# The Firm as Tax Shelter

## Micro Evidence and Aggregate Implications of Consumption Through the Firm

David Leite *

Paris School of Economics

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We 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") we 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 that lie on the border between business and final consumption, but spread among business managers all over the income distribution. Our results suggest that government revenue losses due to consumption through the firm amount to 1% of the GDP. Reallocating tax savings and personal expenditures hidden within firms to reported household income of business managers increases the Gini by one percentage point, and the top 1% income share by half 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 Bld. Jourdan, Paris 75014, France. I am extremely grateful to my advisor Antoine Bozio for his guidance and encouragement on this project. I to thank to Annette Aldsaeter, Miguel Almunia, Laurent Bach, Wojtek Kopczuk, Francisco Lima, Thomas Piketty, Francisco Queiró, Pedro Raposo, and Gabriel Zucman for helpful comments, as well as seminar participants of the 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 to Statistics Portugal for providing their support in novel data access and construction. The data we use is part of Statistics Portugal's project of making 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 non-taxation 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 to avoid the main taxes of modern tax systems, regardless of differences in tax rates between labor and capital, and irrespective of how broad are designed the tax bases. In addition, it does not require sophistication and its hard to audit due to 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 blurb the measurement of final consumption of households and intermediate consumption of fims and, and therefore, result in undervaluation of GDP. However, despite its 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. We 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 its impacts on government revenue loss and inequality.

We take advantage of two unique institutional features in Portugal. First, an electronic invoicing software system adopted by the Portuguese government to fight VAT tax fraud called "e-Fatura". The data generated by e-Fatura covers the universe of business-to-business transactions, and has a large coverage of final consumption expenditures because the government provides a set of incentives to consumers who ask for invoice with their taxpayer number at the moment of the purchase. The second feature of our setting is the existence of two distinct, but mandatory, social security regimes: one for the employees and another for the individuals who control firms, typically business owner-managers. Therefore, from the Social security records, we can observe the month and the year at which individuals switch from being employees to business managers.

Our empirical approach exploits the variation in the flexibility to treat some forms of personal consumption as business expenditures that goes along with the transition from employee to business manager, controlling for the evolution of income and changes in household structure. In particular, we use linked data between electronic invoices and social security records to follow the final consumption of "switchers" – and their household members – in the periods before and after the transition to business manager. As individuals might switch in any period from January 2016 to December 2019, we exploit the panel nature of our dataset using a differences-in-differences estimator with multiple time periods, and using individuals who switch in later periods as a comparison group for those who switch in earlier periods.

We show that reported consumption expenditure of switchers drops 19% one month after switching. In the case of couples, expenditure of the spouses drop 7%, although spouses are selected such that they do not change status throughout the estimation period. One year later, business managers report less 36% expenditures as compared to the period when they used to work as employees, while their spouses report less 12% expenditures. Combined household expenditure drops 31%. We show that these effects are driven by owner-managers in small closely-held firms.

We interpret the drop in consumption expenditures as the counterpart of the portion of personal expenditures that are 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 recover to their pre-switching level one year later, while reported household consumption remains 31% below its pre-switching level. We allocate retained earnings within the firm to household taxable income for the 75% of switchers who are owner-managers: using this comprehensive measure of "owner income", it increases 4.4% in the switching year. Moreover, we show that *the decline in reported consumption is entirely driven by borderline expenditures, while hard-to-shift expenditures do not react*. Empirically, we find that the most responsive categories are expenditures in wholesale and retail trade – e.g., supermarkets, clothing, fuel – followed closely by expenditures in hotels and restaurants and to a lesser extent, expenditures in accounting and legal services. In contrast, we find that expenditures with housing utilities, expenditures in the private sector with non-essential healthcare services, and private education services, do not react.

To a lesser extent, we show that spouses also decrease purchases in borderline expenditure categories, leaving unaffected purchases in "hard-to-shift" categories.

The practical importance of consumption through the firm depends, ultimately, of 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 compared to other margins of tax evasion. However, we find that *consumption through the firm is spread all over the income distribution*. We estimate that the proportion of consumption expenditures shifted to the firm varies between 20% to 30% among switchers at the top quintile of the income distribution. At 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 towards the top of the income distribution.

We are also interested in understanding how personal consumption motives affect the pattern of business expenditures. Hence, in a second empirical exercise, we use the population of owner-managers to estimate how firm monthly expenditures react to birthdays of the owner-manager and her spouse. We find that business expenditures in hotels and restaurants significantly increase 9.8% at the birthday month of the owner-manager, and 6.1% at the birthday month of the owner-manager's spouse (only owner-managers for which the spouse does not work in the same firm are selected). Only expenditures in hotels and restaurants react to the birthdays, while we do not find evidence of changes in the pattern of business expenditures around birthday of employees. We interpret these results as additional evidence of consumption through the firm, but from the angle of business expenditures on the population of owner-managers.

We find that government revenue loss in personal income tax (PIT) and value-added tax (VAT) due to consumption through the firm amounts to approximately 1% of the GDP. To access the redistributive impacts of consumption through the firm, we use the micro estimates to allocate to reported household income the share of personal consumption "hidden" within the firm plus the tax savings on PIT and VAT. We find that Gini coefficient increases approximately one percentage point, while the top 1% income share increases by half percentage point. These unequal impacts result from the fact that business managers concentrate towards the top of the income distribution.

**Related literature.** Our work contributes to the literature in three main ways. First, we present the first estimates of consumption through the firm, which has been suggested as a payout strategy of individuals who control firms, but without direct empirical evidence (Bach *et al.*, 2019; Kopczuk and Zwick, 2020; Alstadsæter *et al.*, 2014; Clotfelter, 1983).[1] Secondly, our analysis shows that the magnitude of government revenue loss due to consumption through the firm is large, even if compared to other margins of tax evasion documented in the literature, as cross-border tax evasion by individuals (Zucman, 2017). Third, our 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 the label on business income that minimizes taxes at payout (labor vs. capital income), and the use of firms as a tax-free saving vehicles through strategic earnings retention. We contribute to this literature by highlighting the role of firms as tax-free consumption vehicles.

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

**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 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.

[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 private consumption, specifically: "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 the *"Liberation"* reported that the ex-CEO of Nissan-Renault, Carlos Ghosn, used the company's money to pay both his own and his wife's birthday parties (link). Also, 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, which ranged from private jets, hotels, massages to birthday parties of family members (link).

# 2 Background and Data

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

## 2.1 Consumption through the firm: tax system and incentives

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

Conceptually, the Portuguese law follows the international standards in the tax treatment of business expenditures, defining them as *"(...) necessary expenditures incurred with a view to obtaining or securing income"*.[2] But a persistent problem in administering the law – 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 travels, hotels, restaurants, etc.) which invites abuses 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]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"*.

## 2.2 Electronic invoices and transitions to business manager

Consumption through the firm is hard to measure: it is a payout does not appear to have been paid in firm administrative data, and it is usually not possible to observe the nature of the goods purchased in order to infer which part of business expenditures are in fact enjoyed as final consumption. To estimate the amount of personal expenditures shifted to firms, we take advantage of two institutional features in Portugal. First, a system of electronic invoices called "e-Fatura", and second, the existence of distinct, but mandatory, social security regimes: one for employees, and another one 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. 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. In the case of final consumers, the government provides a set of incentives to those who ask for invoice with their taxpayer number at the moment of the purchase.[3] The data generated by e-Fatura covers between 70% to 75% of the net-of-VAT consumption of the national accounts. Almost all goods and services are included in e-Fatura, with the notable exception of housing rents issued by individual landlords. Durable goods such as cars, mobile phones, computers, etc., are included, but it is not possible to separate purchases of durable and non-durable goods because we do not have access to itemized invoices that specify the nature of the goods. In our data, individual monthly expenditures are aggregated by the seller's taxpayer number, so we proxy types of expenditure by economic activity of the seller. Online Appendix (C.1) provides additional details on the data generated by the e-Fatura system.

[3]The incentives to final consumers are weekly lotteries of public debt, and deductions on income tax, up to a limit, of expenditures on health, education, nursing homes and general-household spending. The government also rebates 15% of the VAT on expenditures in public transportation passes, hotels and restaurants, hairdressers, and car repair. In addition, the invoices of expenditures involving service providing contracts (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.

**Social security records.** In our setting there are two distinct, but mandatory, social security regimes: one for the employees and another one for individuals who control firms, typically owner-managers. The decree-law 122/2009 requires commercial registry services to report to social security the members of the governing body of firms, which are automatically enrolled in the social security regime of managers. For example, someone who creates a firm becomes enrolled in the regime of mangers since the day of business registration. The pool of individuals in the social security of managers represents 6.5% of the employed population, each firm has an average of 1.15 business managers. The typical individual in the social security regime of managers is an owner-manager of a closely-held non-financial corporation, with less than 10 workers, operating in the activity sectors of retail, consultancy, hotels and restaurants, construction, and manufacturing; a mirror of the firm's size and industry composition of the economy. The typical manager is richer than the average, and tends to concentrate towards the top of the income distribution. Appendix (C.2) describes thoroughly the 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

Our event-studies use two datasets constructed from de-identified administrative data from electronic invoices (e-Fatura) between January 2016 to December 2019. The first dataset is a panel of monthly consumption expenditures of individuals who switch from employee to business manager. The second dataset is a panel of monthly business expenditures of owner-managers. We supplement this information with administrative data from the social security records, the annual personal income tax declaration (IRS) and the panel of company accounts data (IES). The datasets were accessed via safe center of Statistics Portugal and all the data work was done in its servers. Online Appendix (D) provides further details on the construction of the analysis datasets and a in-debt description of the data sources. We provide below a description of two datasets used in the analysis.

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

The switchers are richer than the average and tend to concentrate towards 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 same firm where they used to work as employees. By about 58% used to work as employees in firms with less than ten workers, and 96% become business managers of firms with less than ten workers. 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, we use data from social security records to identify firm owner-managers between January 2017 to December 2019. Second, we link owner-managers to their annual personal income tax declaration (IRS) in order to identify spouses, demographic characteristics (dates of birth, gender, etc.) and taxable income. Third, we link this information with the firm monthly expenditures reported in electronic invoices (e-Fatura). We exclude firms whose owner-manager's spouse work in the same firm, either as manager or as employee. In addition, we exclude firms classified as in-

active 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 firms stay 12 months in the panel. Table (3) describes the monthly panel for 2017, 2018 and 2019, and provides summary statistics. The typical firm is a small firm (93% have less than 10 workers), with a single owner-manager (average 1.15 owner-managers per firm), a value of assets around 500-600K euros, sales between 245-250K euros per year, profits between 10-9K euros per year, and business expenditures between 14-15K euros per month.

# 3 Consumption through the firm: micro evidence

## 3.1 Personal expenditures after switching to business manager

Our goal is to estimate how much personal expenditures are shifted to the firm. We estimate how monthly personal expenditures evolve after an individual's choice to switch from employee to 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 $C_{it}$ are log monthly personal expenditures reported in electronic invoices (e-Fatura) by the switcher, 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; $\delta_k$ are the coefficients of interest on the event time indicators. The analysis dataset corresponds to the panel of monthly consumption expenditures of switchers described in Section (2.3). It includes monthly expenditures of 71,480 individuals, among those 29,677 switchers plus household members, and 2,882,402 person-month observations between January 2016 to December 2019. Tables (1)-(2) provide descriptives.

In Figure (1) we plot raw averages of monthly personal expenditures centered around the event time. This figure displays an abrupt decline in average personal expenditures upon switching. It also shows that average expenditure of cohorts who switch in later periods evolve in parallel with those cohorts who switch in earlier periods.

To account for heterogeneity in treatment timing, we estimate the event-study using the estimator by Callaway and Sant'Anna (2020). In particular, we implement the inverse-probability weighted estimator with event-study-type parameters $\delta_k$ aggregated by relative

time. Standard-errors are computed using a multiplier bootstrap procedure. Appendix Figure (A4) plots estimates using the estimators of De Chaisemartin and D'Haultfoeuille (2020) and Borusyak *et al.* (2021). The results are invariant to the specification choice.

Our estimates suggest that a substantial share of personal expenditures are shifted to firms, and would have been reported as household final consumption if individuals did not switch to 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 spouse. The reported personal expenditure of switchers drops 19% in the first month after switching. In the case of couple households, personal expenditure of the spouses drops 7% – recall that spouses do not change status during the estimation period – while combined household expenditure drops 17% in the first month after switching. To transform these event-studies into a post-switch estimate, we define $\bar{\delta}$ to be the average of $\delta_k$ for the post period $k \in \{9, 10, 11, 12\}$.[4] We estimate the average drops to be: 36% for switchers, 12% for spouses, and 31% for household expenditures.

We attribute the drop in reported consumption expenditures to the flexibility to treat some forms of personal consumption as firm expenditures, rather than responses to an income shock. This 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, expenditures of spouses also decline, even in 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) shows the lack of reaction of household spending in non-essential health and education services provided by the private sector (dentists, therapists, tutors, sports and cultural activities), and housing utilities (water, electricity, gas, and air conditioning), expenditures that are unambiguously final consumption and could hardly be shifted to the firm.[5]

[4] We chose these post periods because the expenditure gap deepens until period $k = 9$ and flatten-out thereafter, hence including the all the periods upon switching would bias downwards the average effect.

[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 in total household expenditures reported in e-Fatura. The composition of expenditures in retail trade suggests that the decline

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

Reported incomes subject to personal taxes are usually not an accurate measure of true owner-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, we construct a more comprehensive measure income: we focus on the 75% switchers of our sample that are owner-managers, and we allocate retained earnings to household taxable income subject to personal taxes. Figure (6b) plots 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% upon switching, following the trend of reported household taxable income before the switch.[7]

## 3.2 Firm size, ownership and industry

To estimate heterogeneous effects by firm characteristics we divide switchers and spouses into groups based on firm size, firm ownership and firm industry. In the case of firm size, we partition firms based on number of workers, and we define three groups: less than 10 workers (small), between 10 to 50 workers (medium), and more than 50 workers

is mostly driven by expenditures in non-specialized stores (supermarkets), followed by expenditures in specialized stores of clothing and shoes, household equipment, food and beverages, fuel and car repair. Expenditures in information and communication comprise mostly expenditures in mobile phone contracts, internet, television and other telecommunication services. Non-essential health expenditures comprise mostly non-urgent medical services provided by the private sector, namely dental practice activities and therapists (expenditures in pharmacies are recorded in retail trade). In our setting, health and education services could be view as non-essential 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) present the distribution of the pool of managers by percentile of taxable income distribution, showing that managers of non-financial corporations bunch around 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 our approach to allocate retained earnings from company accounts data (IES) to taxable income from personal income tax (IRS) among the switchers that we identify as owner-managers. The divergence between personal income and owner-pay suggests that firms are likely to be used as tax-free saving vehicles, which is common across countries and documented in Smith *et al.* (2021) and Miller *et al.* (2020).

(large). Business managers in small, medium and large firms account for 83%, 8% and 7% of the total of individuals enrolled in the social security of managers, respectively. Appendix Figures (A5)-(A7) report the estimates by firm size for switcher, her spouse and total household expenditures. Appendix Figure (A8) and Figure (A9) report estimates by ownership and industry, respectively.

Scope for consumption through the firm is greater among small closely-held firms, but almost uniform across industries. Reported household expenditures drop approximately 34% for switchers in firms with less than 10 workers vs. 12% for switchers in firms with 10 to 50 workers. The discrepancy between effect sizes increases when we divide the groups by firm ownership: reported household expenditures of switchers who are owner-managers drop 38% vs. 15% for non-owners. On the other hand, consumption expenditures of individuals who switch to business managers of large firms do not react. Our results also show that only the personal expenditures of spouses of switchers in small and closely-held firms decline, while spouses of switchers in medium and large firms and spouses of non-owner switchers do not decline upon switching.

## 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 compared to other margins of tax evasion that require higher levels of sophistication. To understand whether consumption through the firm is circumvented to "poor business managers" or a widespread phenomenon, we 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 all over the income distribution. The proportion of household expenditures shifted to the firm varies between 20% to 30% among switchers at the top quintile of the income distribution. At the top 1% – i.e., switchers who earn approximately 173K euros – household expenditures drop 17.9% after 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 when we move towards the top of the income distribution. However, we should bear in mind that switchers – as well as the population of business managers – are concentrated

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

towards the top of the income distribution, which magnifies the final effect on consumption through the firm, even though the magnitude of the coefficients at the top of the income distribution is smaller than the ones estimated at the middle of the distribution.[9]

The fact that consumption through the firm is a widespread phenomenon has important implications to tap micro estimates to aggregate quantities, in particular to estimate the amount of government revenue loss due to consumption through the firm and its distributional implications. We will come back to this in Section (4).

## 3.4 Business expenditures and life events

In this section, we estimate how much personal consumption motives affect the pattern of business expenditures. Specifically, we estimate how monthly business expenditures react to life events of the business owner-manager, or her spouse, with the 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 $F_{it}$ are 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; $\beta_k$ are 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). In 2019, the panel includes 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.

Our results suggest that variations in personal consumption motives of owner-managers, such as birthdays, significantly impact the pattern of "borderline" business expenditures, particularly in hotels and restaurants. While business expenditures in 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, we estimate how monthly business expenditures in hotels and restaurants evolves around the birthday month of the owner-manager and the owner-manager's spouse.

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

Figure (8) plots raw averages of monthly business expenditures in hotels and restaurants around birthday months. There is peak around the birthday month of the owner-manager and her spouse (spouses who work in the same firm are not included). We do the same exercise around the birthday-month of a randomly selected employee in the same firm, but we do not observe such an increase in hotels and restaurants. As in Section (3.1), we estimate the event-study using Callaway and Sant'Anna (2020).

Figure (9) shows that business expenditures in hotels and restaurants significantly increase 9.8% in the birthday-month of the owner-manager 6.1% in the birthday-month of her spouse, while they do not react to the birthdays of employees of the same firm, or their spouses.[10] Figure (10) displays estimates for all business expenditure categories, and confirms that the increase in firm expenditures in 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 micro estimates to aggregate quantities, we depart from household consumption expenditures reported in electronic invoices by business manager households described in Table (4) and Table (5). 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 ($\delta$). Hence, for each household $j$, we 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, we also use the shifting parameters by income percentile, $\hat{\delta}_p$, estimated in Appendix Figure (A11). For instance, for the average consumption expenditure of business manager households in 2019, our adjustment adds to 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).

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

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

**Government revenue loss in PIT and VAT.** Consumption through the firm prevents money from being taxed as a distribution. We start by assuming that business incomes are distributed in the form of dividends and taxed at a flat dividend rate of $\tau$. In this scenario, government revenue losses in personal income taxes (PIT) are given by $\tau/(1-\tau)\cdot\Delta$Cons., where $\Delta$Cons denotes the amount of final consumption "hidden" within the firm. Taking the values of $\Delta$Cons 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 the GDP in 2019 (0.48% using 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 $[1/(1-\tau)(1-\gamma)-1]\times\Delta$Cons. Taking 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 the GDP in 2019. We obtain similar orders of magnitude considering the estimates by income percentile and in the remaining years.

Government revenue losses of 1% of the GDP due to consumption through the firm might seem large, especially in comparison to other strategies of tax evasion.[12] Still, we believe that our estimate is a lower bound of the amount of government revenue losses. In our calculations, we assume that business income is paid in the form of dividends subject to 28% tax rate, however 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%)

[11] Estimates for the previous years are in line with magnitudes, as reported in Appendix Tables (B5)-(B5)

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

and social security contributions (with a contribution rate of 23.75% for the employee and 11% for the employer). The second reason, and probably more important, is the fact this estimate of government revenue loss does not take into account tax savings on corporate income tax that arise from inflating the firm's deductible costs 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, we allocate to the reported taxable income the amount of personal consumption "hidden" in firms gross of PIT and VAT, i.e., $\Delta\text{Cons}\left[1/(1-\gamma)(1-\delta)\right]$. The amount can be obtained 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 the GDP). How this amount of (untaxed) income changes the population's income distribution? To answer this question, we 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, we add back this amount to reported taxable income of business manager households, obtaining an adjusted income distribution.

Our results suggest that adjusting the income distribution by allocating the equivalent amount of income that would allow to consume the same amount outside the firm has important consequences at the top of the income distribution, increasing horizontal inequity. Both Gini coefficient and top income shares significantly increase, as displayed in Figure (11) and Table (7). In 2019, adjusting the distribution increases the Gini of taxable income from 0.4698 to 0.4822, while top 1% income share increases by about half 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 the average and tend to concentrate towards the top of the income distribution; (ii) consumption through the firm is widespread thought the income distribution.[14]

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

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

# 5 Conclusion

This paper combines monthly consumption expenditures from electronic invoices in Portugal with information on transitions from employee to business manager 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, we estimate that business managers shift by about 36% of their consumption expenditures to the firm and 31% of combined household expenditures. The shift is driven by expenditures that lie on the border between business and personal consumption (e.g., retail trade, hotels and restaurants, etc.), while "hard-to-shift" expenditures do not react (e.g., non-essential health services, private education, etc.). Scope for consumption through the firm is greater among small closely-held firms, which comprise more than 80% of the firms in the economy. With firm data, we confirm that the pattern of business expenditures is affected by personal consumption motives. Business expenditures on hotels and restaurants increase 9.8% at the birthday month of the owner-manager and 6.1% at the birthday month of the owner-manager's spouse (which does not work in the firm).

Consumption through the firm is widespread throughout the income distribution, which has strong implications. We find that government revenue loss in personal income taxes (PIT) and VAT due to consumption through the firm amounts to approximately 1% of the GDP. Allocating 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 top 1% income share increases by half percentage point.

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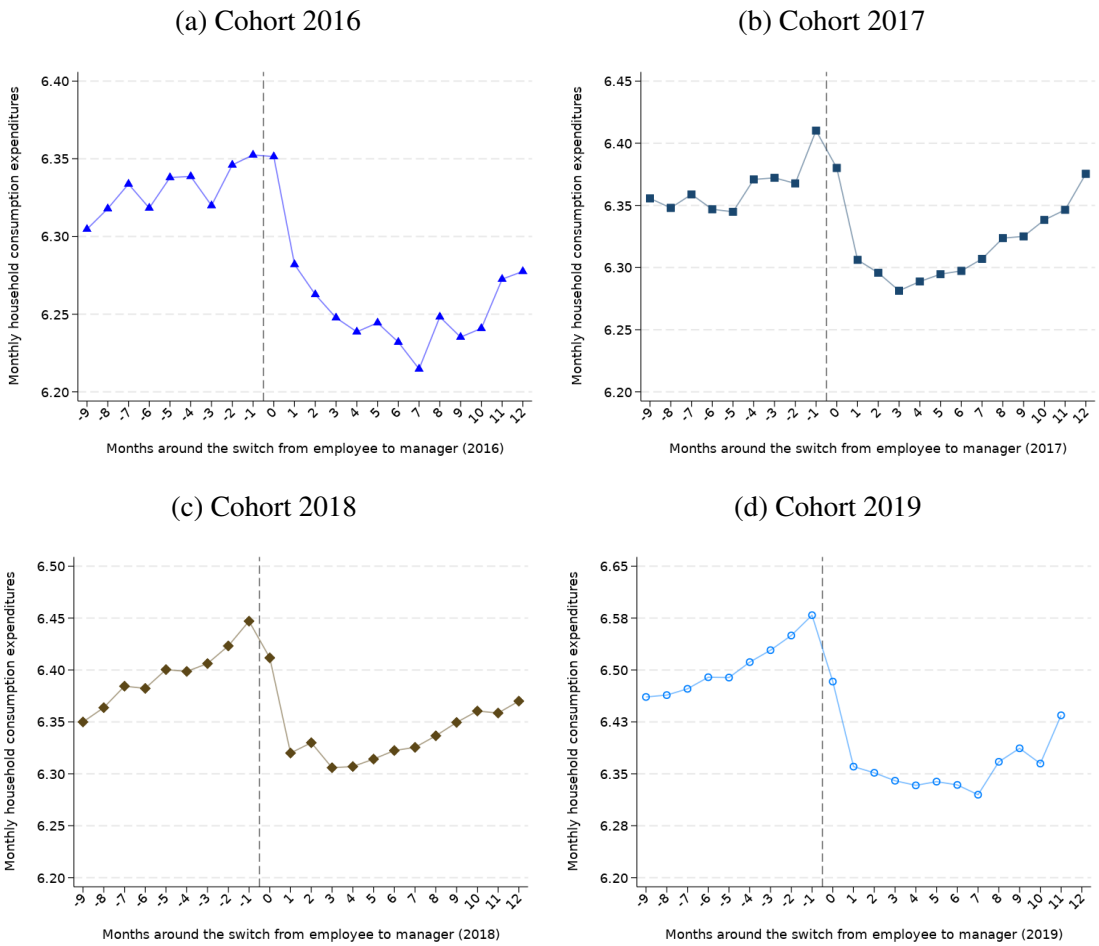
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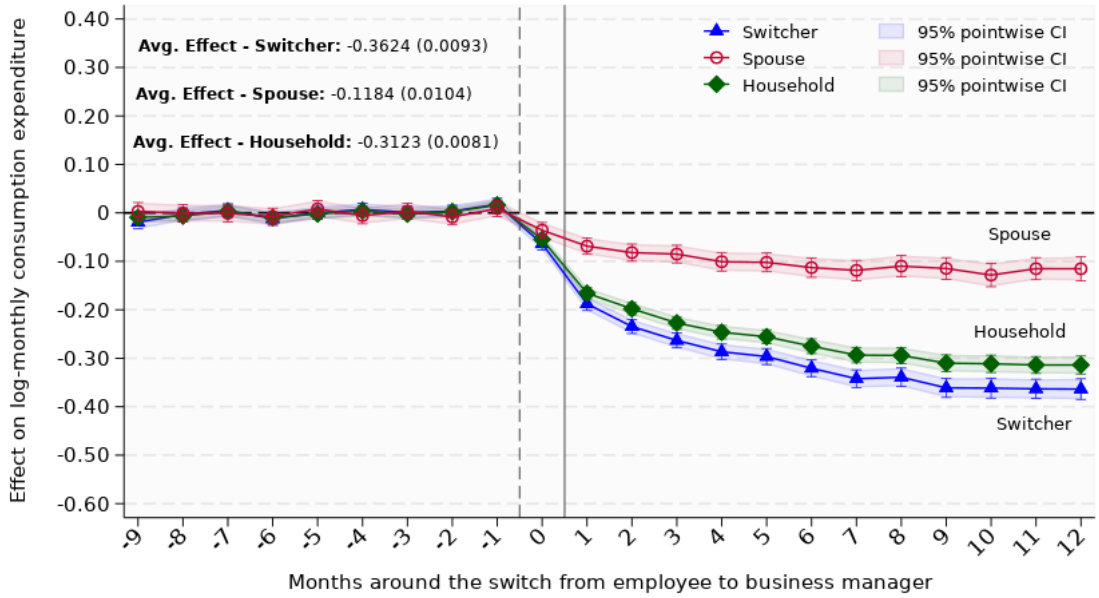
Figure 1: Raw averages of monthly personal expenditures of switchers centered around the month at which individuals switch from employee to business manager




Notes: This figure displays average monthly personal expenditures reported in electronic invoices (e-Fatura) centered around the month at which individuals switch from employee to business manager. There is an abrupt decline in average personal expenditures upon switching. Average expenditure of cohorts who switch in later periods evolve in parallel with the average expenditure of cohorts who switch in earlier periods. Panels (a), (b), (c) and (d) depict the average consumption for the individuals who switch during the years of 2016, 2017, 2018 and 2019, respectively. Section (2.3) describes the construction of the dataset, and Table (1) and Table (2) provides 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 switching from employee to business manager

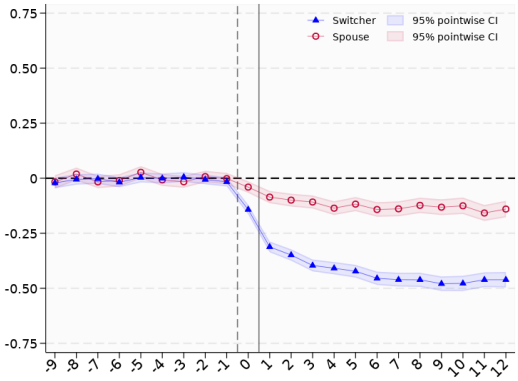



Notes: This figure displays the estimates of the effects on reported monthly personal consumption expenditures of switchers. We present separate estimates for total household expenditure, personal expenditure of the switcher, and personal expenditure of the spouse. The post-switch estimate of personal 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 estimator by Callaway and Sant'Anna (2020) as described in Section (3.1). Appendix Figure (A4) displays alternative results using the estimators by De Chaisemartin and D'Haultfoeuille (2020) and Borusyak *et al.* (2021). The estimates suggest that a substantial share of personal expenditures are shifted to firms, and would have been reported as final consumption if individuals did not switched to business managers. Personal expenditures of switchers drop 19% in the first month upon switching. For couple households, personal expenditures of spouses drop 7% in the first month upon switching (spouses do not change status in the estimation period). Combined household expenditures drop 17% in a month. On average, personal expenditures drop 36% for switchers, 12% for spouses and 31% for combined household expenditures.

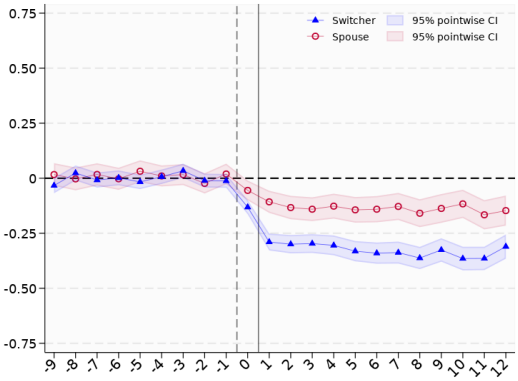
Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

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

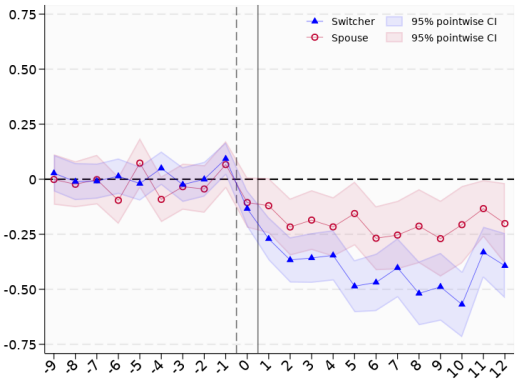
(a) Wholesale & retail trade; car repair



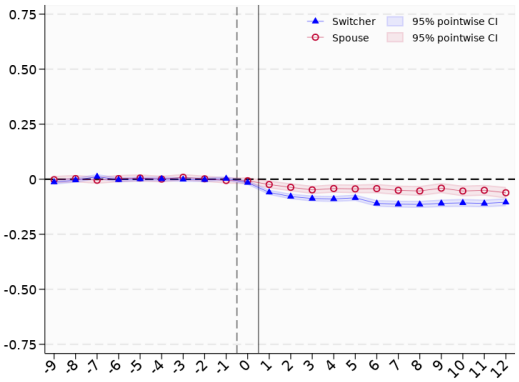

(b) Hotels & restaurants




(c) Technical activities




(d) Information & communication

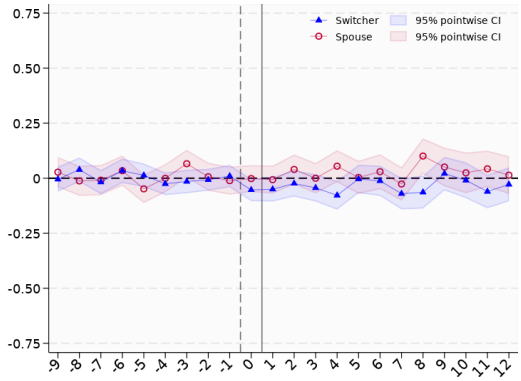



Notes: This figure displays the effects on reported monthly personal consumption expenditures of switchers and spouses by expenditure category (we do not observe products, but we proxy expenditure categories by the industry NACE code of the seller). The sample is the panel of monthly consumption expenditures of switchers from 2016-2019 described in Section (2.3). Tables (1)-(2) provide summary statistics. The estimates were obtained using the estimator by Callaway and Sant'Anna (2020) as described in Section (3.1). There is an immediate decline upon switching in the 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 the 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 mostly driven by expenditures in non-specialized stores (supermarkets), followed by expenditures in specialized stores of 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 the services of layers, accountants and tax advisors), and information and communication (Panel D, NACE code J, comprising mostly expenditures with mobile phone contracts, internet, television and other telecommunication services). It is worth noting that personal expenditures of spouses also decline, even in the kind of expenditures that do not involve couple coordination in leisure time, as technical activities, retail trade or telecommunications.

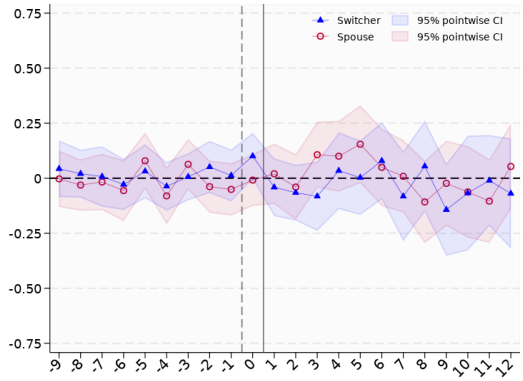
Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

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

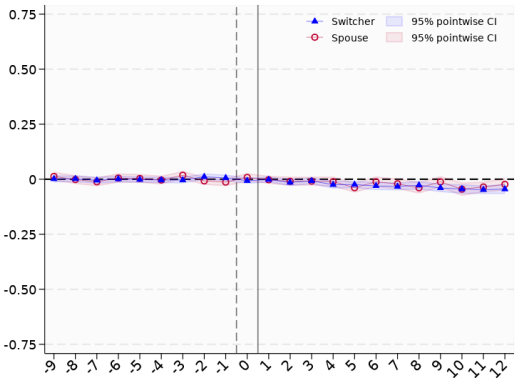
(a) Non-essential health services



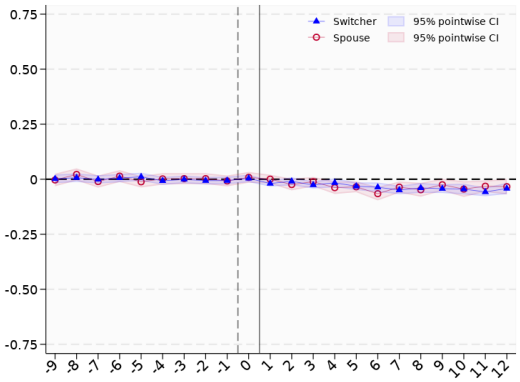

(b) Private education




(c) Water distribution




(d) Electricity, gas & air conditioning

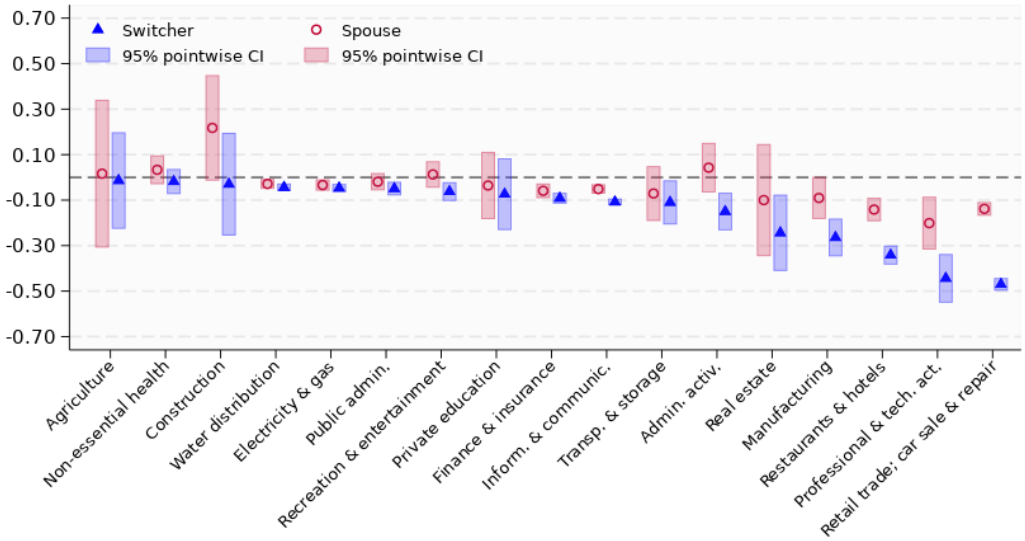



Notes: This figure displays the effects on reported monthly personal consumption expenditures of switchers and spouses by expenditure category (we do not observe products, but we proxy expenditure categories by the industry NACE code of the seller). The sample is the panel of monthly consumption expenditures of switchers from 2016-2019 described in Section (2.3). Tables (1)-(2) provide summary statistics. The estimates were obtained using the estimator by Callaway and Sant'Anna (2020) as described in Section (3.1). This figure illustrates the lack of reaction of "hard-to-shift" expenditures, i.e., consumption expenditures that are unambiguously final consumption and could hardly be shifted to the firm in the form of business expenditures. In particular, non-essential health services (Panel A, which corresponds to sellers with a NACE code Q), which comprise mostly non-urgent medical services provided by the private sector, namely dental practice activities and therapists (expenditures in pharmacies are recorded in retail trade). And also, private education (Panel B, NACE code P), which comprises education services provided by the private sector, namely private tutors, sports and cultural activities. Expenditures in non-essential health and private education account for approximately 10% of total consumption expenditure in e-Fatura (Appendix Figure A1). However, they could be viewed as non-essential expenditures because access to health and education in Portugal is granted to every resident individual and funded by taxes and social security contributions. Finally, housing 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.

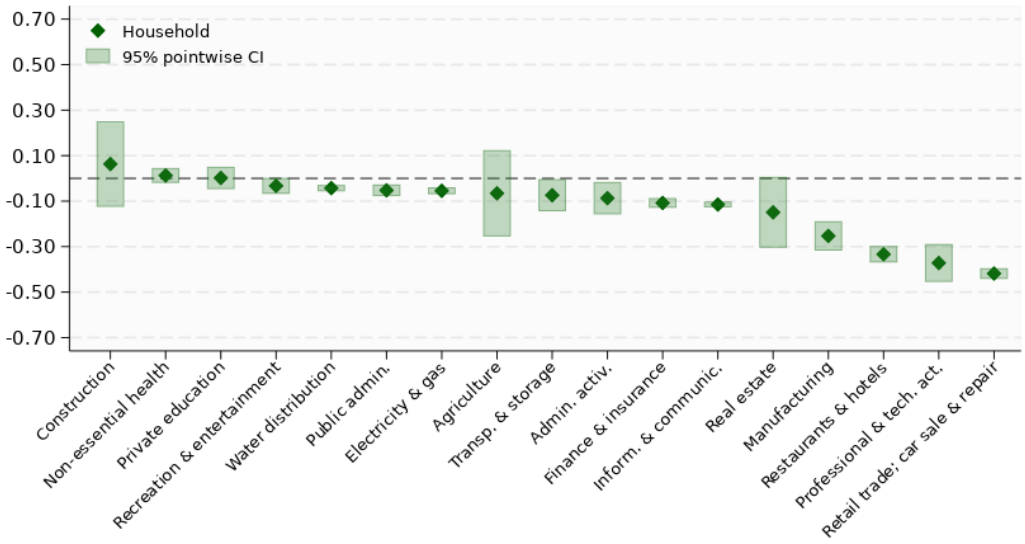
Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

Figure 5: Average effects by all categories of consumption expenditure

(a) Switcher and spouse




(b) Household

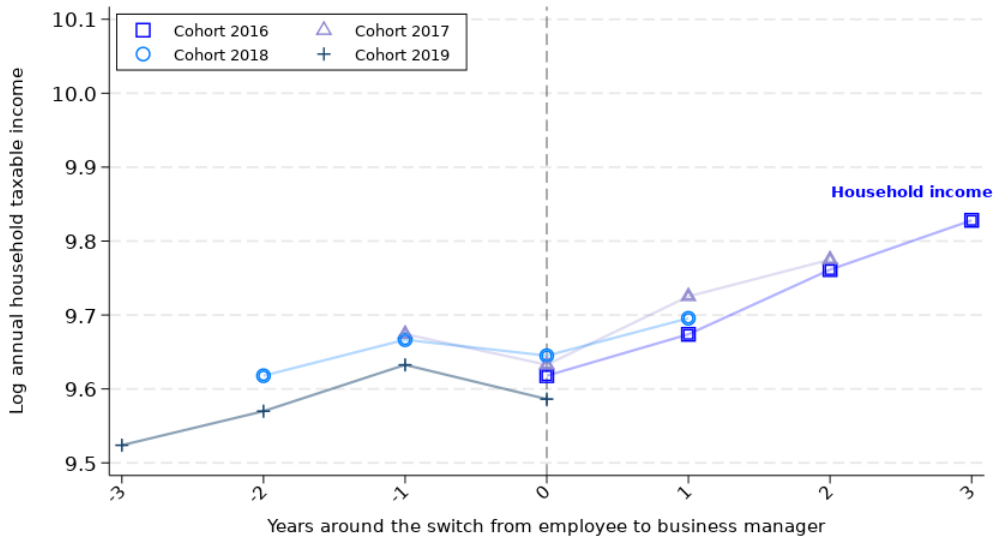



Notes: This figure plots the average effects on reported personal consumption expenditures of switchers, spouses and household expenditures, for all expenditure categories. The sample and estimation method are the same as described in Figures (2)-(4). Expenditures that lie on the business-consumption borderline strongly react upon switching from employee to business manager, while hard-to-shift expenditures do not react. Household expenditures in retail trade (supermakets, fuel, car repair and sale of cars) drop on average 42%, while expenditures in hotels and restaurants drop on average 33%. The average effect on expenditures in non-essential health or private education is not significantly different from zero.

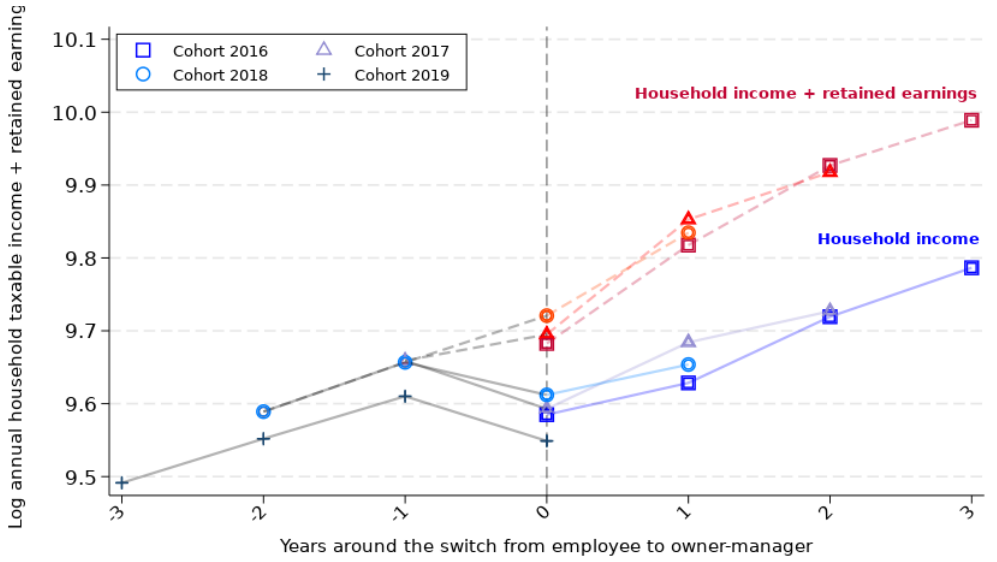
Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

Figure 6: Average household taxable income and firm retained earnings around the year of switching from employee to 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)

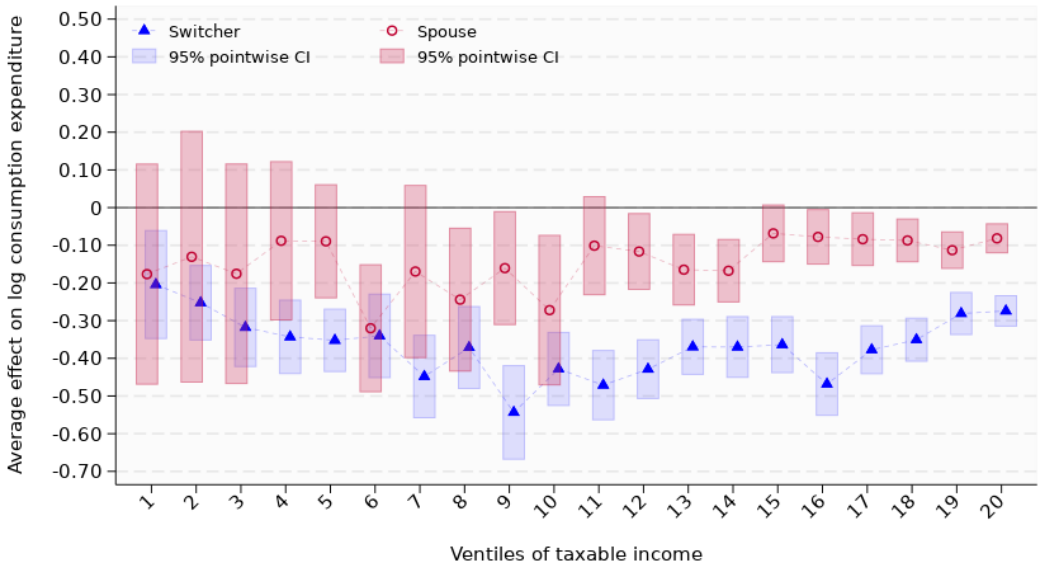



Notes: This figure displays the evolution of household income subject to personal income taxes (PIT) and firm retained earnings around the switching year for the panel of switchers from 2016-2019 described in Tables (1)-(2), merged with company accounts data (IES). Panel (a) displays the evolution of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

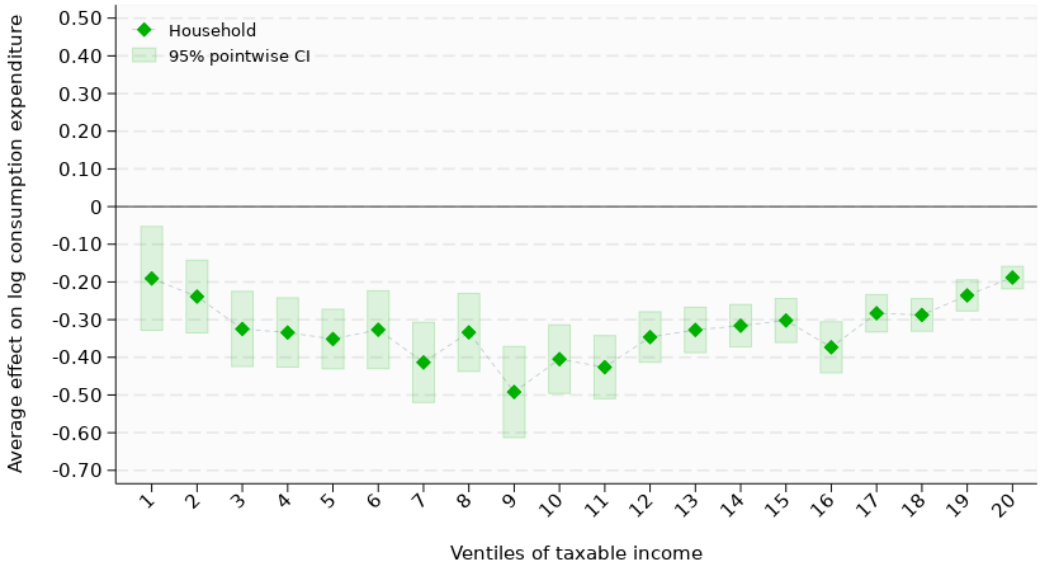
Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

Figure 7: Effects by ventile of household taxable income

(a) Switcher and spouse



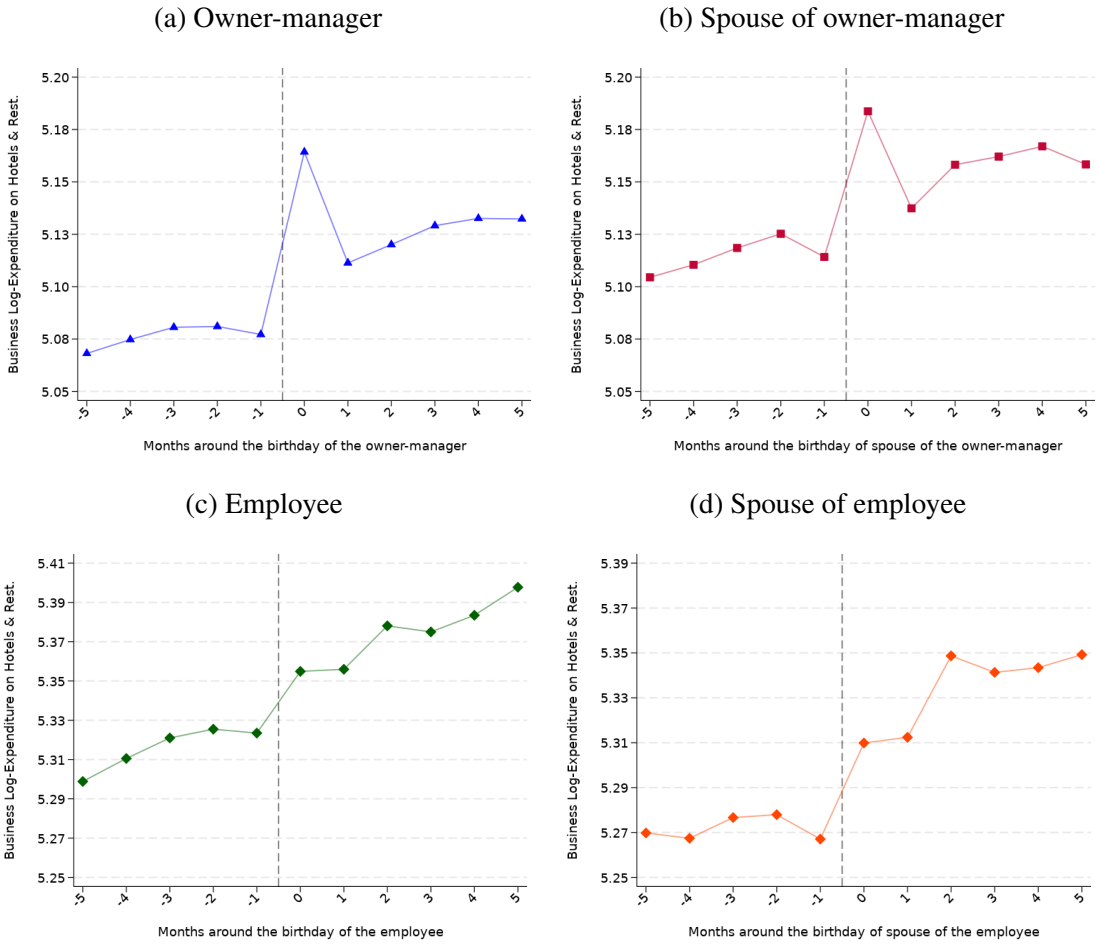

(b) Household




Notes: This figure displays the average effects on reported personal consumption expenditures of switchers, spouses and combined household expenditure by ventile of household taxable income. The sample and estimation method are the same as described in Figures (2)-(4). This figure shows that consumption through the firm is spread all over the income distribution and driven by taxpayers at the top half of the income distribution. The proportion of household expenditures shifted to the firm varies between 20% to 30% among switchers at the top quintile of the income distribution. At 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 when we move towards the top of the income distribution, but switchers are concentrated towards the top of the income distribution, which magnifies the final effect (e.g., there are by about 5 times more switchers and business managers at the top 10% of the income distribution than at the bottom 10% as shown in Table 2 and Table 4).

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

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

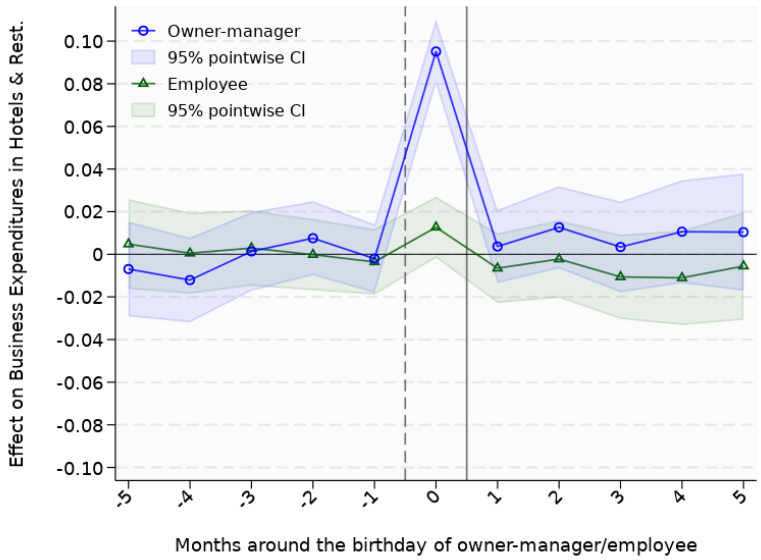



Notes: This figure displays average monthly *business* expenditures in hotels and restaurants reported in electronic invoices (e-Fatura) centered around birthday months of the owner-manager and spouse (Panels a-b) and a randomly selected employee working in the same firm and her spouse (Panels c-d). 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 in hotels and restaurants around the birthday month of the owner-manager and her spouse (owner-manager's spouses who work in the same firm are not included in the sample).

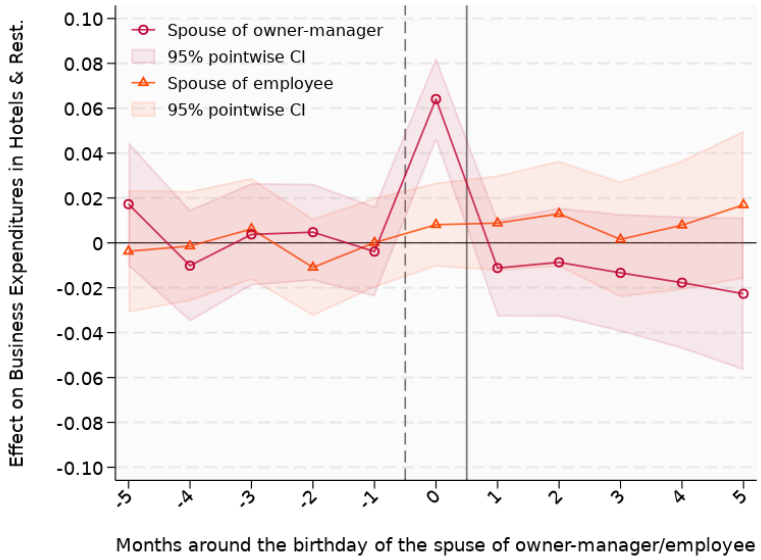
Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

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

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




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

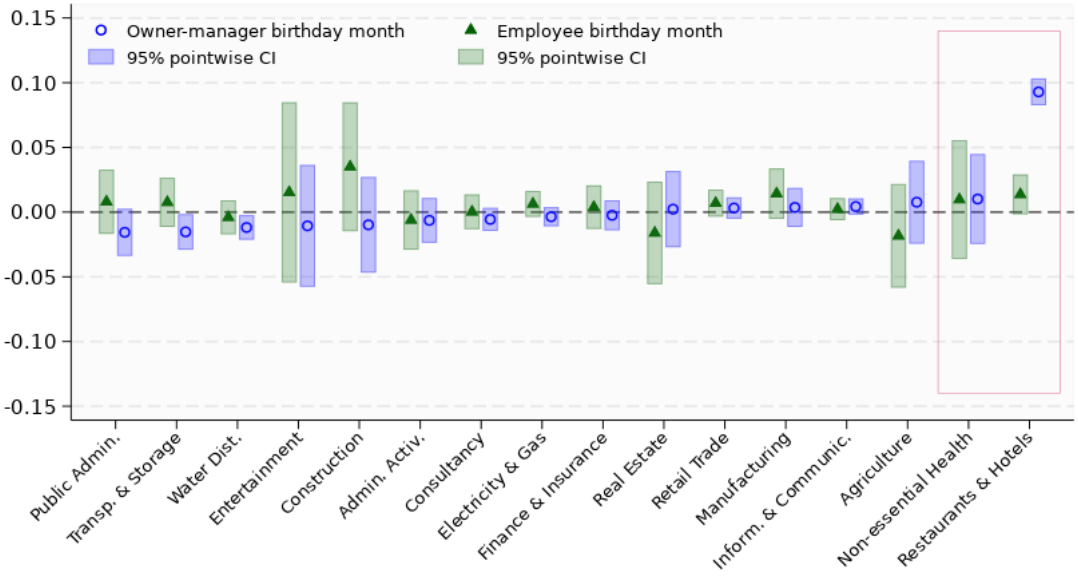



Notes: This figure displays the estimates of the effects on monthly business expenditures in hotels and restaurants centered around birthday months of the owner-manager and the owner-manager's spouse (the sample excludes spouses who work in the same firm), and a randomly selected employee working in 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 were obtained using the estimator by 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. Our results suggest that variations in personal consumption motives of owner-managers significantly affect the pattern of business expenditures in hotels and restaurants, which increase 9.8% and 6.1% at 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.

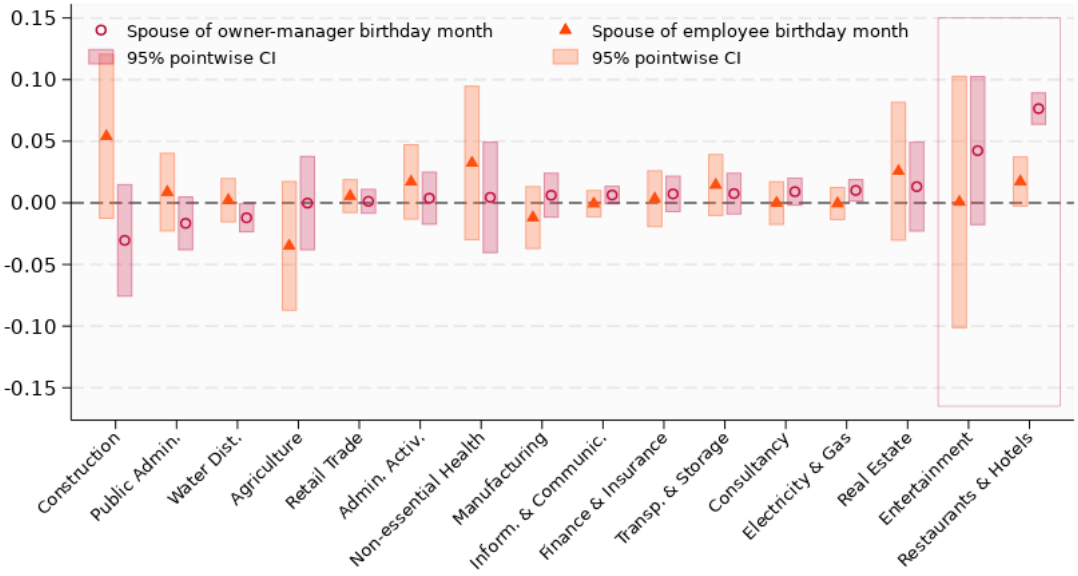
Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

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

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




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

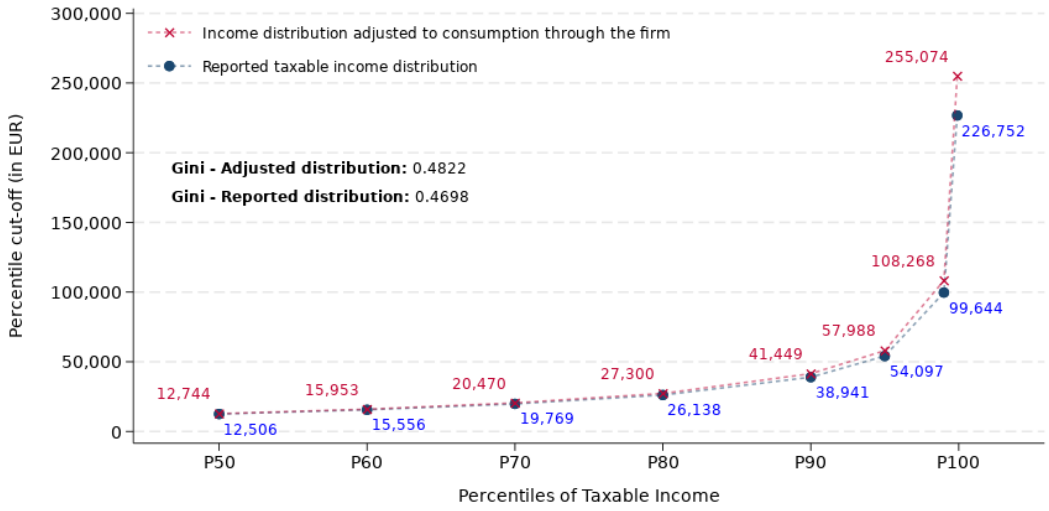



Notes: This figure displays the average estimates of the effects on monthly business expenditures centered around birthday months of the owner-manager and the owner-manager's spouse, and a randomly selected employee working in the same firm and her spouse. The sample and the estimation method are the same as described in Figure (9). This figures shows that the peak in the firm's expenditures in hotels and restaurants around the birthday month 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 at the birthday month.

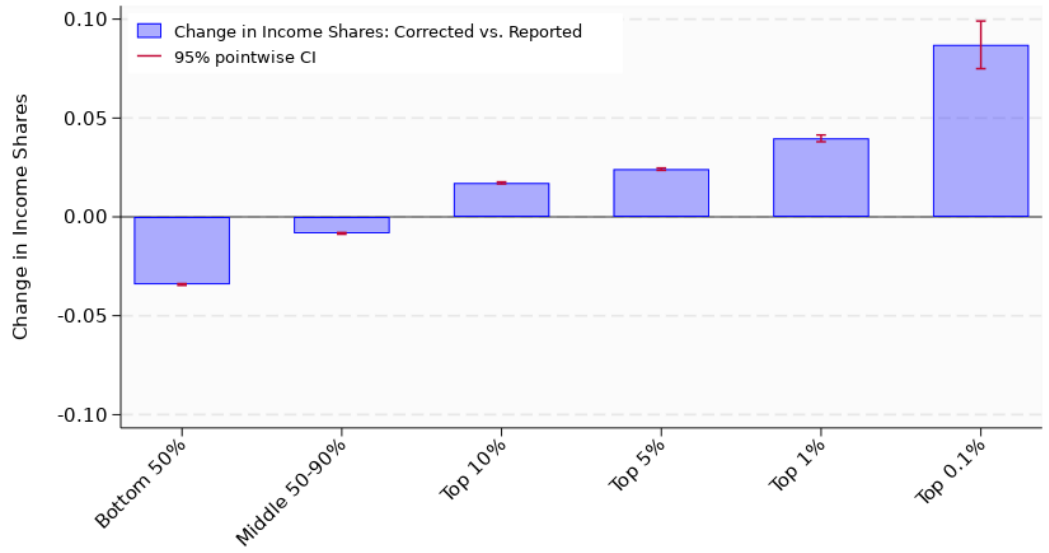
Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

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

(a) Implications on Gini and income percentiles: reported vs. adjusted distribution




(b) Implications on top income shares: reported vs. adjusted distribution




Notes: This figure compares 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 about one percentage point, while the top 1% increase by about half percentage point. These unequalizing effects are consistent with business managers concentrating towards the top of the income distribution (Table 4 and Appendix Figure A17) and 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 monthly consumption expenditures of switchers described in Section (2.3). The panel is constructed using the individuals who switch from employee to business manager between January 2016 to December 2019 from the Social security records, linked to spouses and other household members from the personal income tax declaration (IRS) and consumption expenditures from electronic invoices (e-Fatura). It excludes individuals whose spouse also switches to business manager, whose household composition changes 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). By about 3/4 of the individuals stay 48 months in the panel.

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 socio-economic 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 males 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 towards the top of the household taxable income distribution, with by about 20% of business managers belonging to the Top 10% o and 4% to the Top 1%. We divide household taxable income by two in the case of couple households who opt by 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)** | | | |
| Less 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 |
| Non-essential 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-manager 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 the Social security records from 2017 to 2019, linked to spouses from the personal income tax declaration (IRS) and business expenditures from electronic invoices (e-Fatura). It excludes firms whose spouses work in the same firm. In 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 the population of business managers reported in the annual personal income tax declaration

| | (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 manager's 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 the Social security registers linked to household taxable income from the annual personal income tax declaration (IRS). We exclude business managers of firms classified as inactive in the business registry and business managers classified as non-residents in IRS. Individual taxation of income is optional for married couples, so we divide by two the taxable income of married individuals who opt by joint taxation. Business managers tend to concentrate towards the top of the income distribution, by about 20% of managers belong to the top 10% of the distribution, and by about 4% of the managers belong to the top 1%. Business managers at the top 1% earn approximately between 167-175K 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 the 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 manager's 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 the Social security registers linked to the annual personal income tax declaration (IRS), and to electronic invoices (e-Fatura). We exclude business managers of inactive firms in the business registry and non-resident business managers. Business managers tend to concentrate towards 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-manager's household expenditure (287.9 thousand households) | 6,119 | 2.85 | | |
| **B. Change in household consumption** | | | | |
| $\Delta$Cons. $= \bar{c}/(1-\hat{\delta}) - \bar{c}$ | 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 personal expenditures shifted to firms would be reclassified as final consumption expenditures (Panel B); the aggregate loss in personal income taxes (PIT) and value-added taxes (VAT) associated to consumption through the firm (Panel C); 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 ($\delta$). 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 brackets 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 the ones 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 the personal income tax declaration 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 Figure (11) and Table (6). In 2019 considering consumption through the firm as a form of remuneration, increases Gini coefficient by about one percentage point, while the top 1% increase by about half percentage point. Consumption through the firm has considerable unequalizing effects, which is consistent with the fact that business managers concentrate towards the top of the income distribution and the fact 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

[Incomplete]

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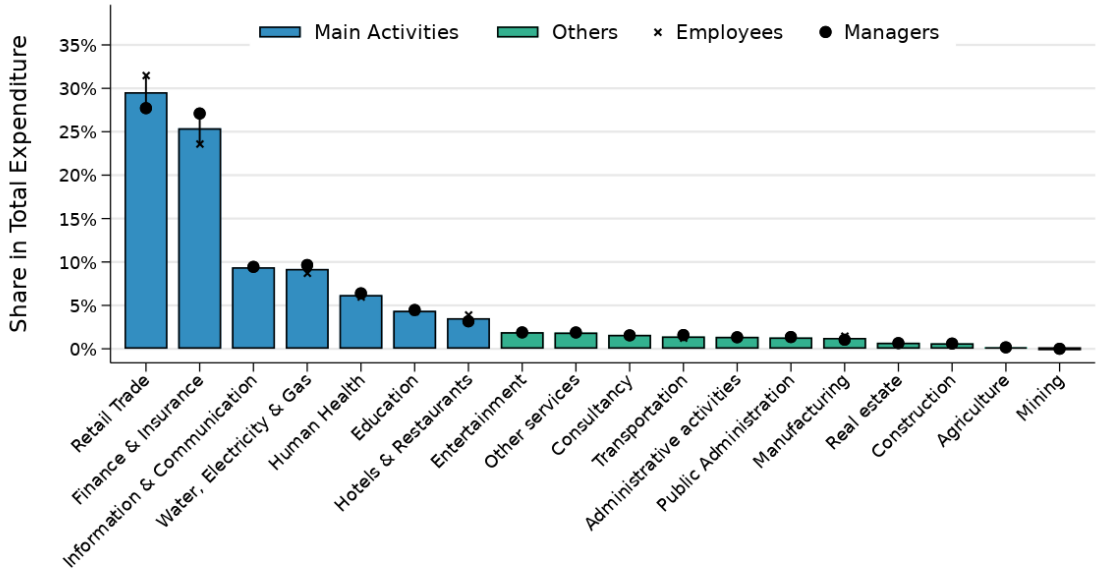
D.2 Firm-level data . . . . . A-32

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# A Additional figures

## A.1 Additional descriptives on the switchers

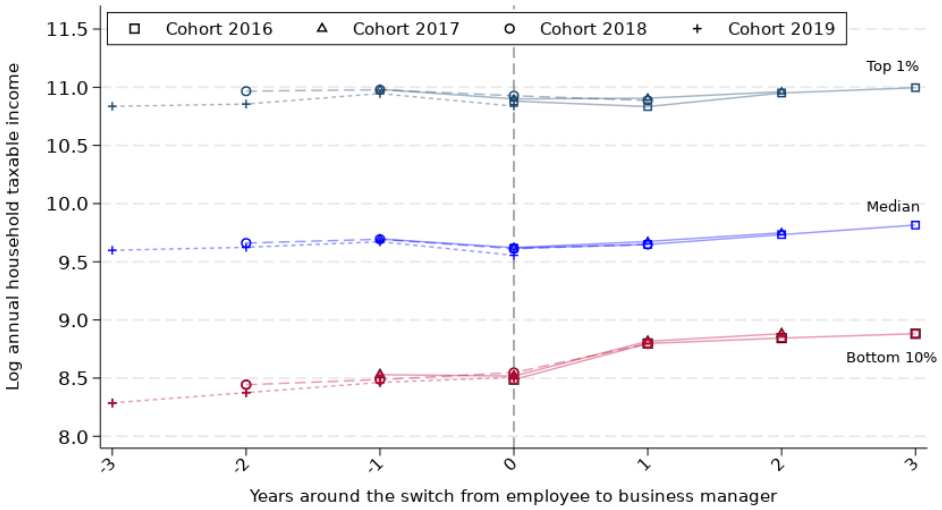
Figure A1: Household consumption shares of the switchers, 2016-2019




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

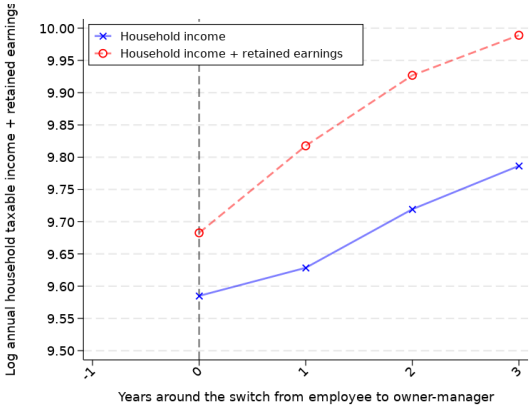



Notes: This figure displays the evolution of top 1%, median and bottom 10% of household income subject to personal income taxes (PIT) around the switching year for the panel of switchers from 2016-2019 described in Tables (1)-(2).

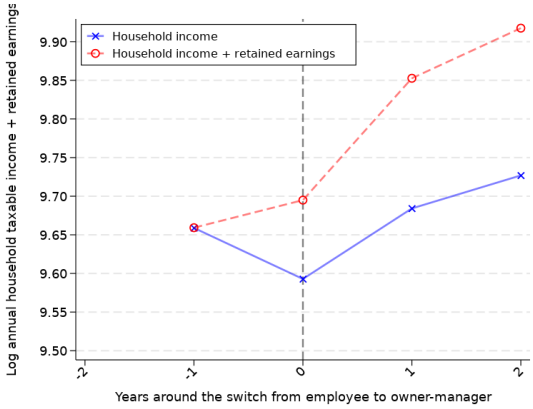
Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

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

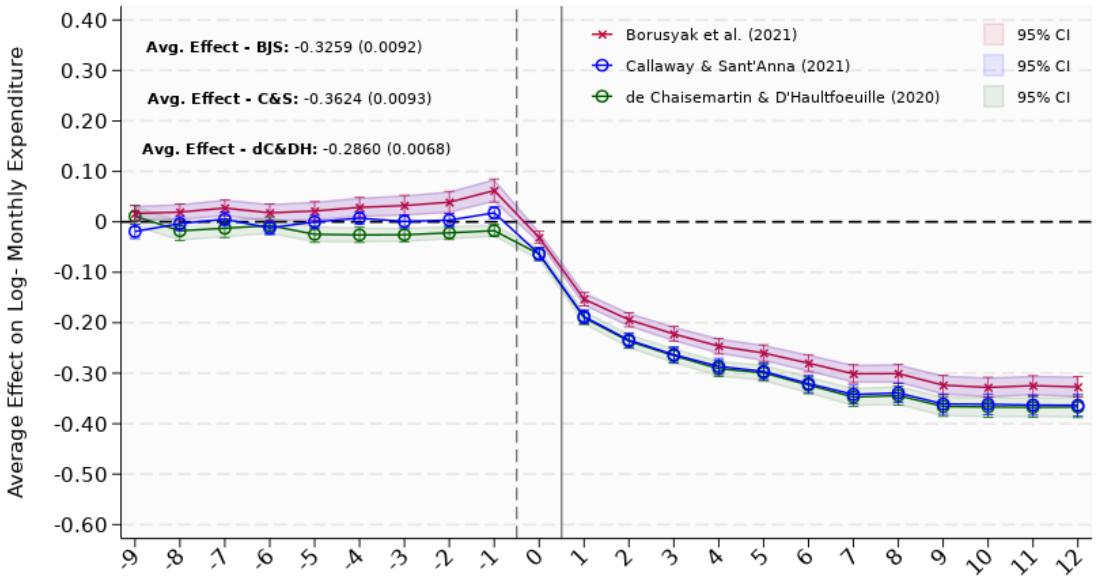



Notes: This figure displays the evolution of household income subject to personal income taxes (PIT) and firm retained earnings by switching cohort for the panel of switchers from 2016-2019 described in Tables (1)-(2), merged with company accounts data (IES)

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



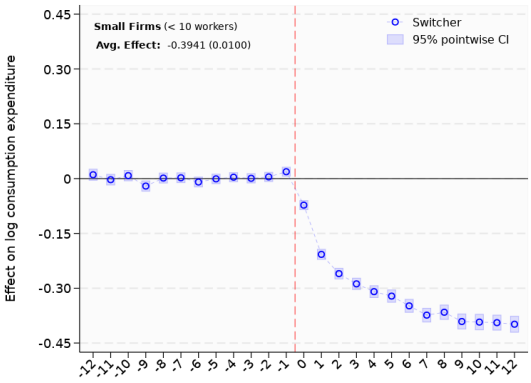

Notes: This figure displays the estimates of the effects on reported monthly personal consumption expenditures of switchers. The post-switch estimate of personal expenditures ("Avg. Effect") is defined as the average of the event-study coefficients for the post periods $k \in \{9, 10, 11, 12\}$. The 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.

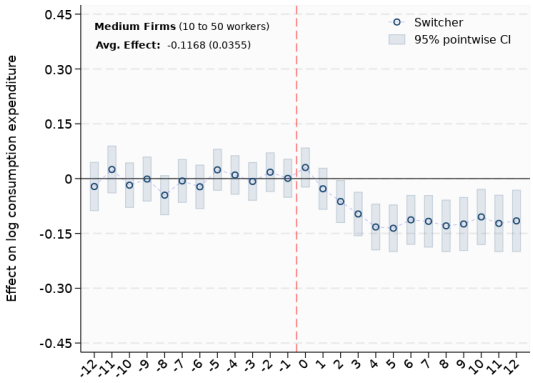
## A.3 Effects by firm size, ownership and industry

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

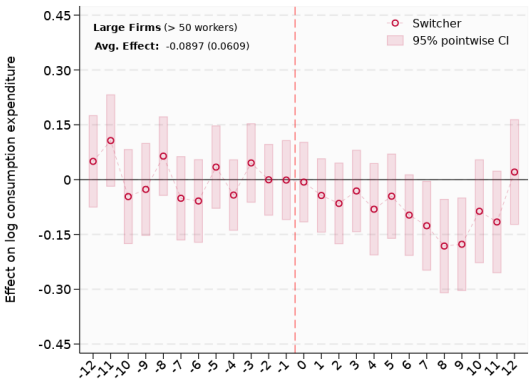
(a) Small firms (less than 10 workers)




(b) Medium firms (10 to 50 workers)




(c) Large firms (more than 50 workers)

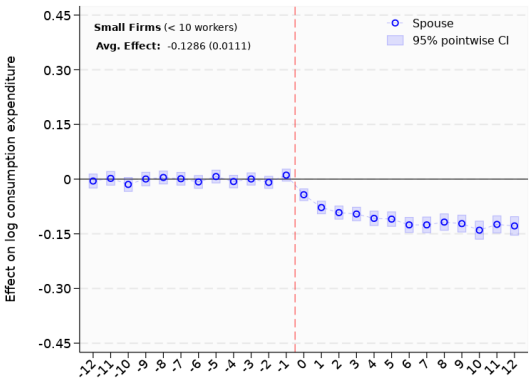



Notes: This figure displays the effects on reported monthly personal consumption expenditures of switchers by firm size in terms of number of workers. The sample is the panel of monthly consumption expenditures of switchers from 2016-2019 described in Section (2.3). Tables (1)-(2) provide summary statistics. 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.

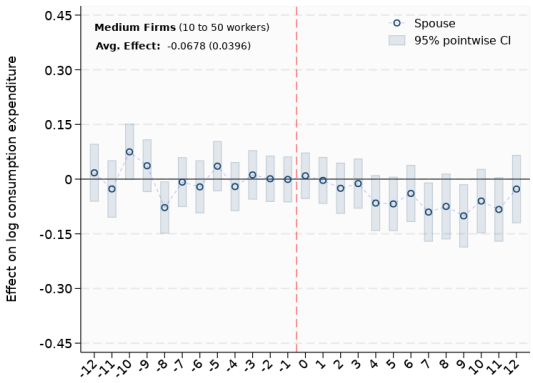
Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

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

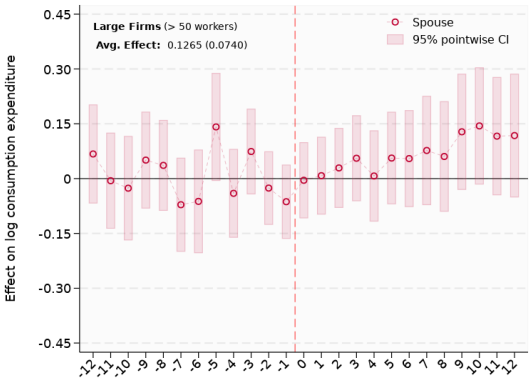
(a) Small firms (less than 10 workers)




(b) Medium firms (10 to 50 workers)




(c) Large firms (more than 50 workers)

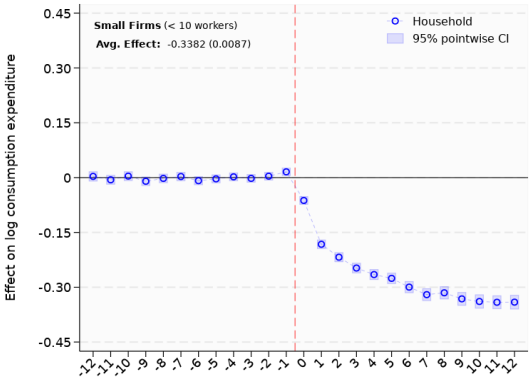



Notes: This figure displays the effects on reported monthly personal consumption expenditures of switcher spouses' by firm size in terms of number of workers. The sample is the panel of monthly consumption expenditures of switchers from 2016-2019 described in Section (2.3). Tables (1)-(2) provide summary 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).

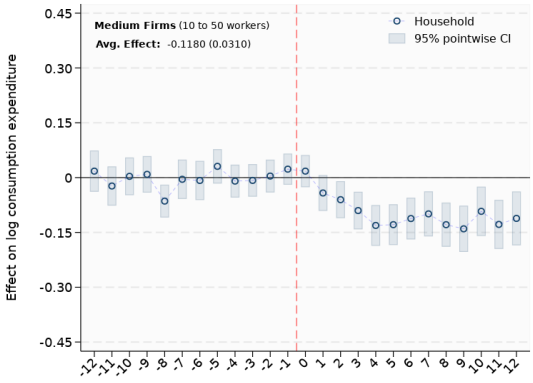
Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

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

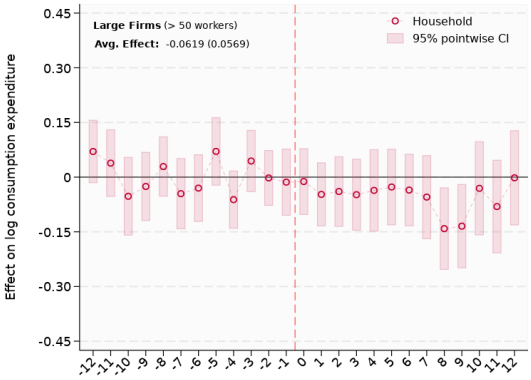
(a) Small firms (less than 10 workers)




(b) Medium firms (10 to 50 workers)




(c) Large firms (more than 50 workers)

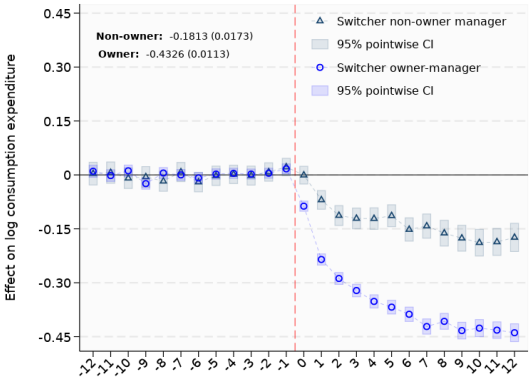



NOTES: This figure displays the effects on reported monthly personal consumption expenditures of switcher household by firm size in terms of number of workers. The sample is the panel of monthly consumption expenditures of switchers from 2016-2019 described in Section (2.3). Tables (1)-(2) provide summary 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.

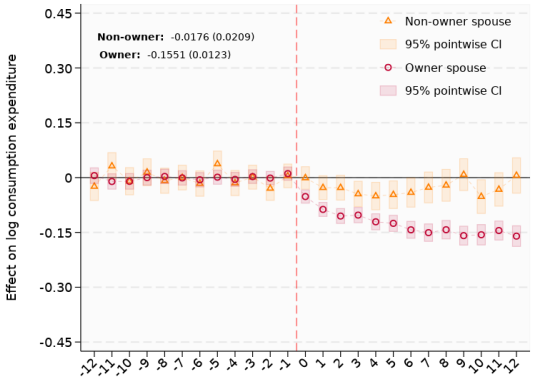
SOURCES: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

Figure A8: Effects by firm ownership

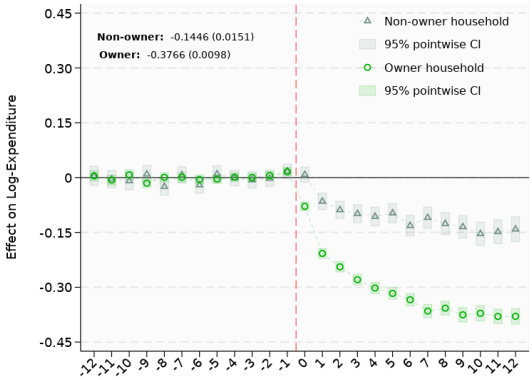
(a) Switcher




(b) Spouse




(c) Household

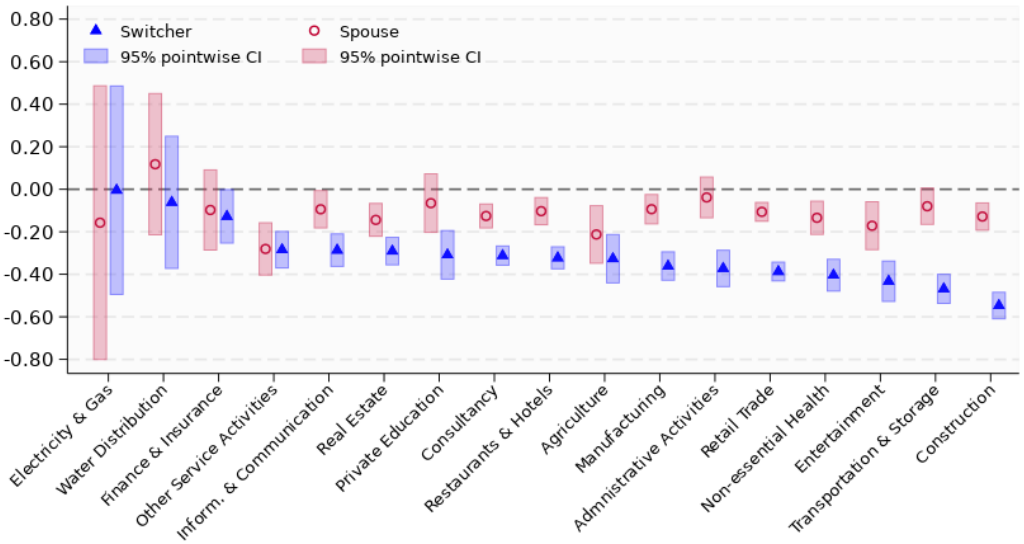



Notes: This figure displays the effects on reported monthly consumption expenditures of switchers, spouses and combined household expenditures by firm ownership (Appendix Section **??** describes our approach to identify switchers who become owner-managers). The sample is the panel of monthly consumption 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).

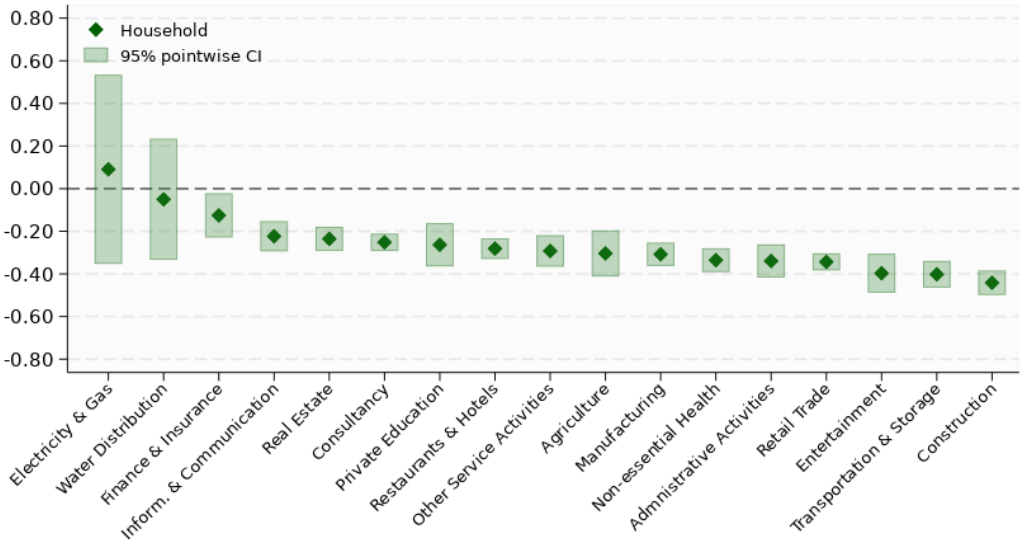
Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

Figure A9: Average effects by industry

(a) Switcher and spouse




(b) Household



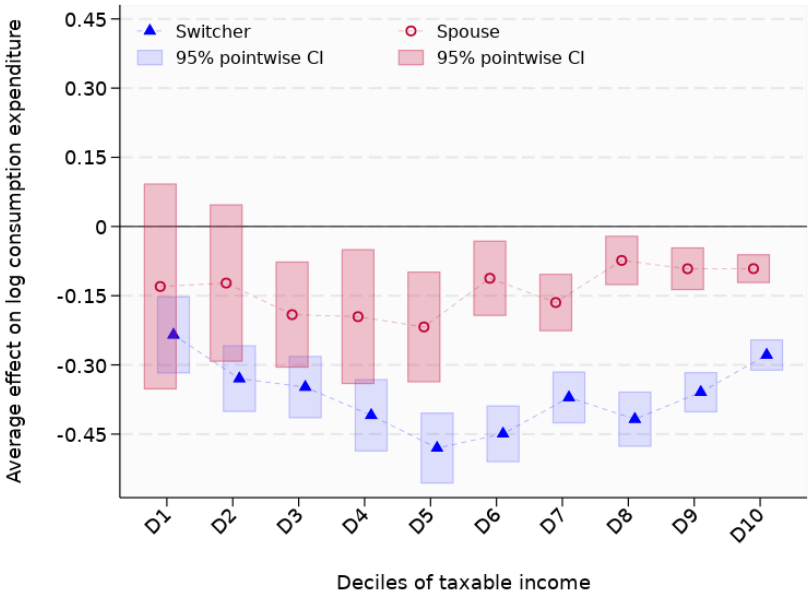

Notes: This figure displays average effects on reported monthly consumption expenditures of switchers, spouses and combined household expenditures by firm ownership The sample is the panel of monthly consumption expenditures of switchers from 2016-2019 described in Section (2.3). Tables (1)-(2) provide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

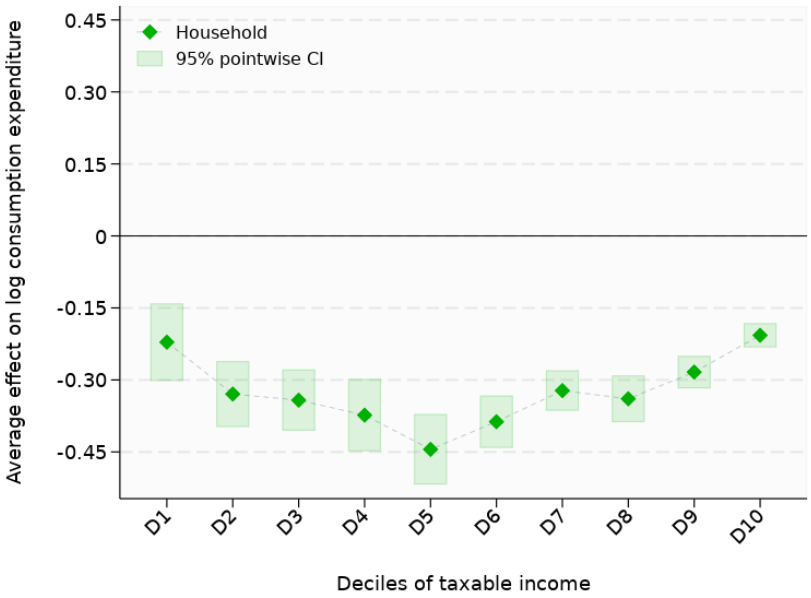
## A.4 Effects by income decile and percentile

Figure A10: Effects by decile of household taxable income

(a) Switcher and spouse




(b) Household

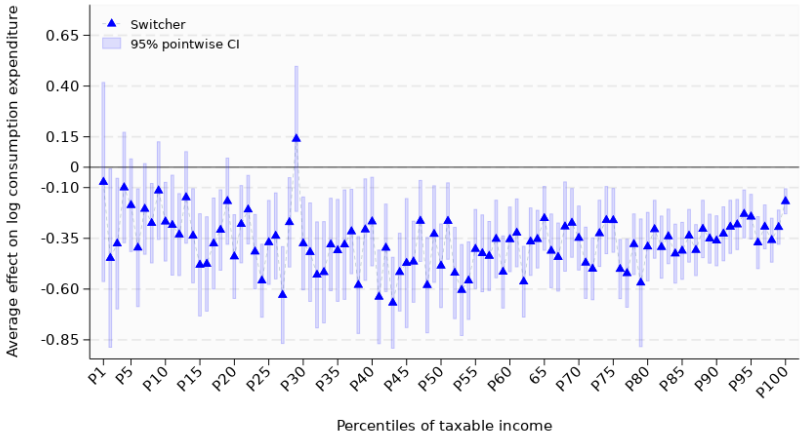



Notes: This figure displays the average effects on reported personal consumption expenditures of switchers, spouses and household expenditures by deciles of household taxable income. The sample is the panel of monthly consumption expenditures of switchers from 2016-2019 described in Section (2.3). Tables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

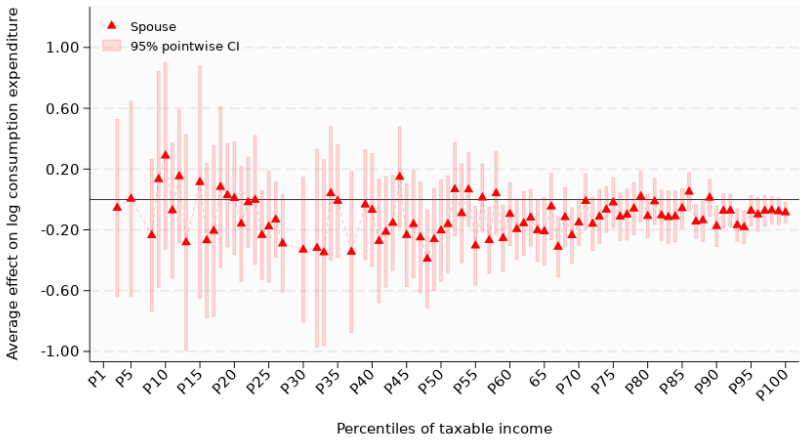
Sources: Calculations based on administrative datasets of e-Fatura, IRS, Social security records, 2016-2019.

Figure A11: Effects by percentile of household taxable income

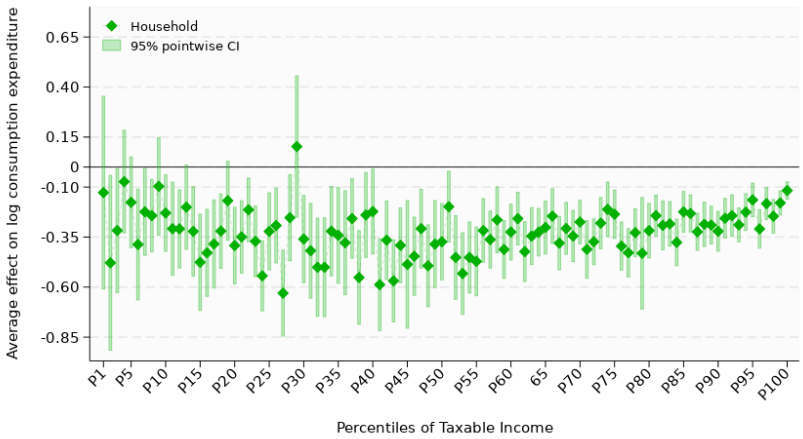
(a) Switcher




(b) Spouse




(c) Household



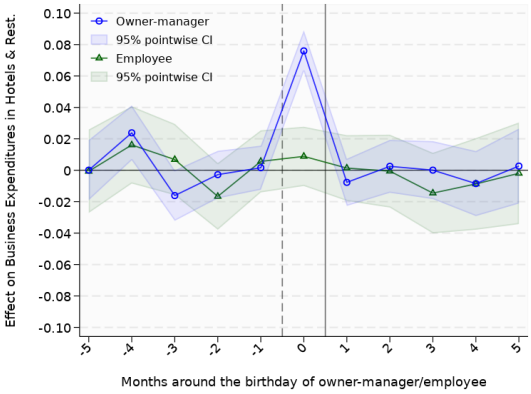

NOTES: This figure displays the average effects on reported personal consumption expenditures of switchers, spouses and household expenditures by percentiles of household taxable income. The sample is the panel of monthly consumption expenditures of switchers from 2016-2019 described in Section (2.3).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

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

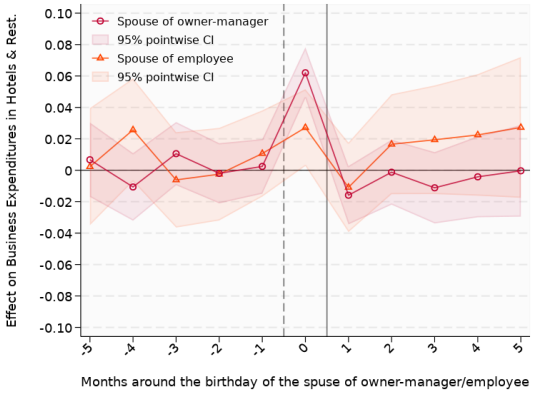
## A.5 Business expenditures and life events: additional results

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

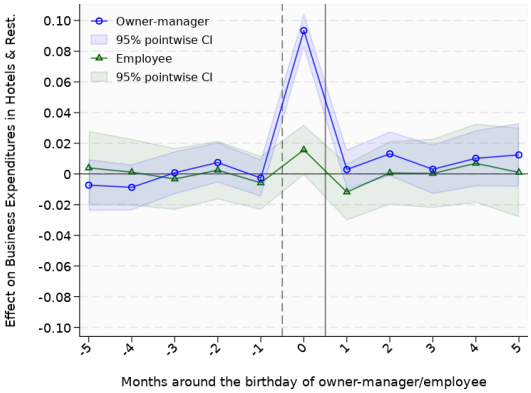
(a) Owner-manager vs. employee, 2016



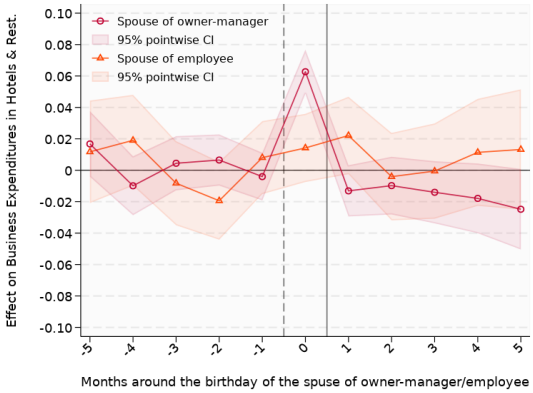

(b) Owner spouse vs. employee spouse, 2016



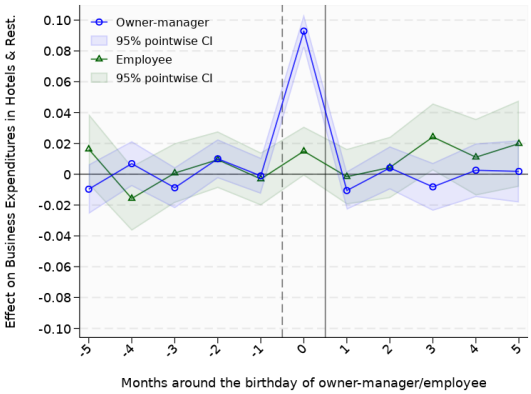

(c) Owner-manager vs. employee, 2017



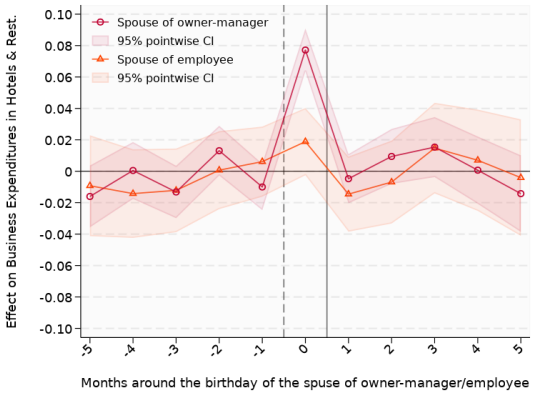

(d) Owner spouse vs. employee spouse, 2017




(e) Owner-manager vs. employee, 2018




(f) Owner spouse vs. employee spouse, 2018

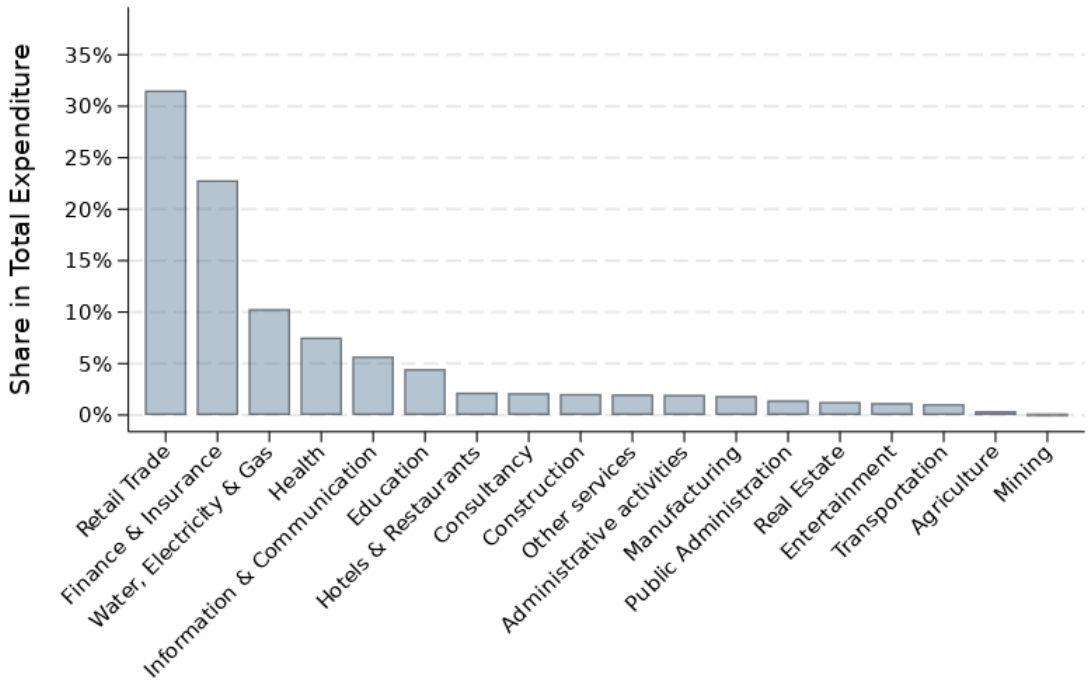



Notes: This figure displays the estimates described in Figure (9) of the main paper for the years 2016-2018. There is a peak in the firm's expenditures in hotels and restaurants around the birthday months in 2016-2018 with the similar orders of magnitude as in 2019.

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

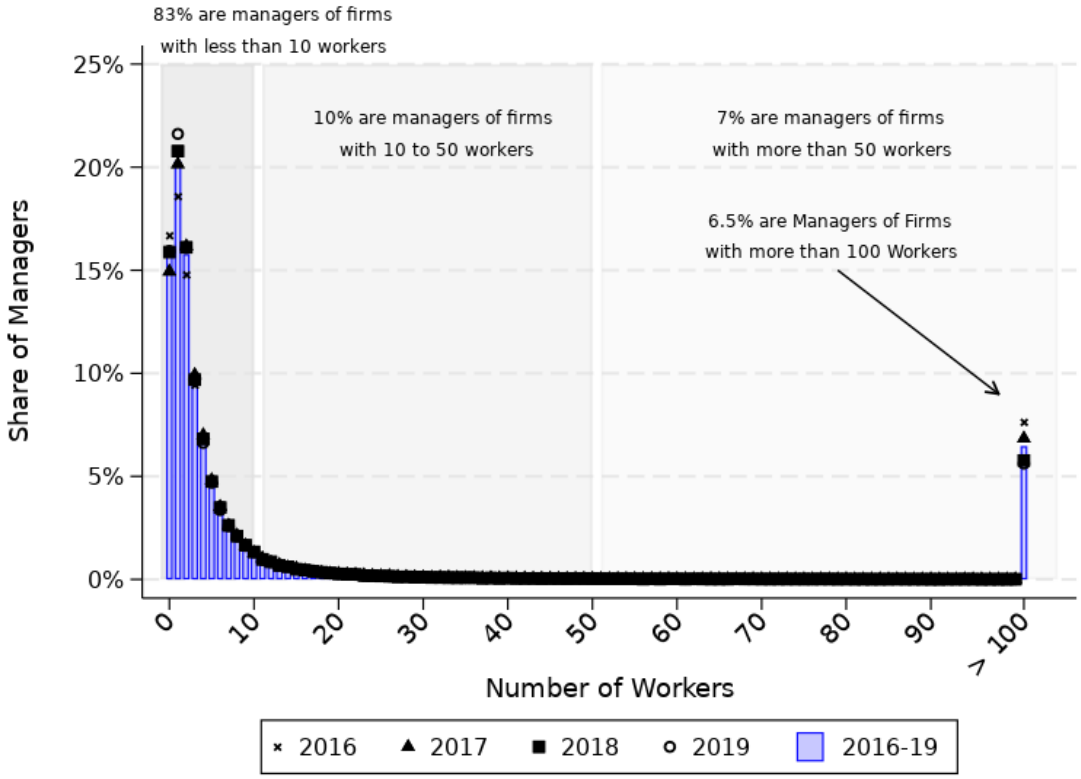
Figure A13: Household consumption shares of the population of business managers, 2016-2019




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.

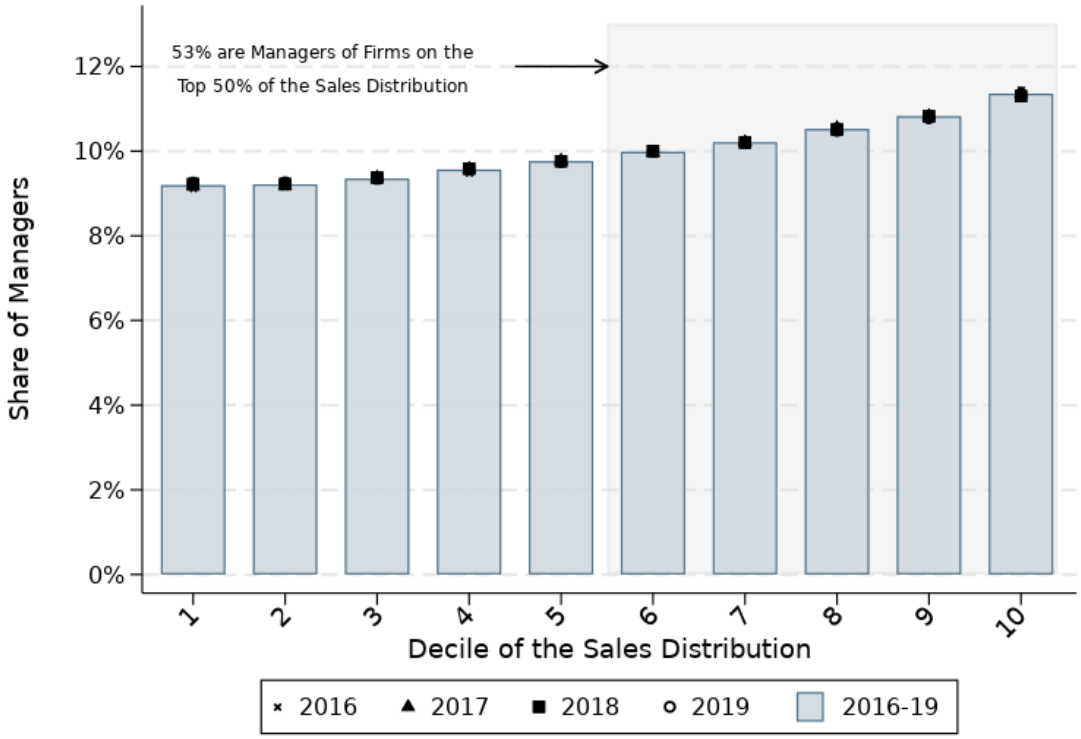
Figure A14: Distribution of the population of business managers by firm size, 2016-2019




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.

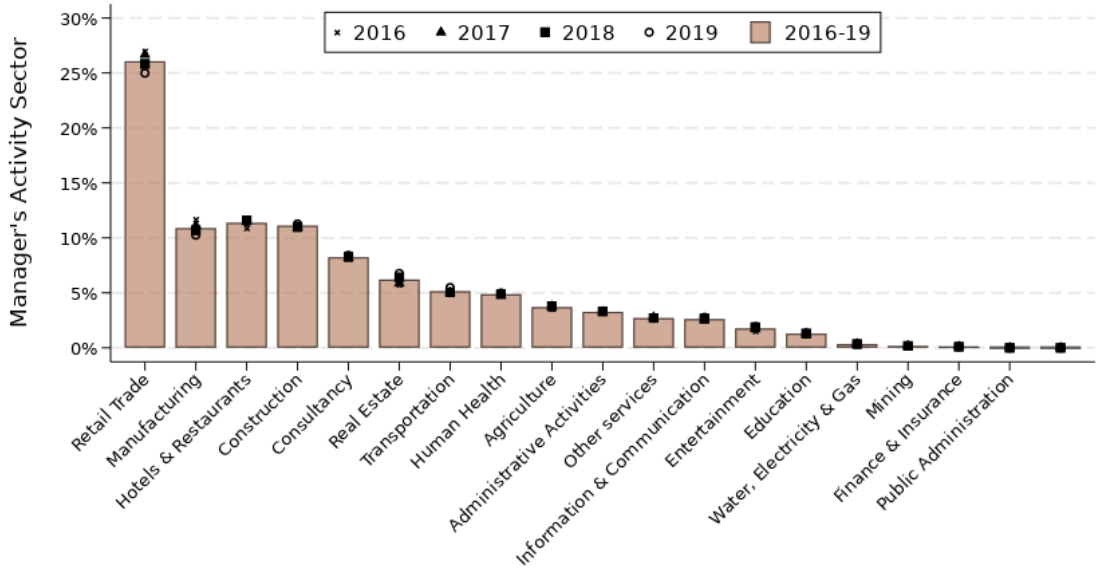
Figure A15: Distribution of the population of business managers by firm size in terms of sales, 2016-2019




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

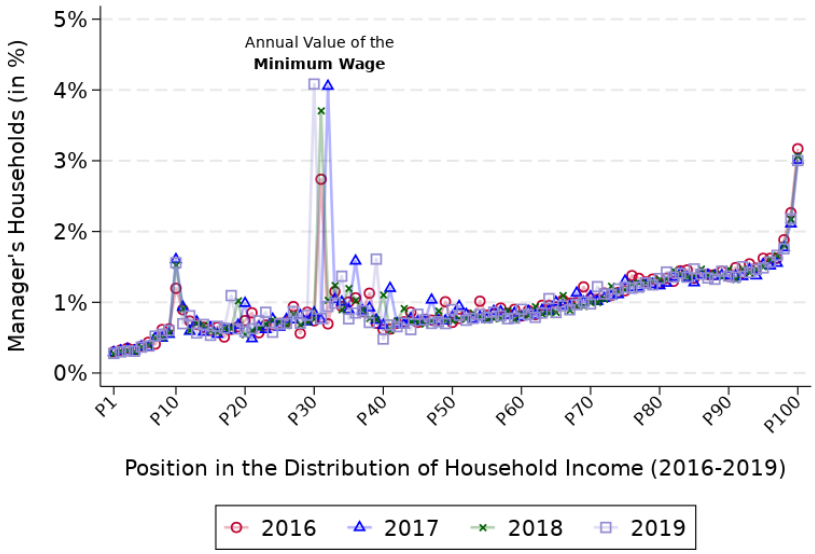



Notes: This figure reports the distribution of the population of business managers by the firm size measured in terms of sales for 2016-2019. Tables (4)-(5) of the main paper present detailed summary statistics and additional information on this population. By about 2/3 of the population of business 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).

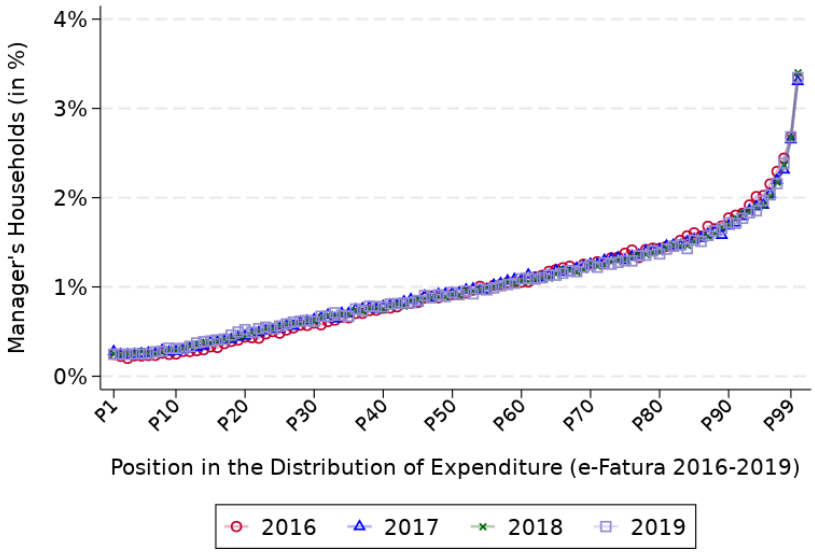
Sources: Calculations based on administrative datasets of Social security records, IES, 2016-2019.

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** | | | | | | | | |
| $\Delta$Cons. $= \bar{c}/(1-\hat{\delta}) - \bar{c}$ | 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** | | | | |
| $\Delta$Cons. $= \bar{c}/(1-\hat{\delta}) - \bar{c}$ | 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.

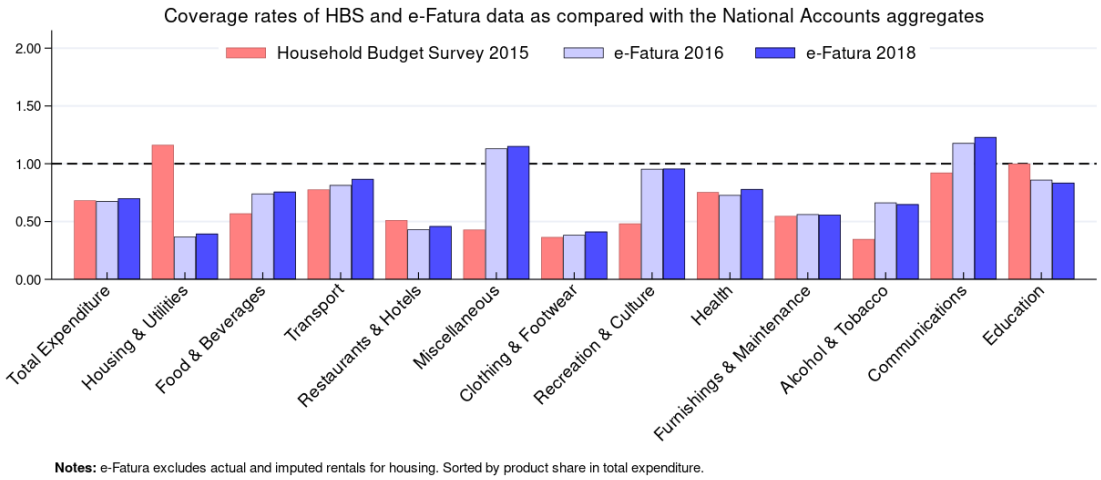
Table C6: Coverage Rates of e-Fatura with respect to the National Accounts, 2016-2019

| | (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

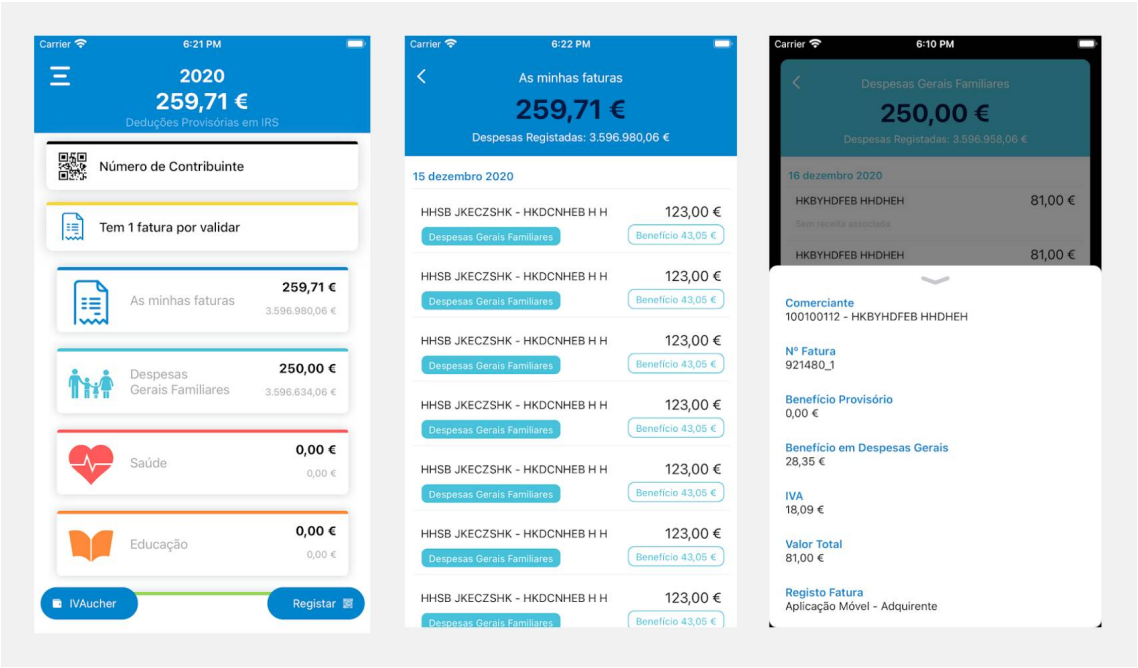



Notes: This figure illustrates possible ways of requesting the taxpayer number for each purchase to ensure that expenditures are recorded in e-Fatura. The consumer can request the invoice with a taxpayer number at the time of purchase and provide the cashier with their taxpayer number verbally. This 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).