons.	(1,839	2,133)	(0.94	1.09)	(894	4,128)	(0.46	2.11)
D. Change in pre-tax household income								
$\frac{1}{(1-\gamma)\cdot(1-\tau)} \cdot \Delta$Cons.	4,448		2.27		4,362		2.23	
	(4,126	4,786)	(2.11	2.44)	(2,006	9,264)	(1.02	4.73)

Notes: This table presents the aggregate implications of consumption through the firm for the year 2017, as discussed in Section (4) and Table (6).

Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records 2016-2019.

Table B5: Aggregate implications of consumption through the firm, 2018

	(1) $\widehat{\delta} = 0.3123$		(2) $\delta = \widehat{\delta}_p$	
	Million EUR	% of GDP	Million EUR	% of GDP
A. Baseline household consumption				
Household expenditure (5.2 million households)	50,978	24.85		
Owner-manager's household expenditure (277.3 thousand households)	5,767	2.81		
B. Change in household consumption				
ΔCons. $= \bar{c}/(1-\hat{\delta}) - \bar{c}$	2,618	1.28	2,532	1.23
	(2,429 2,817)	(1.18 1.37)	(1,176 5,321)	(0.57 2.59)
C. Aggregate loss in PIT and VAT				
Personal Income Tax (PIT)				
$\tau = 28\%$	1,018	0.50	985	0.48
$\tau/(1-\tau) \cdot \Delta$Cons.	(945 1,095)	(0.46 0.53)	(457 2,069)	(0.22 1.01)
PIT + Value-added Tax (VAT)				
$\tau = 28\%$ and $\gamma = 23\%$	2,104	1.03	2,035	0.99
$\left[\frac{1}{(1-\gamma)\cdot(1-\tau)} - 1\right] \cdot \Delta$Cons.	(1,952 2,264)	(0.95 1.10)	(945 4,277)	(0.46 2.08)
D. Change in pre-tax household income				
$\frac{1}{(1-\gamma)\cdot(1-\tau)} \cdot \Delta$Cons.	4,723	2.30	4,568	2.23
	(4,381 5,081)	(2.14 2.48)	(2,121 9,598)	(1.03 4.68)

Notes: This table presents the aggregate implications of consumption through the firm for the year 2018, as discussed in Section (4) and Table (6).

Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records 2016-2019.

C Additional details on the institutional setting

C.1 The program of electronic invoices (e-Fatura)

Implementation. The e-Fatura system is an electronic invoicing software system adopted by the Portuguese government in January 2013 initially designed to fight VAT fraud and decrease the VAT gap. The decree-law 198/2012 requires electronically reporting of invoices to the tax authority, and covers all individuals or legal entities with headquarters, stable establishment, or tax domicile in Portugal. The data generated by e-Fatura covers all business-to-business transactions (VAT listings for Portugal).

In the case of final consumers, the government provides a set of monetary rewards to consumers who request their taxpayer number – henceforth referred as NIF – on each receipt to ensure that firms correctly report final sales transactions to the tax authority. Any person who holds a Portuguese taxpayer number can register final consumption expenditures in e-Fatura and becomes automatically eligible for the monetary rewards of the program. Almost all household expenditures in the national territory appear in e-Fatura, with the exception of housing rents, which have their own electronic invoicing system.

The consumer may request the invoice with a taxpayer number at the time of purchase and provide the cashier with their taxpayer number verbally. Alternatively, they can present a barcode on a physical card, or a QR code from the "e-Fatura mobile app" (see examples in Figure C19). Finally, taxpayers may also register invoices in e-fatura by scanning the QR code printed in each invoice using the "e-Fatura mobile app". Expenditures involving service providing contracts are automatically issued with NIF (e.g., telecommunications, gas, electricity and water supply). Expenditures in retailers where the consumer possesses a loyalty card with her taxpayer number associated, or fees related to the provision of services by the public administration, are also be automatically issued with taxpayer number.

Firms send electronically to the tax authority all the receipts issued in SAF-T format. The tax authority receives the receipts from the firms and establishes a direct communication channel with consumers through an online account for each taxpayer available in its website or through a dedicated "e-Fatura mobile app" (see examples in Figure C20). In the online account, taxpayers that check and verify all their expenditures recorded in e-Fatura, and the monetary rewards accumulated throughout the year.

All in all, e-Fatura is a third-party reporting program originally designed to address the "last mile" problem of self-enforcing mechanism of the VAT through active consumer participation. A well documented example in the economic literature is the Brazilian tax lottery based on electronic invoices (Naritomi, 2019).

Incentives to participate in e-Fatura There are two types of monetary rewards for consumers: income tax rebates and weekly lotteries of public debt. Rewards are increasing in the value of the purchase such that consumers have incentives to ask for invoices with NIF and to make sure that the value of the purchase is reported correctly by the seller.

- **Tax rebates**. For each invoice issued with NIF, consumers can deduct to their income tax liability: (i) 15% of the VAT paid in automobile and motorcycle repair, hotels and restaurants, hairdressers, veterinaries and gymnasiums, and 100% of the VAT paid in subscriptions to public transports; (ii) 35% of general-housing spending (utilities, clothing, retail, combustibles, etc.) up to 500 euros (couples) or 250 euros (singles); (iii) 30% of education related expenditures (up to 800 euros); 15% of human health related expenditures (up to 1,000 euros); 25% of expenditures related to nursing homes (up to 400 euros). Consumers are invited to verify throughout the year the expenditures in the e-Fatura online account and inform the Tax Authority until end of March of the next civil year if they find any discrepancy between the information in the invoice issued to the consumer and the invoice registered electronically. Taxpayers can check in the online account – via website or through the mobile app – the amount of deductions accumulated in each invoice.

- **Lotteries.** Consumers do not need to preregister to participate in the lottery. The system automatically generates a lottery ticket for each 10 euros of expenditure accumulated in e-Fatura by asking the invoice with taxpayer number. Lottery draws are held every week on Thursdays and broadcast on the national television with a lottery prize of 35,000 euros of public debt bonds. There are also two more extraordinary lotteries in June and September with a lottery prize of 50,000 euros of public debt bonds (from April 2014 to December 2015, the lottery prizes were luxury cars instead of public debt bonds). By about 2.12 million euros in lottery prizes are distributed every year. In the online account, consumers can check the total number of lottery tickets accumulated each week and the winning lottery ticket. The Tax Authority notifies the winners by mail and telephone, who then have 90 days to collect the prizes.

Population coverage. Consumer participation increased steadily over time. According to numbers published by the Tax Authority, from December 2014 to December 2018, the number of invoices issued with NIF more than doubled, and the number of consumers that have some sort of expenditure registered in e-Fatura increased by about 30%.[A.1] The expenditure data from e-Fatura covers almost all of the resident population in Portugal. From 2016 to 2019, by about 97%-98% of the resident individuals have some sort of expenditure registered in e-Fatura (Table C6, Column 1). The ratio between the sum of annual household expenditures accounted in e-Fatura and the equivalent aggregate from the National Accounts ranges between 68%-70% (Table C6, Column 3) which compares to a coverage rate of 68.87% from the Household Budget Survey 2015 (Figure C18). Housing rents have a separate system of electronic invoicing and they are the only expenditure item that is not recorded in e-Fatura. Excluding actual or imputed housing rents from the denominator of the National Accounts, the coverage rate of e-Fatura amounts to 79%-81% of the total household consumption expenditures (Table C6, Column 4).

[A.1] *"Relatório de Actividades Desenvolvidas de Combate à Fraude e Evasão Fiscais 2018"*, p. 54-59.

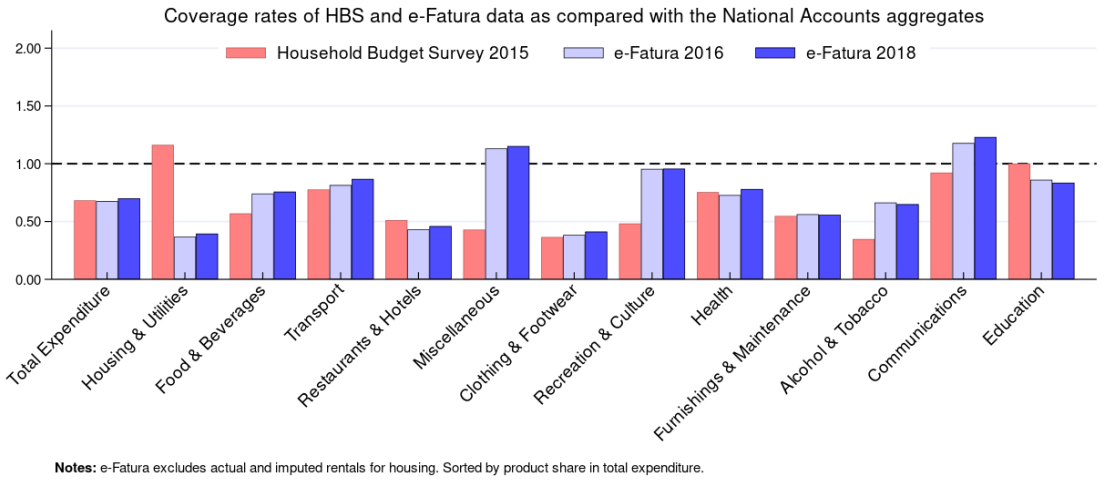
Table C6: Coverage Rates of e-Fatura with respect to the National Accounts, 2016-2019

	(1) Resident Population (all individuals)	(2) Resident Population (only with NIF)	(3) National Accounts (all expenditures)	(4) National Accounts (excl. housing)
2016	94.81%	97.47%	67.64%	79.13%
2017	94.79%	97.67%	68.73%	80.04%
2018	95.23%	97.94%	70.11%	81.50%
2019	97.84%	97.97%	69.58%	80.87%

Notes: This table presents the coverage rates of e-Fatura in terms of resident population and the consumption expenditures of resident households from the National Accounts. Column (1) displays the ratio between the number of distinct consumers that appear at least once in e-Fatura and the resident population of that year. Column (2) displays the same information as Column (1), but considers only the resident individuals that have a NIF. Column (3) displays the ratio between consumption expenditures of resident households recorded in e-Fatura and the total consumption expenditures of resident households from the National Accounts. Column (4) displays the same information as Column (3), but excludes expenditures with actual and imputed housing rents from the National Accounts, as they are not recorded in e-Fatura.

Source: Calculations based on administrative datasets of e-Fatura, and Eurostat (`nama_10_co3_p3`).

Figure C18: Coverage Rates of e-Fatura vs. Household Budget Survey, 2016-2019



Notes: This figure presents the coverage rates of e-Fatura and the Household Budget Survey in terms of consumption expenditures of resident households reported in the National Accounts by type of expenditure. We approximate expenditures in e-Fatura to the classification of individual consumption by purpose (COICOP) using the conversion table of the statistical classification of products by activity (CPA) to COICOP published by Eurostat (CPA-COICOP converter). In the case of expenditures in retail trade (NACE-G), we use the share of sales by product reported in the yearly survey to retail trade firms (IECOM).

Sources: Calculations based on administrative datasets of e-Fatura, Household Budget Survey 2015, Eurostat (`nama_10_co3_p3`) and IECOM 2016-2018 (*IECOM - Inquérito às Empresas de Comércio*).

Figure C19: Examples of devices used to request invoices with taxpayer number in e-Fatura

(a) Physical card with the taxpayer number in a bar code



(b) Mobile app with the taxpayer number in a bar or a QR code

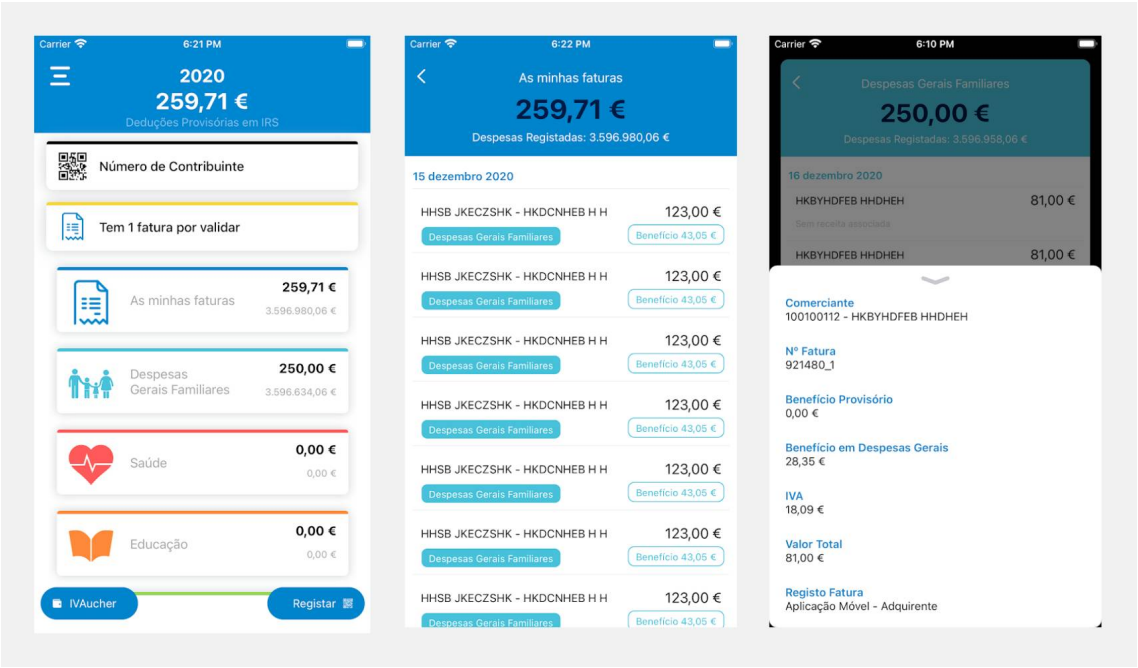


Notes: This figure illustrates possible ways of requesting the taxpayer number for each purchase to ensure that expenditures are recorded in e-Fatura. The consumer can request the invoice with a taxpayer number at the time of purchase and provide the cashier with their taxpayer number verbally. This is the most common situation because the taxpayer number is frequently used as a personal identifier by public services or private companies. Alternatively, individuals may also present a bar code on a physical card (Panel a) or a QR code from the e-Fatura mobile app (Panel b). These can be read by almost all invoicing machines, automatically generating the receipt with the taxpayer number. Finally, individuals may also add the invoice to e-Fatura by scanning the QR code of each invoice with the "e-Fatura mobile app". It is mandatory to print invoices with a QR code that uniquely identifies the invoice.

Sources: The physical card can be printed from the Tax Authority website, while the "e-Fatura" mobile app is available here or here.

Figure C20: Example of e-Fatura online account

(a) "e-Fatura mobile app"



(b) "e-Fatura lottery mobile app"



NOTES: This figure presents two mobile apps through which the Tax Authority establishes a communication channel with taxpayers. Panel (a) presents the "e-Fatura mobile app" in which taxpayers can check their invoices in real time, the amounts accumulated in terms of income tax deductions in each invoice, and the total amount accumulated by type of deduction (e.g., education, health, general expenditures, etc.). Panel (b) presents the "e-Fatura lottery mobile app" in which taxpayers can check the number of lottery tickets they accumulated for each lottery draw, the dates of the lottery draws, the amounts of prizes, and the number of the winning ticket.

SOURCES: The the "e-Fatura mobile app" is available here or here, and the "e-Fatura lottery mobile app" is available here or here.

C.2 Social security regimes: employees vs. business managers

In Portugal, social security contributions to the public social security system are mandatory. There are three main social security regimes: (i) the social security regime of employees (TCO, in Portuguese abbreviation); (ii) the social security regime of the self-employed (TI); and (iii) the social security regime of members of the managing bodies of a company – henceforth the social security regime of Managers (MOE).

The social security regime of the managers differs from the one of the employees in the sense that the relationship with the firm is regulated through a *mandate contract* (instead of a *labor contract*) not subject to the same type of regulations regarding wage setting, severance payments or weekly working hours. The Social Security further specifies that the social security regime of managers covers individuals who perform management functions and are in a position of control of the firm – e.g., owner-managers, manager-partners, directors and/or members of the board of directors – and whose appointment requires notarial certification.[A.2]

In this paper we focus on business managers, but these regulations apply more generally to the managers of legal entities, which include firms (non-financial corporations), but also financial institutions and non-profit institutions serving households. Still, 90% of the managers are managers in the Social Security registries are managers of private firms.

The assignment of individuals to social security regimes is enforced through third-party reporting system involving the Ministry of Justice, the Tax Authority and the Employers. In the case of the managers, the Ministry of Justice communicates to the Social Security the existence of a notarial act appointing someone as manager of a legal entity, and the Social Security automatically assigns the individual to the regime of managers.

Using the data from the Social Security Registries from 2016 to 2019, these rules allow to identify the date at which individuals switch from the social security of employees to the one of the managers. As illustrated in Figure (**??**), in 2019 the number of individuals classified as managers by the social security amounts to 6.5% of the employed population, throughout the year 2019, by about 0.2% of the employees switched to managers. These orders of magnitude remain fairly the same in the period 2016-2019.

[A.2] The Ministry of Justice makes publicly available the dates of appointment, names and taxpayer numbers of the members of managing bodies of the universe of legal entities incorporated in the country at https://publicacoes.mj.pt/.

C.3 Personal Income Tax [in progress]

C.4 Corporate Income Tax [in progress]

D Additional details on data [in progress]

D.1 Individual and household-level data

D.1.1 Panel of social security records

D.1.2 Panel of consumption expenditures from electronic invoices (e-Fatura)

D.1.3 Panel of income tax returns (IRS)

D.1.4 Description of the main variables used

D.2 Firm-level data

D.2.1 Panel of business expenditures

D.2.2 Panel of company accounts data (IES)

D.2.3 Construction of the estimation sample

The construction of the estimation sample involved merges of the administrative sources described previously, both at the individual-level and at the entity-level. It can be summarized in five steps: (i) We start by identifying the subset of individuals who switch from employee to manager in the Social Security registries in each of the 48 months from 2016-2019. The individuals with multiple switches are excluded; (ii) Then, we merge the sample of the switchers with income tax returns in order to identify the members of the household, and obtain the annual household taxable income. We exclude the households in which both members of the couple switch from employee to manager, or whose household composition changes in the estimation period – e.g., births, marriages, divorces, etc. – because such changes can significantly impact the evolution of household expenditures. (iii) Next, we merge switchers and household members with *e-Fatura* in order to trace monthly expenditures before and after the month at which individuals switch from employee to manager. (v) Finally, we conduct some additional validations at entity-level. We consider only the individuals who became managers of active firms according to National Statistics Agency.

The merged dataset is presented in Table (1). It consists of a panel with 2.9 million observations that results from the merging of 71,480 individuals (7,000-8,000 switchers every year plus their household members) with the monthly expenditure data from *e-Fatura*. By about 3/4 of the individuals – and their household members – stay 48 months in the panel, and between 82%-83% of the observations in the middle of the panel stay at least twelve months as employees (*before* the event) and twelve months as managers (*after* the event).