Are Changes of Organizational Form Costly? Income Shifting and Business Entry Responses to Taxes

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Abstract

Drawing on administrative panel data covering the full population of business owners in the UK, I study the effects of differential tax liabilities across organizational forms on business entry and on income shifting. I find that a 10% increase in savings from incorporation leads to a 1.7% increase in the number of new business owners. However, higher entrepreneurial entry is offset by income shifting – increasing the hazard rate of incorporation of the existing self-employed by up to 2.3% for a 10% increase in tax savings. I show that despite large tax savings from incorporation (exceeding 10 pp in some years), a substantial proportion of business owners fail to incorporate, suggesting that income shifting through incorporation is not the primary avoidance channel for the self-employed.

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Keywords: Entrepreneurial Entry, Incorporation, Organizational Form, Avoidance, Income Shifting, Compliance Cost

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Many countries tax incorporated and unincorporated businesses differently. This differential taxation allows for greater policy flexibility, yet opens up opportunities for tax avoidance that can lead to large deadweight losses if firms can choose their organizational form strategically. Such organizational form income shifting also complicates the measurement of many economic outcomes: income inequality, labor and capital shares, and corporate rate of return (Gordon and Slemrod (2000); Clarke and Kopczuk (2017)). Thus, knowing the responsiveness of organizational form to tax incentives is critical both for the accurate interpretation of economic outcomes and for optimal tax policy. In the presence of income shifting, the optimal tax rate depends not only on the elasticity that measures real changes in economic activity, but also on the elasticity of income shifting (e.g. Piketty et al. (2014)).

Whether the choice of organizational form is affected by tax incentives remains an open empirical question because of data constraints. To generate an unbiased measure of income shifting, a researcher must be able to track individuals across time and legal forms, which necessitates a link between personal and corporate tax records. In the absence of such linkage, income shifting becomes indistinguishable from entrepreneurial entry, as, for example, a lower corporate tax rate simultaneously incentivizes organizational form switches and genuine business entry. In this paper, I use administrative tax return data from the UK that covers the entire population of business owners – incorporated or not – to answer two questions: Do differences in corporate and personal tax liabilities lead to strategic organizational form switches? And to what extent does lower tax liability increase entrepreneurial entry? The panel microdata allows me to observe organizational form changes over time in a setting where there are no legal restrictions on the choice of organizational form or the payout structure.

Since 1999, incorporation offers substantial tax savings over the traditional self-employment for most small business owners in the UK. For this reason, I estimate the magnitude of organizational form shifting by focusing on business owners who initially chose the personal tax base, and then use a proportional hazard model to estimate the effect of the personal-minus-corporate tax differential on the hazard rate of incorporation. This approach accounts for the natural propensity of maturing firms to incorporate because of non-tax considerations and

ensures that the income shifting elasticity only measures tax-motived switches. My preferred estimate suggests that a 10% increase in the tax differential increases the probability of organizational form switching by 2.3% in a given year. Next, I show why it is important to differentiate between income shifting and business entry. First, following the previous literature, I estimate the relationship between the number of incorporated firms and the tax differential between corporate and personal forms.[1] Using a fixed-effects model, I find that a 10% increase in the tax wedge increases the number of newly incorporated firms by 2.1%. I then show that only half of this response is due to genuine new entry, and that the other half is due to income shifting by the previously unincorporated businesses.

My identification relies on rich variation in tax liability across time and income, stemming from varying schedules and thresholds that determine corporate, dividend, income, and payroll tax rates from the 1996/97 to 2012/13 tax years. In my estimation of organizational form switching, I include year fixed effects to control for features of the tax code that affect all business owners, and splines of past incomes to control for natural propensities to incorporate. The identification is thus driven by variation in the tax wedge between corporate and personal tax bases across both time and profit groups. Since the choice of organizational form trades off tax savings and non-tax merits of incorporation against the cost of incorporation, the nature of which is unknown, I consider multiple measures of tax savings, yet find similar results. My elasticity estimates of income shifting range between 0.15 and 0.37, and my preferred estimate of 0.23 is based on expected savings from incorporation, which are measured as a percent of predicted profits based on firms' profits in the past three years.

The estimated elasticities imply that income shifting is an important but perhaps not the primary channel of tax avoidance among low-to-mid-income business owners. To see this, note that the yearly incorporation rates are low – averaging between 0.5 and 3% per year depending on the income group. Therefore, an elasticity of 0.23 implies that increasing tax savings by an additional 5pp from the current average savings of of 5-6% of profits would only increase the incor-

[1]For example, see Gentry (1994); Romanov (2006); Da Rin et al. (2011); Devereux and Liu (2015); DeBacker et al. (2019).

poration rate to 0.62-3.69%. To gauge the effect of organizational form shifting on tax revenue, I perform a back-of-the-envelope calculation which suggests that the corporate tax decreases and payroll tax increases that happened between 2000/01 and 2012/13 resulted in approximately 96,000 tax-motivated incorporations. This reduced the total collected tax revenue by approximately £1.43 billion, and the average income shifter saved £2,000-£3,000 per year as a result of incorporation.

To compare income shifting responses to increases in entrepreneurial entry as a result of tax breaks, I use the data on the universe of business owners in the U.K. I argue that a positive wedge between personal and corporate income tax rates increases the number of incorporated firms through three distinct channels: organizational form switches by the existing self-employed, an overall increase in the number of first-time business owners, and an increased preference for corporate form by first-time business owners. I estimate a relationship between the number of these individuals and the tax differential using a year and profit-bin fixed effects model. The results suggest that a 10% increase in the difference between effective corporate and personal tax rates increases the number of newly incorporated but previously unincorporated business owners by 1.44%, the number of first-time business owners by 1.69%, and the preference for corporate form among first-time business owners by 0.73%. Accounting for the relative share of first-time business owners to previously unincorporated firms among all newly incorporated firms implies that approximately half of the increase in incorporations in response to tax breaks is actually due to income shifting.

The results of this study are subject to several caveats. First, because the vast majority of business owners have profits of less than £100,000 per year, the results may not reflect the behavior of larger firms. The differences may stem from factors such as access to tax planning services, or the relative ability to evade taxes because of cash transactions. The advantage of focusing on smaller firms is in their relative flexibility: non-tax considerations are likely to play a smaller role in small firms' decision-making process, underlining the importance of tax incentives. Second, because my identification approach relies on variation in tax savings across income groups and time, I focus on business owners with positive profits, and do not consider organizational form changes for firms with

losses. Third, while most tax changes studied in this paper appear to follow a gradual trend, so are unlikely to represent government's response to individual behaviors, cancellation of the zero starting rate discussed in Section 1.1 may have been implemented to curb income shifting. If so, my estimates may suffer from simultaneity bias. Finally, while business ownership is the main source of income for 80% of my sample, I am not able to observe whether these businesses engage in innovative projects. Distinguishing between innovative start ups and lifestyle businesses is a subject of hot debate in entrepreneurship literature (Hurst and Pugsley (2011), Haltiwanger et al. (2012)), and is outside the scope of this study.

This paper relates to two strands of literature that study income and entrepreneurial responses to tax incentives. First, it contributes to the literature that explores how taxes affect entrepreneurial entry by studying changes in the number of self-employed individuals or corporations over time (e.g., Gentry (1994); Romanov (2006); Da Rin et al. (2011); Devereux and Liu (2015); DeBacker et al. (2019)). As all of these studies use personal *or* corporate tax data, they do not differentiate between income-shifting responses by existing business owners and entrepreneurial entry. Within this literature, Devereux and Liu's (2015) paper is the closest to this study. My results suggest that approximately half of the new incorporations studied by Devereux and Liu (2015) are due to income shifting rather than true entrepreneurial entry.

Second, this paper contributes to a nascent literature that studies the choice of legal form. I improve on previous estimates by using a comprehensive, full-population panel microdataset that addresses prior literature limitations and allows for both stock and flow analysis of the choice of legal form. Previous studies relied on aggregate data that combined individuals with varying or even opposite levels of incentives, which could result in attenuation bias (Gordon and MacKie-Mason (1994); MacKie-Mason and Gordon (1997); Goolsbee (1998); Goolsbee (2004); Mooij and Nicodme (2008); Luna et al. (2010); Liu (2014)). A few studies used individual data but focused on selected samples of firms (Carroll and Joulfaian (1997) and Onji and Tang (2017)). Several recent studies explore the choice of organizational form, using individual data from Scandinavian countries, where savings from incorporation are limited due

to requirements on the payout structure (e.g., Alstadster and Wangen (2010); Edmark and Gordon (2013)).[2] Further, in contrast to previous studies that solely relied on personal and corporate tax variation, this study also uses variation in payroll taxes. My results suggest that any tax differences between personal and corporate tax bases could lead to income shifting.

1 Institutional Setting and Data Description

1.1 Tax Incentives for Incorporation

In the UK, business owners can choose between two broad categories of organizational form: they can choose to be treated as self-employed individuals subject to personal income taxation, or they can incorporate and thus be subject to corporate taxation. Hereafter, I will refer to entrepreneurs who choose to be taxed under the personal tax base as "self-employed" (including partnerships), to those who choose the corporate tax base as "owner-managers," and to all individuals regardless of legal form as "business owners."

Figures 1 and 2 show how savings from incorporation – defined as the difference between taxes paid under the personal and corporate tax regimes – change across time and across profit levels from 1996/97 until 2012/13.[3] In most years and for most individuals, incorporation reduces tax liability through three channels described in detail below. First, incorporation allows business owners to avoid paying payroll taxes by distributing profits as dividends. Second, incorporation reduces tax liability due to the use of notional tax credits. And third, in-

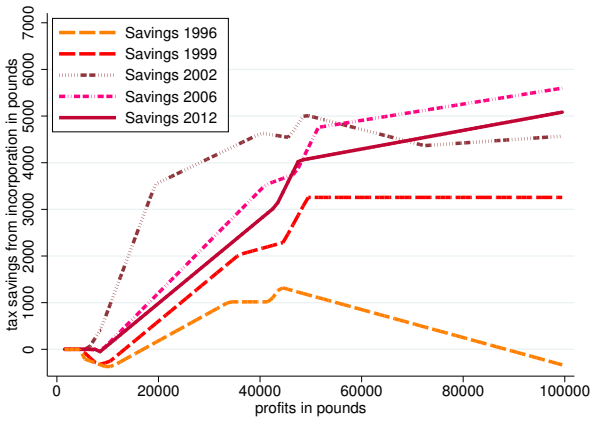
[2] Income can be reclassified through other means, for example, by distributing profits as dividends rather than wages, or by borrowing through equity rather than bonds (e.g. Gordon and Slemrod (2000); Fjrli and Lund (2001); Sivadasan and Slemrod (2008); Thoresen and Alstadster (2010); Pirttil and Selin (2011); Harju and Matikka (2016a); Alstadster and Jacob (2016); Harju and Matikka (2016b); Lpez-Laborda et al. (2017); Waseem (2018)). Researchers who study changes in labor and capital incomes of individuals thus estimate combined effects of incorporation and other forms of income reclassification. For the purposes of welfare analysis, measures of total income shifting are useful because they allow for estimation of deadweight loss. However, from a policy point of view, they are less desirable because they provide no details regarding *how* income is shifted, making policy recommendations difficult.

[3] Note that in the U.K. the tax year runs from April 6 until April 5 of the following year. In graphs, I report the first year only, i.e. 1996 refers to the 1996/97 tax year. Appendix Table A.1 summarizes actual tax rates.

corporation allowed taking advantage of corporate tax cuts in 2000/01 – 2006/07.

"Self-employed" individuals must pay two general types of taxes. First, they must pay personal income tax on profits earned in a given tax year minus eligible deductions. During the study period, the income tax schedule remained relatively simple, with three to four marginal tax brackets ranging between 0% and 50%. In addition to income taxes, self-employed individuals must pay National Insurance Contributions (NIC): a flat weekly tax that ranges between £2.65 and £6.55 and a proportional yearly tax of 6%-9% on profits. The flat rate NICs determine one's pension credits, whereas the proportional NICs do not provide any benefits. Proportional NICs are charged on profits above the *Lower Profit Limit* (LPL), set around £4,385–7,605. Until 2003, these NIC contributions were capped by the *Upper Profit Limit* (UPL) – set around £23,000-£42,000 – but starting in 2003, a 1%-2% proportional NIC is due on all profits above the UPL.

Figure 1: Potential Savings from Incorporation



Notes: This figure shows how the potential savings from incorporation changed over time. Savings are calculated as the difference between the tax liability under the personal and corporate tax bases and assuming taxable income equals taxable profits. Between 1996 and 1999, the corporate tax rate gradually decreased from 24% to 20%, making incorporation more attractive. In 2000, a "starting" corporate tax rate was introduced, reducing the corporate tax rate to 10% for the first £10,000 of profits; the rate was further reduced to 0% in 2002, and then abolished in 2006. Income tax rates remained relatively stable, while the NIC contribution rate increased by 1% in 2000, 2003, and 2011, again making incorporation more attractive. All values are measured in 2013 pounds. For more details, see Section 1.1 and Appendix A.1.

"Owner-managers," on the other hand, are subject to corporate, dividend, and personal income taxes, along with NICs. The amount of tax they must pay,

however, depends on how they choose to distribute profits. The most optimal approach is to pay a small salary equal to the *Primary/Secondary* NIC threshold, and then pay out the rest in dividends. Doing so ensures that owner-managers qualify for NIC benefits similarly to the self-employed, but do not have to pay any NICs, thus saving between 1% to 9% of profits.[4]

The dividend tax rates are set in a way to approximately equalize the dividend-plus-corporate tax rate to personal income tax rates. However, the tax brackets do not align perfectly because of the use of notional tax credits. To see this, note that for a dividend distribution d, individuals are assumed to have received $\frac{d}{1-t^{notional}}$ worth of dividends. Therefore, while a self-employed individual is subject to a higher bracket income tax when his profits p cross the bracket threshold, an owner-manager is subject to the higher bracket dividend rate only if his taxable dividend $\frac{p(1-\tau^{corporate})}{1-t^{notional}}$ is greater than the bracket threshold. Starting from 1999/00, $t^{notional}$ was set at a significantly lower rate than the corporate tax rate, resulting in a smaller tax liability for owner-managers because their taxable dividends $\frac{p(1-\tau^{corporate})}{1-t^{notional}} < p$ whenever $t^{notional} < \tau^{corporate}$.

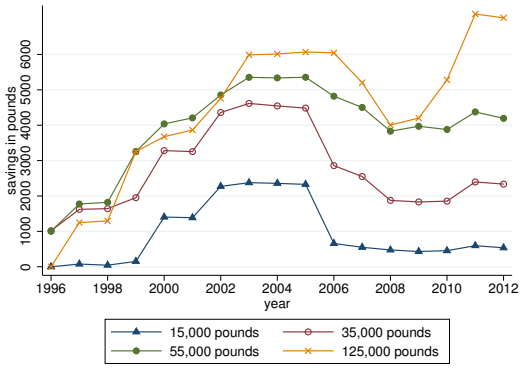
Finally, incorporation was particularly advantageous in the early 2000's, when a special starting corporate tax rate of 10% was introduced in 2000/01. This tax rate was decreased to 0% in 2002/03, and was abolished in 2006/07. The starting rate applied to profits below £10,000 and was gradually phased out to the regular corporate tax rate when profits reached £50,000.

Figures 1 and 2 highlight the tax variation used to estimate income shifting responses in this paper. First, NICs have been increased by 1% three times, in 2000/01, 2003/04, and 2011/12, each time increasing the attractiveness of incorporation. Second, the corporate tax rate has increased twice (in 2007/08 and 2009/10 by 1%) and decreased four times (in 1997/98, 1999/00, 2002/03, 2011/12 by 1 to 3%), in addition to the introduction and subsequent abolishment of the starting rates described above. Third, the notional tax credit rate decreased from 20% to 10% in 1999, again making incorporation more attractive. Finally, a

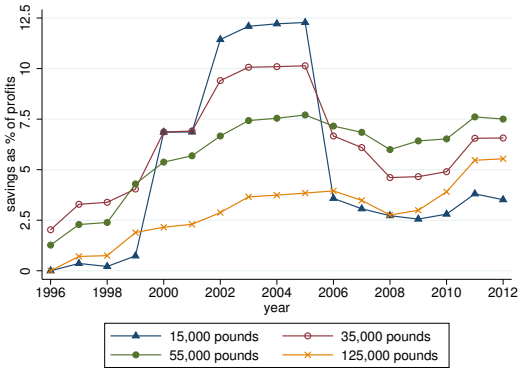
[4] Pension and unemployment insurance credits are earned when one's wage earnings exceed the *Lower Earnings Limit* (LEL) which is set *below* the *Primary/Secondary* threshold (PT/ST) that determines one's liability for employee and employer NICs respectively. Primary and secondary thresholds coincided for almost all years, and at most differed by £416 per year. For more details, see Appendix A.1.

Figure 2: Tax Savings from Incorporation over Time by Profit Level

(a) Savings in Pounds



(b) Savings as Percent of Profits



Notes: This figure shows how the potential savings from incorporation changed over time for individuals with profits equal to £15,000, £35,000, £55,000, or £125,000. Estimates are inflation adjusted to 2013 pounds. Savings are calculated as the difference between tax liability under the personal and corporate tax bases and assuming taxable income equals taxable profits. All negative values are set to zero. For more details, see Section 1.1 and Appendix A.1.

higher income tax rate of 50% was introduced in 2010/11. Although this higher rate applies both to the self-employed and the owner-managers (through a higher dividend rate), it made incorporation more attractive, because owner-managers are able to retain earnings and thus shift tax liability to potentially more tax-favorable years. However, savings from incorporation start to decrease when profits cross £300,000 because the corporate rate increases to 28%-30%.

For small business owners, who are the focus of this study, there are few practical differences between the incorporated and unincorporated tax rules. The differences between corporate tax returns and self-assessment returns filed by the self-employed are minor and are unlikely to affect small business owners. Importantly, both legal forms could equally benefit by sharing some of their profits with a non-working spouse or children. In contrast to the U.S. with its myriad of legal forms, most business owners in the U.K. choose one of three legal categories: unincorporated sole trader, unincorporated partnership, or incorporated limited company. Therefore, nontax benefits of incorporation (if any) generally go hand in hand with tax benefits. Switching organizational form entails some hurdles. First, individuals face a number of one-time costs. Business owners must register

the new firm with the Companies House: this procedure can be done online or in-person and costs less than £40. Further, individuals must transfer ownership of assets and loans related to the new firm, set up a payroll system, and learn about tax and accounting rules. Second, in addition to filing yearly personal tax returns, owner-managers must file yearly corporate tax returns and statutory accounts, and also maintain payroll.

1.2 Data Description

I use administrative tax returns ("Self-Assessments") of self-employed individuals filed between 1996/1997 and 2012/2013. I restrict my sample to taxpayers who report receiving income from *trade* or *partnerships* (i.e., self-employed) or who report being a *director* of a company (i.e., owner-managers). The dataset provides limited demographic info (gender, age, place of residence) and industry of business for self-employed individuals.

The left panel of Table 1 presents overall summary statistics. Due to the fact that the dataset covers the universe of business owners in the UK, the total number of observations is very large – 81 million observations over 17 years covering 12 million taxpayers. About 75% of these observations record periods of self-employment (trades or partnerships). Average age of business owners is between 40 and 44, with some heterogeneity by income type. Most individuals – 60%-75% of business owners – are males. Women are more represented in partnerships, reflecting the prevalence of husband-wife partnerships. Most self-employed individuals report modest profit levels – with median profits of £8,227 among trades and £11,065 among partnerships in 2013 pounds.[5] Owner-managers show higher median profits of £37,734. Since the benefits of incorporation increase with profit level, Table 1 suggests incorporation is more prevalent among individuals with larger potential tax savings. Finally, average savings from incorporation range from £754 or 3.18% of profits for individuals in trades to £1,959 or 5.42% of profits for owner-managers. Most self-employed work in retail, services, and various professional services.

To what extent is business ownership the main source of earnings for these

[5] For partnerships, profits level refers to individual earnings rather than aggregate earnings.

individuals? Among the self-employed, less than 23% report working both as business owners and wage earners. However, the reliance on wage income decreases substantially when we focus on business owners with positive tax liabilities. Within the sample used to estimate income shifting elasticities (see Section 2.1), less than 12% report wages above £1,000 per year. Among directors, approximately 80% report only one wage schedule, so have no outside earnings. For the 20% with multiple wage schedules, it is impossible to differentiate between earnings from their own corporation and from outside employers.

Table 1: Summary Statistics – All Data and Survival Analysis Samples

	All Data				Survival Analysis Samples		
	Trades Only	Partnerships Only	Owner--Managers	Combination	All All	Predicted profits	Previous profits
Number of Observations	47,003,062	15,511,981	14,601,943	3,970,960	29,175,943	9,728,733	9,728,733
Number of Taxpayers	8,115,649	1,789,179	2,020,286	394,887	6,760,241	1,945,397	1,945,397
Obs. Per Taxpayer (median)	4	8	6	10	3	4	4
Obs. Per Taxpayer (mean)	5.81	8.78	7.05	10.05	4.32	5.00	5.00
Number of Trades					24,141,359	7,646,433	7,646,433
Number of Partnerships					5,415,273	2,241,335	2,241,335
Number of Spells					0.98	0.98	0.98
Number of Incorporations					303,827	187,751	187,751
Age (mean)	40	44	43	44	38	38	38
Male (percent)	0.74	0.60	0.76	0.74	0.65	0.75	0.75
Percent with Wages>£1,000	22.37	17.28	92.91	47.68	29.33	11.60	11.60
Wage % of Total Income	72.49	71.62	36.21	33.79	73.94	40.76	40.76
Profits (mean)	14,540	30,619	59,195	61,089	14,991	30,776	32,199
Profits (25th percentile)	2,705	3,006	16,902	9,369	1,741	12,222	10,965
Profits (50th percentile)	8,227	11,065	37,734	24,603	6,775	18,385	17,963
Profits (75th percentile)	17,912	28,582	59,742	52,641	15,257	28,802	30,097
Savings (mean)	754	940	1,959	860	749	1,666	1,565
Savings (25th percentile)	0	0	619	0	0	302	110
Savings (50th percentile)	0	132	2,455	1,416	0	1,051	880
Savings (75th percentile)	1,018	1,900	4,120	3,845	821	2,695	2,571
% Savings (mean)	3.18	3.75	5.42	4.63	3.23	6.17	5.39
% Savings (25th percentile)	0.00	0.00	2.72	0.43	0.00	2.44	1.13
% Savings (50th percentile)	0.57	2.67	5.34	4.22	0.05	4.95	4.50
% Savings (75th percentile)	5.32	6.26	7.59	7.09	5.14	8.64	7.45

Notes: Savings and Percent Savings measure potential savings from incorporation given individuals' profits, in pounds and as a percentage of profits. All values are in 2013 pounds. Number of trades and number of partnerships reflect the number of observations where taxpayers reported respective statuses, so are not mutually exclusive. Share of wages as percent of total income is conditional upon having positive wages.

The dataset has two important limitations for the purposes of this paper. First, it does not provide details on incorporation; instead, I am only able to observe the types of income that individuals report each year. I define incorporation as a switch from reporting self-employed income (trade or partnership) in one year to reporting being a director in the following year. Therefore, some of these individuals might become directors in a business venture that is not related to previous self-employed earnings (either as a director of a new business venture that an individual owns or as a third-party director of an existing business that an individual does not own). Such imprecision is unlikely to be problematic for the purposes of this paper because most small businesses are managed by their owners.[6] Second, because I base my analysis on individual tax returns, I am not able to observe the actual profits of *incorporated* businesses. Instead, I observe total paid wages and total reported dividends. This limitation does not affect the income shifting estimates of Section 2 because the analysis only relies on information from years when individuals are self-employed. However, this limitation may affect estimates in Section 3 and so is discussed in greater detail in that section.

2 Estimating Income Shifting

Taxation is likely to affect business behavior and entrepreneurial activity in two ways. First, differences between effective personal and corporate tax rates lead to income shifting: individuals should prefer the legal form that minimizes their tax liability (MacKie-Mason and Gordon (1997)). Second, lower corporate tax rates encourage risk-taking and thus increase entry into entrepreneurship (Cullen and Gordon (2007); Gentry and Hubbard (2005)). When corporate liability is lower than personal, the two responses are indistinguishable unless the researcher can observe pre-incorporation status. In this section, I estimate the magnitude of income shifting by focusing on business owners who initially chose the personal tax base, and then estimate the causal effect of personal-minus-corporate income tax differential on incorporation.

[6] According to recent statistics from the Department for Business Innovation and Skills, 76% of firms did not employ anyone aside from the owner. See Department of Business Innovation and Skills (2015).

2.1 Empirical Approach and Sample Construction

When choosing a legal form, a business owner must weigh the nontax advantages of each legal form against its tax liability.[7] Most common benefits of corporate legal form include limited liability protections, ability to trade on the stock exchange, and flexible compensation flow through profit deferral and use of dividends. Incorporation, however, comes at a cost: higher levels of formality make accounting and tax reporting more complicated. Since benefits of incorporation are typically the highest for established firms, while compliance costs are the highest for small firms, many entrepreneurs start as self-employed and incorporate later as their firms grow and mature.[8]

Therefore, if tax liabilities were equalized across legal forms, the natural probability of incorporation in year t of a firm's life could be measured by the baseline hazard rate

$$\alpha(t) = Prob(C \leq \mathbb{E}[NonTax_t]) = F_C(\mathbb{E}[NonTax_t]),$$

where $\mathbb{E}[NonTax_t]$ represents expected nontax benefits from incorporation, and incorporation costs C follow a cumulative distribution (cdf) F_C.[9] Our goal is to distinguish this naturally occurring change of legal form from income shifting that occurs when firms change legal form with the goal of reducing their tax liability. In the presence of tax incentives, the incorporation probability in year t of a firm's life is given by the hazard rate

$$h(t) = P(C \leq \mathbb{E}[NonTax_t] + \mathbb{E}[Tax_{t,y}]) = F_C(\mathbb{E}[NonTax_t] + \mathbb{E}[Tax_{t,y}]), \quad (1)$$

where $\mathbb{E}[Tax_{t,y}]$ measures tax savings from incorporation in a calendar year y (corresponding to individual firm's life-year t). Since the distribution of incor-

[7] For more detailed treatment of the optimal choice of organizational form see, for example, Jensen and Meckling (1976) and Scholes et al. (2002).

[8] If changes of legal form are inexpensive and tax rules vary a lot across years, business owners could choose a different legal form each year. In practice, however, firms rarely change legal form – doing so is costly and tax rules typically change gradually. For example, the corporate base has been tax-advantaged in the UK for the past 20 years, while the personal base has been preferred in the US for the past 30 years.

[9] Equation (1) requires an additional assumption that incorporation cost is independent of firm survival.

poration costs F_C is unknown, a simplifying assumption can be made in order to relate the actual hazard rate $h(t)$ to the baseline hazard $\alpha(t)$ by specifying $h(t) = \alpha(t)(\mathbb{E}[Tax_{t,y}])^{\xi}$. Then ξ is a parameter that measures legal form's responsiveness to tax incentives: a large value of ξ would imply that the cdf F_C is steep, so legal form changes are inexpensive, while a small value of ξ would imply a slowly increasing F_C. Since ξ measures tax avoidance responses, it can be incorporated in optimal tax formulae following the approach of Piketty et al. (2014).

The above framework suggests that one can estimate income shifting responses using a proportional hazard model. To do so, I focus on business owners who initially chose the personal tax base, and then estimate the relationship between tax changes and observed incorporations. I define incorporation as a switch from reporting trade or partnership income in one year to reporting being a director of a company and not reporting self-employment income the following year.

Let $h_{i,t}$ denote the incorporation hazard rate of an individual i in year t after becoming self-employed, and let α_t denote the baseline hazard rate in year t. The goal is to understand how the hazard rate $h_{i,t}$ shifts when tax savings from incorporation change in a Cox hazard model:

$$\log(h_{i,t}) = \log(\alpha_t) + \beta_1 \log(\mathbb{E}[Tax_{i,t,y}]) + \beta_2 \log(\mathbb{E}[Tax_{i,t,y}]) \cdot t + \beta_3 X_{i,y}, \qquad (2)$$

where $\mathbb{E}[Tax_{i,t,y}]$ is a vector that measures the *expected* attractiveness of incorporation in calendar year y and firm's life-year t, and therefore is based on the tax schedule in year y but profits in years $y-1$ or earlier, and $X_{i,y}$ is a vector of observed characteristics. From (2) it follows that β_1 gives the elasticity of the hazard rate with respect to expected savings from incorporation at the beginning of the self-employment, and β_2 captures the time-varying effects of tax savings on the hazard rate.[10] Controls $X_{i,y}$ include geographical-area fixed effects, year and industry fixed effects, sex, age, residency status, and the amount of dividends (as a proxy for financial sophistication). In addition, I include 10-piece income splines in year $t-1$, as well as 2- and 3-year lags, following Gruber and Saez (2002) and

[10] It is a common practice to include time-varying terms in survival models. As the results show, the hazard rate of incorporation does not vary with the duration of self-employment.

Weber (2014). Other than controlling for a potential serial correlation in profits, including both year fixed effects and income splines ensures identification is driven by variation in tax savings across both time *and* profit groups as shown in Figures 1 and 2.

I now discuss the advantages and limitations of the chosen approach: specifically, the survival model over a discrete-choice model, measurement of tax savings, and sample inclusion.

Survival model. I choose a survival-model approach over a discrete-choice model for three reasons. First and most importantly, although business owners can switch between incorporated and unincorporated legal forms each year, such switches are unlikely to be desirable because incorporation provides a tax advantage for most small businesses starting in 1999/00. Hence, while the precise amount of tax savings increases or decreases depending on tax policy and entrepreneur's profits, the relative preference for corporate form remains unchanged.[11] Second, survival models avoid bias stemming from potentially unequal survival rates of unincorporated and incorporated firms, and there is no necessity to choose between balanced or unbalanced data samples. The hazard rate is calculated by correctly incorporating information from firms that exist throughout the period, along with firms that terminate. Third, using a survival model approach avoids data limitations: while owner-managers' profits are estimated with errors, the profits of the self-employed are estimated accurately. Since the survival analysis follows the entrepreneur until they switch, the results in this section avoid this data limitation.

Expected Savings. I focus on expected savings because the incorporation decision must rely on *expected* rather than *realized* income, as profits cannot be subjected to a different tax base retroactively. I consider several measures of expected savings from incorporation: tax savings from incorporation in year y as percent of income, as well as natural logarithm of savings in pounds and as a percent of income. All measures of savings do not take into account the non-tax benefits of incorporation, as these are captured by the baseline hazard α_t. I assume all profits are paid out optimally (recall Section 1.1), but consider retaining profits as a robustness check.

[11] Among individuals who incorporate, less than 13% return to self-employment in the future.

My main measure of expected income $\mathbb{E}[p_{i,t,y}]$ relies on previous years' *taxable profits*, which are defined as the greater of zero and profits after losses carried over; hence, $p_{i,t,y}$ is always nonnegative.[12] Due to the fact that future profits are difficult to predict, in the main analysis, I focus on two measures of expected profits $\mathbb{E}[p_{i,t,y}]$ and consider several alternatives as a robustness check. First, I use the previous year's taxable profits and set $\mathbb{E}[p_{i,t,y}] = p_{i,t-1,y-1}$. Second, I set $\mathbb{E}[p_{i,t,y}] = \hat{p}_{i,t,y}$, where I predict individuals' taxable profits $\hat{p}_{i,t,y}$ by estimating

$$p_{i,t,y} = \gamma_0 + \sum_{k=1}^{3} \gamma_k p_{i,t-k,y-k} + \sum_{k=1}^{3} \delta_k RF_{i,t-k,y-k} + \eta X_{i,y}. \tag{3}$$

In (3), $p_{i,t-k,y-k}$ measures the individual's taxable profits in year $y-k$, and $RF_{i,y-k,y-k}$ is an indicator that a self-employment return was filed in year $y-k$.[13] As additional robustness checks, I also consider the maximum of the past three years' profits, as well as the realized profits. All specifications yield similar results.

Specification (2) does not account for the potentially dynamic nature of the incorporation decision. To better understand this limitation, suppose a true model is given by $y = \mu_0 + \mu_1 Sav_1 + \mu_2 Sav_2 + \varepsilon$ while the researcher estimates $y = m_0 + m_1 Sav_1 + e$; where Sav_1 and Sav_2 represent contemporaneous and future tax savings respectively. Then the estimated average treatment effect is given by $m_1\overline{Sav_1} = \mu_1\overline{Sav_1} + \mu_2\frac{Cov(Sav_1,Sav_2)}{Var(Sav_1)}\overline{Sav_1}$ instead of the desired $\mu_1\overline{Sav_1} + \mu_2\overline{Sav_2}$. This example illustrates that the magnitude of the bias then depends on how much attention individuals pay to the future and on how well current savings predict future savings. When tax policy is stable, tax savings from one year should provide a good predictor of future savings because profits exhibit high levels of serial correlation and because tax schedule changes gradually. On the other hand, when tax policy is volatile, a rational individual should put less weight on the future tax savings because of their unpredictability, thus suggesting

[12] The attractiveness of each legal form depends on realized profits, deductions, and other earnings, so a measure of $\mathbb{E}[p_{i,t,y}]$ based on taxable income rather than taxable profits would be preferred. The disadvantage, however, is that such comprehensive analysis requires accurate prediction of all components of taxable income, which is difficult, especially for the self-employed with only a few years of experience.

[13] Controls $X_{i,y}$ include geographical-area fixed effects, year and industry fixed effects, time trend, sex, age, age squared, whether the individual qualifies for state pension, the presence of other dividends (as a proxy for financial sophistication), and residency status.

a lower μ_2. For these reasons, model (2) provides a reasonable starting point for estimating income shifting.

Sample Restrictions. Because I can only observe individuals starting from 1996/97, I restrict the sample to business owners who report being self-employed in year y but were not self-employed in some *observed* year $y-1$. Hence, the main sample includes individuals who entered self-employment in 1997/98 or later, and those who had interruptions in the self-employment status prior to 1996 (see Appendix A.2). As most self-employed earn small incomes and therefore are not subject to taxes, I further restrict the sample to business owners who report taxable profits greater than the personal allowance (first kink of the income tax schedule) in more than 50% of the years, and only include person-year observations in which taxable profits exceed the personal allowance. This sample restriction ensures that the estimated elasticities are calculated based on individuals who frequently experience positive tax liability (after previous losses are taken into account) and thus should be most responsive to tax incentives. Furthermore, focusing on people with frequent profits takes the best advantage of the institutional setting: the cleanest variation in tax savings is available for people with gains. The robustness of the results to the sample selection is shown in Table A.2 in the appendix.

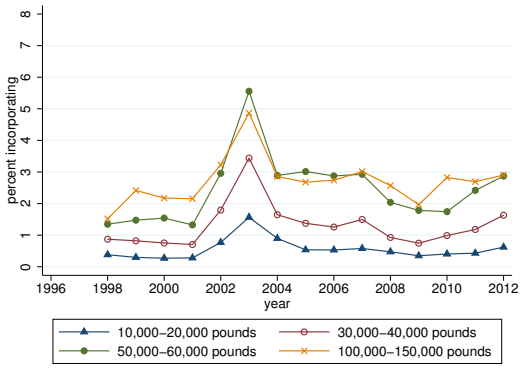
The right panel of Table 1 provides the summary statistics used in this section. The restriction on profit levels reduces the sample from 6.76 million sole proprietors and partnerships to 1.94 million. Among these individuals, only 187,000 eventually incorporate. An average entrepreneur in the sample could save £1,666 (6.17% of profits) by incorporating if the tax savings are measured based on predicted profits, or £1,565 (5.39%) based on the previous year's profits.

2.2 Hazard-Model Estimates

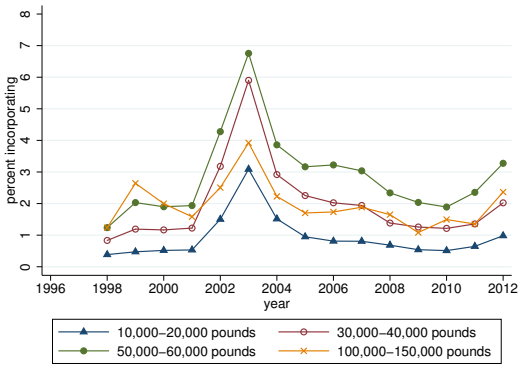
Before turning to hazard-model estimates, I present some graphical evidence on how the likelihood of incorporation responds to tax rates. Figure 3 shows how the rate of incorporation changes over time. Consistent with the discussion in Section 2.1, large and persistent heterogeneity exists in the probability of incorporation across income groups, with lower-income self-employed individuals being less prone to incorporation than higher-income individuals. However, this

Figure 3: Percent of Incorporations Over Time

(a) Trades



(b) Partnerships

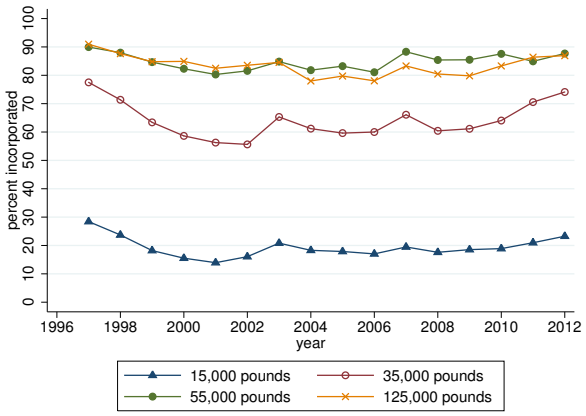


Notes: This figure shows how the number of incorporations changes over time for individuals with the following previous year's profit levels: [£10,000, £20,000], [£30,000, £40,000], [£50,000, £60,000], and [£100,000, £150,000]. Estimates are inflation adjusted to 2013 pounds. Only incorporations from a previous self-employment status are counted; that is, individuals who incorporate from the start are not included.

increasing relationship between income level and incorporation seems to stop or reverse for higher-profit groups. Second, for most income groups, partnerships exhibit higher rates of incorporation. Third, a clear correlation appears to exist between the rates of incorporation in Figure 3 and potential savings from incorporation in Figure 2. Moreover, this correlation is stronger for higher-income individuals, despite the fact that they experience smaller changes in potential savings. Finally, although the results in this section do not account for the incorporation decisions of first-time business owners, I can observe incorporation shares among first-time business owners in Figure 4. Compared with experienced sole proprietors and partners in Figure 3, first-time business owners appear to be less responsive to tax incentives, previewing the findings of Section 3. Importantly, Figure 3 suggests that by focusing on business owners who initially chose a personal tax base, I am not estimating income shifting for a negatively selected group.[14]

[14] Kaplan-Meier survival curves by age, gender, and self-employment status are available in Appendix Figure A.1. The survival curves confirm partnerships are more likely to incorporate (with nearly 25% incorporated after 16 years versus approximately 12.5% for trades). They also show that men and individuals of working age are more likely to incorporate. Finally, some variation exists across industries, but this variation is arguably smaller than, for example, by

Figure 4: Percent Incorporated among Fist-Time Business Owners



Notes: This figure shows how the percent incorporated changes over time among first-time entrepreneurs with first-year profit levels: [£10,000, £20,000], [£30,000, £40,000], [£50,000, £60,000], and [£100,000, £150,000]. Estimates are inflation adjusted to 2013 pounds.

Table 2 shows the results of estimating a proportional hazard model with savings based on predicted profits. All specifications include demographic controls, year fixed effects, and lag-1, lag-2, and lag-3 income splines. Columns (1)-(3) use a log specification of tax savings in percent, while columns (4)-(6) use a log specification of tax savings in pounds; all of these estimates can be interpreted as elasticities. Finally, columns (7)-(9) consider a log-linear specification with tax savings measured as fractions of taxable profits.

Column (1) shows that a 10% increase in the difference between average personal and corporate tax rates leads to a 2.25% increase in the hazard rate of incorporation. Given the average savings from incorporation of approximately 6% (Table 1) and an average incorporation rate of 0.5-3% per year depending on the income group (Figure 3), increasing the savings by an additional 5 percentage points would increase the yearly incorporation rate to 0.62-3.69%. Column (2) suggests this elasticity does not vary greatly with self-employment duration: the interaction term is positive and statistically significant but very small. Columns (4) and (5) focus on savings in pounds rather than in percent. The elasticity estimate of 0.15 is slightly smaller than when savings are measured in percent.

income or self-employment type.

Table 2: Cox HM Estimates: Main Estimates (Predicted Profits)

	Log(Savings %)			Log(Savings £)			Savings %		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Savings	0.225	0.198	0.255	0.145	0.160	0.135	6.146	8.235	6.299
	(0.003)	(0.004)	(0.006)	(0.002)	(0.003)	(0.003)	(0.090)	(0.124)	(0.137)
Time x Savings		0.005			-0.003			-0.488	
		(0.001)			(0.000)			(0.021)	
Savings in Year $t+1$			-0.027			0.012			-0.192
			(0.006)			(0.003)			(0.130)
N of observations: 9,726,892 in all specifications									

Notes: This table shows the results of estimating the proportional hazard model described in Section 2.1 using tax-savings measures based on predicted profits. Each column represents an estimate from a separate regression. Standard errors are clustered by individual. Savings % is measured in fractions. Savings in Year $t+1$ measures savings based on year $t+1$ tax schedule. Each regression includes the following controls: individual demographics; year, geographic, and industry fixed effects; and 10-piece splines of previous-year profits, profits 2 years ago, and profits 3 years ago respectively, with break points at £10,000. All £-values are inflation adjusted to 2013.

Again, the interaction term with the duration of self-employment is not economically significant. Although responses to tax savings in pounds and as a percentage of income appear to be similar on average, they measure different incentives. Savings in pounds is an appropriate measure if incorporation is primarily driven by fixed costs. On the other hand, savings as a percentage is more accurate if variable costs of incorporation matter the most. Columns (7)-(9) estimate semi-elasticities: a 1 percentage point increase in savings from incorporation leads to 6.15% increase in the hazard rate of incorporation. As follows from Table 1, average savings from incorporation are 6.17%. Hence, the estimate in column (8) implies an elasticity of 0.38, which is slightly larger than 0.23 from column (1).

The results presented so far show how the hazard rate of incorporation responds to tax incentives in a given year. However, individuals only need to incorporate once in order to benefit from lower tax rates in the future, so could respond not only to current tax rates, but also to future tax rates. To evaluate the presence and magnitude of such anticipatory responses, I include a measure of future tax savings – measured using the tax schedule in year $t+1$ but based on the same expected profits – in columns (3), (6) and (9). The results suggest that individuals primarily respond to the current year's incentives, with little or no response to future years' incentives. Several explanations are possible. First,

individuals simply might not trust the government to honor the announced rates. Although as short-term rates are relatively stable, this explanation is unlikely. Second, individuals might be inattentive to future tax rates because these rates are less salient than current taxes. Third, individuals may be unable to respond because of financial constraints.

To estimate the forgone tax revenue as a result of income shifting, I use my estimated elasticity of $e = 0.23$ to predict the number of incorporations in each year that were motivated by tax avoidance considerations between 1999/2000 and 2012/13. Specifically, I estimate the number of income shifters in year t as $N_t^{Shifters} = e \cdot (h_{97-99} \cdot N_t^{Self-Empl}) \cdot \frac{Savings_t - Savings_{97-99}}{Sav_{97-99}}$, where $N_t^{Self-Empl}$ measures the number of self-employed individuals in year t, $Savings_t$ measures averages savings of individuals who incorporated in year t, and $Savings_{97-99}$ measures average savings of individuals who incorporated in 1997-1999. This exercise suggests that as a result of reforms that happened between 2000/01 and 2012/13, approximately 96,000 business owners incorporated in order to save on taxes, which reduced the total collected tax revenue by £1.43 billion. An average income shifter saved £2,000-£3,000 per year as a result of incorporation. However, this back-of-the-envelope calculation does not account for the number of income shifters in 1997/98-1999/00, and therefore only measures increases in income shifting over time.

2.3 Measurement Error and Robustness Checks

Since entrepreneurs decide on whether to incorporate or not based on the expected savings from doing so, my measure of savings may suffer from a measurement error if entrepreneurs' expectations of tax savings differ from my estimates. For example, entrepreneurs may have private information about their future business operations that is not yet reflected in observed profits. Alternatively, my estimates of tax savings may differ from entrepreneurs' due to differences in tax policy forecasts. Finally, entrepreneurs' expectations may be erroneous: they may be too optimistic or too pessimistic about their business prospects, or they may make mistakes when calculating tax savings.

I investigate the robustness of my results to alternative measures of profits in Table 3. Column (1) uses predicted profits as in Table 2, column (2) uses the

highest taxable profits in the past three years, column (3) uses the previous year's income, and column (4) uses actual realized taxable profits in each year. Panel A assumes profits are distributed and are subject to that year's dividend tax, whereas Panel B assumes profits are retained. Because retained profits are not subject to dividend tax, overall savings from incorporation are higher, therefore, estimated elasticities should be slightly lower. This is precisely what we observe: for most specifications, estimates in Panel B are slightly smaller than in Panel A. All profits measures produce similar results, and my preferred specification – predicted profits – falls approximately in the middle of the range. Additional robustness checks are available in the appendix.

Table 3: Cox HM Estimates: Comparing Income Measures

	Predicted Profits	Highest 3-Year Profits	Previous Profits	Actual Profits
	(1)	(2)	(3)	(4)
Panel A: Profits are Distributed				
Log(Savings %)	0.225	0.366	0.206	0.254
	(0.003)	(0.003)	(0.003)	(0.004)
Log(Savings £)	0.145	0.251	0.124	0.178
	(0.002)	(0.002)	(0.002)	(0.003)
Savings %	6.146	7.043	3.337	9.924
	(0.090)	(0.083)	(0.091)	(0.136)
Panel B: Profits are Retained				
Log(Savings %)	0.222	0.393	0.203	0.198
	(0.004)	(0.003)	(0.004)	(0.004)
Log(Savings £)	0.137	0.255	0.119	0.143
	(0.002)	(0.002)	(0.002)	(0.002)
Savings %	4.656	7.623	2.088	2.999
	(0.112)	(0.074)	(0.116)	(0.103)
Number of Observations: 9,726,892 in all specifications				

Notes: This table shows the results of estimating the proportional hazard model described in Section 2.1 using tax savings measures based on various measures of taxable profits. Each cell represents an estimate from a separate regression. Standard errors are clustered by individual. Each regression includes the following controls: individual demographics; year, geographic and industry fixed effects; and 10-piece splines of previous year profits, profits 2 years ago and profits 3 years ago respectively, with break points at £10,000. All £-values are inflation adjusted to 2013.

In absence of validation data, researchers can use multiple measures of the same variable as instruments, in order to obtain consistent estimates of interest. To fix ideas, suppose the true model is given by $y^* = \beta X^* + Z\gamma + \varepsilon$ and the

researcher has access to two measures of X^*: $X_1 = X^* + \mu_1$ and $X_2 = X^* + \mu_2$. As discussed in Bound et al. (2001), instrumenting X_1 with X_2 will lead to a consistent estimate of β if the following three conditions are satisfied. First, the measurement error in question is classical, i.e. $\sigma_{X^*,\mu_1} = 0$. Second, the reporting errors in X_2 should be unrelated to factors other than the X^* affecting y, i.e. $\sigma_{\mu_2,\varepsilon} = 0$. And third, the two errors in reporting X^* should be uncorrelated, i.e. $\sigma_{\mu_1,\mu_2} = 0$.

While it is plausible that the first and second conditions are satisfied, the third condition is most likely to be violated. By construction, the available measures relate to each other and are based on past profit realizations. If the measurement error is due to unobserved information about future performance or different beliefs about the future tax rules, measurement errors μ_1 and μ_2 are likely to be correlated, and therefore the instrumental variable (IV) approach would not produce the desired correction. Whether the first condition is satisfied or not will depend on the nature of measurement error. If the measurement error is driven by mistakes in calculating tax savings, the first condition is likely to be satisfied. On the other hand, since tax savings are a nonlinear function of profits, a classical measurement error in profits does not necessarily translate into classical measurement error in savings.[15] Interestingly, σ_{X^*,μ_1} may be negative if individuals believe that cheating under the corporate base is more difficult than under the personal tax base. Finally, an additional econometric issue arises from the fact that there is no well-accepted estimation approach for IV hazard models. For these reasons, I do not implement such an IV correction. To summarize, this discussion highlights the difficulty of accounting for measurement error in non-linear models absent perfect information on firm owner's decision making process, gives context to the estimates of this paper, and shows that these issues are ripe for future investigation.

2.4 Who Incorporates? Heterogeneity of Response

In this section, I examine which factors affect the incorporation decision. I start by exploring how incorporation levels vary by demographic characteristics. Ap-

[15] I explore these types of errors in Appendix Table A.5.

pendix Table A.3 shows the hazard rate of incorporation is 10-18% higher for males than females. Age has an inverse U-shaped effect on the hazard rate, and individuals below the statutory age of retirement are 30% more likely to incorporate than individuals above the statutory age. Being a UK resident has a large effect on incorporation, whereas having larger dividends has a negligible effect. Finally, Table A.3 shows the varying effects of self-employment type on incorporation.

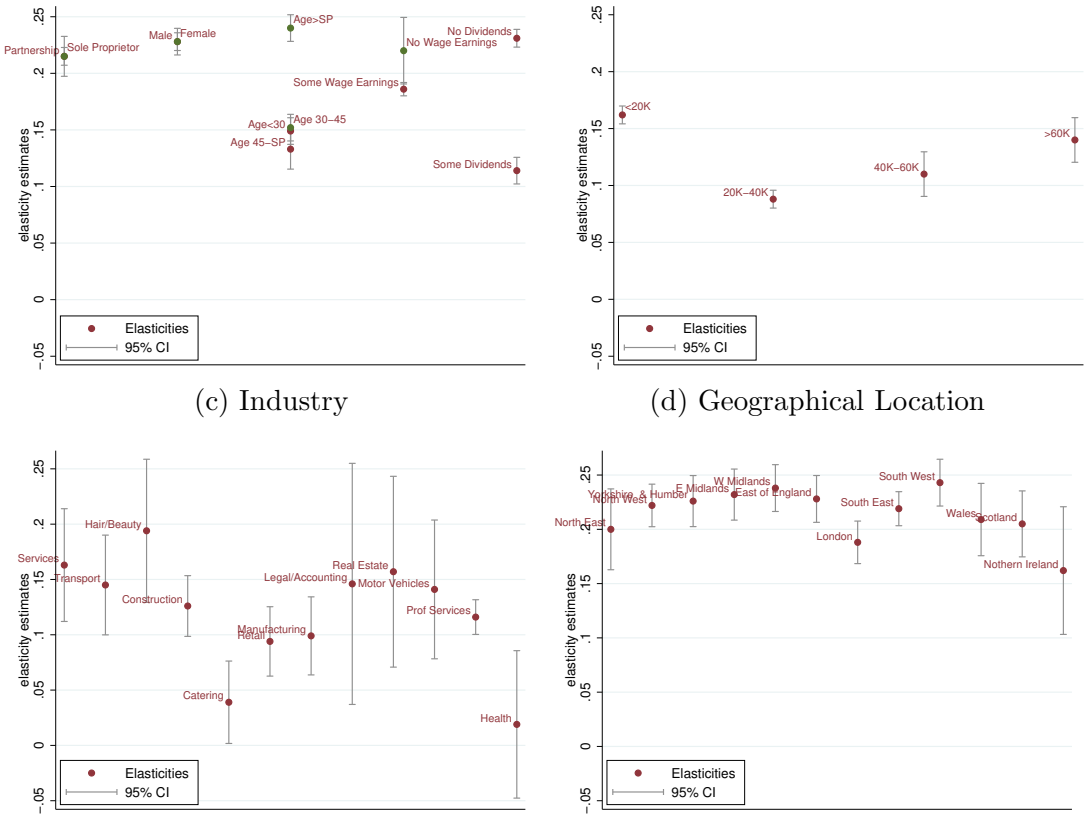
Next, I explore whether differences in levels of incorporation also translate into differences in elasticities. Figure 5 presents the results of estimating specification (1) of Table 2 for various demographic groups respectively, with savings measures based on predicted profits.

Panel (a) focuses on demographic characteristics. Results suggest that elasticities do not vary greatly by self-employment type or gender. Similarly, I find elasticities of the hazard rate of incorporation to be similar across age groups, with the exception of elderly individuals, who appear to be more responsive to tax changes than younger individuals. This finding is in stark contrast to the levels evidence from Table A.3, which documents significantly lower incorporation hazard rates for elderly business owners. Next, individuals for whom self-employment is the only source of income exhibit slightly higher elasticities than individuals with wage incomes. Finally, individuals with no dividends are twice as likely to income shift than individuals with positive dividends. If positive dividends are a proxy for financial sophistication, Figure 5 implies that less financially savvy business owners are either more responsive to tax incentives, or that they are less likely to select the incorporated form when starting their business. Since my sample is restricted to individuals who initially chose self-employment, the results in this section do not control for initial self-selection. This heterogeneity analysis suggests that differences in observed levels of incorporation and elasticities of incorporation are unlikely to be attributed to differences in awareness of tax regulations. If information were the primary channel for the choice of legal form, one would expect to observe low elasticities of incorporation for groups with low levels of incorporation. We do not observe this in Figure 5. The mismatch between levels and elasticities instead suggests that individuals vary in perceived costs of incorporation.

Figure 5: Cox HM Estimates: Heterogeneity Analysis (Predicted Profits)

(a) Demographics

(b) Profit Level



(c) Industry

(d) Geographical Location

Notes: This figure shows the results of estimating the proportional hazard model described in Section 2.1 using Log(Savings %) based on predicted profits. Each point estimate represents an estimate from a separate regression. Standard errors are clustered by individual. Each regression includes the following controls: individual demographics; year, geographic and industry fixed effects; and 10-piece splines of previous-year profits, profits 2 years ago, and profits 3 years ago respectively, with break points at £10,000. All £-values are inflation adjusted to 2013.

Panel (b) of Figure 5 breaks down the sample into four groups based on average taxable profits during the observed period of business ownership. Because tax incentives exhibit lower variance within these narrower income groups within a year, I do not include year fixed effects. The results are generally consistent across specifications and suggest a slightly higher elasticity among the lowest-profits group, and no obvious relationship for other income groups.

Panel (c) of Figure 5 explores elasticity heterogeneity across a number of selected industries. The results show some heterogeneity across industries but are sensitive to specification. Importantly, estimates show that professionals (Accounting, Real Estate, Professional Services) are not necessarily more tax-elastic than owners of basic service businesses (Services, Construction, Hair and Beauty). Finally, Panel (d) shows elasticity estimates by geographical location. The results show some heterogeneity, but the differences in elasticities are small.

3 Distinguishing between Income Shifting and Entrepreneurial Entry

The results in the previous section show that income shifting is an important margin of response that cannot be disregarded when looking at the effect of taxation on entrepreneurial activity. However, lowering corporate tax liability could still be a useful policy tool if doing so increases entrepreneurial activity. In this section, I follow the previous literature and study how the number of unincorporated and incorporated businesses changes in response to taxation. In contrast to the previous work, I am able to decompose the total increase in the number of new incorporated firms into true entry into entrepreneurship and income shifting between tax bases.

Researchers interested in the effect of corporate taxes on entrepreneurship often estimate how the number of new incorporated firms responds to changes in tax rates (e.g., Gentry (1994); Romanov (2006); Da Rin et al. (2011); Devereux and Liu (2015)). However, a relative decrease in corporate tax rates affects the number of new incorporated firms in three ways. First, lower corporate taxes make entrepreneurship more attractive and hence increase entrepreneurial entry. Second, the newly created businesses are more likely to choose the tax-favored

base, and hence incorporate from the start. Third, lower corporate taxes also lead to income shifting among the existing unincorporated firms as shown in Section 2. Thus, the elasticity of new incorporated businesses with respect to tax savings from incorporation is a weighted sum of elasticity of switching from a personal to a corporate tax base, an elasticity of choosing the corporate form among first-time business owners, and an elasticity of entrepreneurial entry (both incorporated and not), all with respect to tax savings from incorporation and weighted by the relative shares of switchers and true new businesses. Formally,

$$e_{\substack{New\_Incorp \\ Firms}} = \frac{Switchers}{New\_Incorp} \cdot e_{Switchers} + \left(1 - \frac{Switchers}{New\_Incorp}\right) \cdot \left[e_{\substack{\%Incorp \\ New\_Entrprs}} + e_{\substack{New \\ Entreprs}} \right]. \tag{4}$$

Therefore, one can differentiate between entrepreneurial entry and income shifting by studying the changes in the number of new incorporated business owners that were previously unincorporated to estimate $e_{Switchers}$ (or use the results from Section 2), by studying the changes in the share of incorporated businesses among first-time business owners to estimate $e_{\substack{New \\ Entreprs}}$, and the number of new business owners (incorporated or not) to estimate $e_{\substack{\%Incorp \\ New\_Entrprs}}$. To summarize, I estimate a fixed-effects model:

$$\log(Outcome_{it}) = \gamma_i + \lambda_t + \beta(\tau^{corporate} - \tau^{personal})_{it} + \varepsilon_{it}, \tag{5}$$

where $(\tau^{corporate} - \tau^{personal})_{it}$ measures the differences between effective personal and corporate average tax rates for each profit bin i in year t, and $Outcome_{it}$ measures the corresponding number of business owners. Specification (5) relies on the counts rather than the micro data, because we are interested in entrepreneurial entry – a microdata analysis would require data on the full population, which is not available.

For the purposes of this analysis, the available data present two limitations. First, new business owners are defined as individuals who have not reported receiving self-employment income previously (from trade or partnership) or being a director on their tax return. Since the panel data are limited to the years 1996/97–2012/13, individuals who have taken a short break from self-employment during the period studied might appear as new business owners, even though they have had previous entrepreneurial experience. This data limitation only

affects the early years of the sample; for this reason, I drop the years prior to 2002. Second, individual tax return data contain information on distributed wages and dividends of directors rather than realized profits. If many directors choose not to pay out full realized profits, or have earnings from other jobs, the estimated profits will be incorrect and the entrepreneur will be assigned to the wrong profit bin (Miller et al. (2019)). For these two reasons, I match my main specification to that of Devereux and Liu (2015) (henceforth, DL'2015), who use 2002/2003–2008/2009 corporate tax return data to investigate how changes in savings from incorporation affect the number of newly incorporated firms in the UK. As DL'2015 rely on corporate tax return data, they have accurate information on realized profits and the year of incorporation. However, they are not able to distinguish between income shifters and true new business owners. To assess the importance of measurement errors, I match my sample to that of DL'2015 and show that their results replicate. I then extend my sample to all years. In all specifications I look at profit levels between £0 and £100,000, broken down into £100 bins.

The results are summarized in Table 4. Panel A replicates DL'2015 and shows that the results are similar. My semi-elasticities are 0.030 – assuming earnings are retained – and 0.032 if earnings are distributed, compared to DL's estimates of 0.038 and 0.032, respectively.[16] Panel A suggests that distributed profits provide a satisfactory proxy for realized profits and do not adversely affect the estimates.

Panel B of Table 4 breaks down estimates from Panel A following (4) separately in semi-elasticities (to match the analysis in DL'2015) and in elasticities (to match the analysis in the Section 2.2). Following DL'2015, Table 4 measures savings as percent rather than as fractions, and therefore estimates of Panel A and rows (a)-(b) of Panel B should be multiplied by 100 before comparing them to columns (7) – (9) of Table 2. Overall, Panel B shows that optimal policymaking must account for the fact that lowering corporate tax rates has both positive effects (higher rates of entrepreneurship) and negative effects (income shifting from personal tax base): the income shifting elasticities in column (2) are of approximately equal value to the business entry elasticities in column (4). Interestingly,

[16] For simplicity, I only replicate the log-linear specification from Table 4.

Table 4: Entrepreneurial Entry and Income Shifting

Panel A: Replicating Devereux and Liu (2015)

	outcome variable: logarithm (new incorporated entrepreneurs), 2002-2008	
Savings % Retained	0.030***	
	(0.001)	
Savings % Distributed		0.032***
		(0.001)
Year FE	yes	yes
Num Obs	7000	7000

Panel B: Breaking down by type of response

	outcome variable: logarithm of				
	N total new incorporated entrepreneurs	N switchers from personal base	N 1st-time incorporated entrepreneurs	N 1st-time entrepreneurs (personal & corporate)	Share incorp. among 1st-time entrepreneurs
	(1)	(2)	(3)	(4)	(5)
(a) In semi-elasticities on distributed earnings, 2002-2012					
Savings % Distributed	0.039***	0.029***	0.041***	0.033***	0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Number of Observations	11000	10997	11000	11000	11000
(b) In semi-elasticities on distributed earnings with income > Personal Allowance, 2002-2012					
Savings % Distributed	0.044***	0.033***	0.048***	0.035***	0.013***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
(c) In elasticities on distributed earnings with income > Personal Allowance, 2002-2012					
Log(Savings % Distributed)	0.210***	0.144***	0.242***	0.169***	0.073***
	(0.008)	(0.008)	(0.009)	(0.007)	(0.004)
(d) In elasticities on distributed earnings with income > Personal Allowance, 2002-2012					
Log(Savings £ Distributed)	0.098***	0.063***	0.117***	0.080***	0.037***
	(0.007)	(0.006)	(0.007)	(0.006)	(0.003)
Number of Observations	10259	10256	10259	10259	10259

Notes: Each cell represents an estimate from a separate regression. Savings % measure savings from incorporation given individuals' profits, as a percentage of profits (not fractions). Savings % Retained are calculated under the assumption that all profits are retained, and therefore do not incur dividend taxes. Savings % Distributed are calculated under the assumption that all profits are distributed, and therefore are subjected to dividend taxation. All £-values are inflation adjusted to 2013.

new business owners appear to be less responsive to tax incentives (column (5)) than experienced business owners (column (2)). The estimated elasticities in row (a) are low: a 10 pp increase in tax savings from incorporation would only lead to a 2.9% increase in switching from a personal to a corporate tax base, and a 3.3% increase in entrepreneurial entry. This is because, in any year, roughly half of the new incorporations represent switching from personal tax base, i.e., $\frac{Switchers}{New\_Incorp} \approx 0.5$, it follows that only half of the increase in incorporations represent genuine entrepreneurial entry.

The results in row (a), however, are based on all the observations, including taxpayers with very low levels of profits. However, as Table 1 shows, individuals with small profits are unlikely to be sensitive to tax rates due to the basic personal exemption. To avoid this limitation, I focus on business owners who are subject to personal tax liability in rows (b) – (d), similar to the analysis in Section 2. Estimates in column (2) of rows (c) and (d) can be compared to estimates of column (1) and (4) of Table 2, respectively. The results suggest that a 10% increase in tax savings from incorporation leads to a 0.8-1.69% increase in the number of new business owners, and a 0.63-1.44% increase in income shifting. These elasticities are slightly smaller than the estimates of Table 2, which predict a 1.45-2.25% increase in income shifting. Consistently with graphical evidence from Figure 4, first time business owners' choice of legal form is less influenced by tax consideration, increasing by 0.37-0.73%.

4 Conclusion and Policy Implications

In this paper, I estimate income shifting and business entry responses to differences in personal and corporate tax liabilities in the UK. I find that a 10% increase in the difference between effective personal and corporate tax rates leads to a 1.69% increase in the number of new businesses. However, higher entrepreneurial entry is offset by income shifting – increasing the hazard rate of incorporation of the existing self-employed by up to 2.3% for a 10% increase in tax savings. Although I find that the number of newly incorporated businesses increases, I do not observe the nature of these individuals' prior employments, so cannot verify that the new firms are not income shifters as well. Lower corporate tax

rates make the corporate base attractive not only to the existing unincorporated self-employed, but also to regular employees, making "independent contractor" work more attractive than regular wage employment. To what extent this form of income shifting happens in practice remains an open empirical question.[17]

The results confirm that any tax differences between personal and corporate tax bases – whether due to payroll, dividend, or income taxes – can lead to income shifting, and thus, in principle, should be avoided. However, the estimated elasticities of income shifting and implied revenue losses are relatively small. Thus, the results suggest that although important, income shifting is not the key channel for tax avoidance, and that more complicated forms of income shifting are even less likely to be utilized. If organizational form shifting is uncommon, there is less need to equalize effective personal and corporate tax rates, at least for lower-income individuals. However, the extent to which my findings apply to high-income individuals remains unclear because the vast majority of business owners in my sample have profits of less than £100,000. On one hand, larger firms may exhibit higher levels of organizational form shifting because of access to better tax planning services, or because income shifting is the only opportunity to avoid taxation. On the other hand, the decision of larger businesses may critically depend on nontax considerations, in which case, organizational form switches may be difficult.

These low levels of organizational form shifting are surprising because the income shifting considered in this paper is unquestionably legal and involves minimal hurdles. Moreover, for the low-to-mid-income businesses considered in this study, tax considerations are likely to be the primary factor when choosing a legal form. What could explain the low levels of organizational form income shifting? It is unlikely that individuals are completely unaware of the potential tax savings because most of them employ the assistance of tax preparers at some point.[18] Several alternative explanations are possible. First, individuals might fail to income shift because of inertia (Jones (2012); Benzarti (2020)). Since learning about the tax code is costly (Abeler and Jger (2015); Bergner and Heckemeyer

[17]See Lim et al. (2019) for evidence of such income shifting in the U.S.

[18]A conflict of interest is improbable in this setting because corporate tax return preparation is likely to be more profitable, which should incentivize tax preparers to advise their clients on the potential tax savings.

(2017); Zwick (2018)), individuals might prefer to delay the learning, resulting in indefinite procrastination, since incorporation does not have a natural deadline. Second, business-owners might find evasion to be a more optimal method of reducing their tax liability. This type of response has been documented by Waseem (2018) in Pakistan, and is supported by lower levels of incorporation among cash businesses and higher estimated unconditional tax gaps (HMRC (2017)) for the self-employed. Alternatively, they might believe that incorporation will lead to a higher probability of auditing or that cheating is easier under the personal tax base. While incorporation is associated with higher levels of formality, it does not preclude cheating, as cash transactions are equally difficult to verify for incorporated and unincorporated firms.

References

Abeler, J. and S. Jger (2015): "Complex Tax Incentives," *American Economic Journal: Economic Policy*, 7, 1–28.

Alstadster, A. and M. Jacob (2016): "Dividend Taxes and Income Shifting," *The Scandinavian Journal of Economics*, 1–25.

Alstadster, A. and K. R. Wangen (2010): "Small Corporations' Income Shifting Through Choice of Ownership Structure A Norwegian Case," *Finnish Economic Papers*, 23, 73–87.

Benzarti, Y. (2020): "How Taxing Is Tax Filing? Using Revealed Preferences to Estimate Compliance Costs," *American Economic Journal: Economic Policy*.

Bergner, S. M. and J. H. Heckemeyer (2017): "Simplified Tax Accounting and the Choice of Legal Form," *European Accounting Review*, 26, 581–601.

Bound, J., C. Brown, and N. Mathiowetz (2001): "Chapter 59 - Measurement Error in Survey Data," in *Handbook of Econometrics*, ed. by J. J. Heckman and E. Leamer, Elsevier, vol. 5, 3705–3843.

Carroll, R. and D. Joulfaian (1997): "Taxes and Corporate Choice of Organizational Form," *US Department of the Treasury, OTA Paper*, 73.

Clarke, C. and W. Kopczuk (2017): "Business Income and Business Taxation in the United States Since the 1950s," *Tax Policy and the Economy*, 31, 121–159.

Cullen, J. B. and R. H. Gordon (2007): "Taxes and Entrepreneurial Risk-taking: Theory and Evidence for the U.S." *Journal of Public Economics*, 91, 1479–1505.

Da Rin, M., M. Di Giacomo, and A. Sembenelli (2011): "Entrepreneurship, Firm Entry, and the Taxation of Corporate Income: Evidence from Europe," *Journal of Public Economics*, 95, 1048–1066.

DeBacker, J. M., B. Heim, S. Ramnath, and J. M. Ross (2019): "The Impact of State Taxes on Pass-Through Businesses: Evidence from the 2012 Kansas Income Tax Reform," *Journal of Public Economics*, 174, 53–75.

Department of Business Innovation and Skills, D. (2015): "Statistical Release - Business Population Estimates for the UK and Regions," URN15/92.

Devereux, M. and L. Liu (2015): "Incorporation for Investment," Mimeo.

Edmark, K. and R. H. Gordon (2013): "The Choice of Organizational Form by Closely-Held Firms in Sweden: Tax Versus Non-Tax Determinants," *Industrial and Corporate Change*, 22, 219–243.

Fjrli, E. and D. Lund (2001): "The Choice Between Owners Wages and Dividends under the Dual Income Tax," *Finnish Economic Papers*, 14, 104–119.

Gentry, W. M. (1994): "Taxes, Financial Decisions and Organizational Form," *Journal of Public Economics*, 53, 223–244.

Gentry, W. M. and R. G. Hubbard (2005): "Success Taxes," Entrepreneurial Entry, and Innovation," in *Innovation Policy and the Economy, Volume 5*, The MIT Press, 87–108.

Goolsbee, A. (1998): "Taxes, Organizational Form, and the Deadweight Loss of the Corporate Income Tax," *Journal of Public Economics*, 69, 143–152.

——— (2004): "The Impact of the Corporate Income Tax: Evidence from State Organizational Form Data," *Journal of Public Economics*, 88, 2283–2299.

Gordon, R. and J. Slemrod (2000): "Are "Real" Responses to Taxes Simply Income Shifting Between Corporate and Personal Tax Bases?" in *Does Atlas Shrug?: The Economic Consequences of Taxing the Rich*, ed. by J. Slemrod, Harvard University Press, 240–279.

Gordon, R. H. and J. K. MacKie-Mason (1994): "Tax Distortions to the Choice of Organizational Form," *Journal of Public Economics*, 55, 279–306.

Gruber, J. and E. Saez (2002): "The Elasticity of Taxable Income: Evidence and Implications," *Journal of Public Economics*, 84, 1–32.

Haltiwanger, J., R. S. Jarmin, and J. Miranda (2012): "Who Creates Jobs? Small versus Large versus Young," *The Review of Economics and Statistics*, 95, 347–361.

Harju, J. and T. Matikka (2016a): "Business Owners and Income-Shifting: Evidence from Finland," *Small Business Economics*, 46, 115–136.

——— (2016b): "The Elasticity of Taxable Income and Income Shifting Between Tax Bases: What is Real and What is Not," *International Tax and Public Finance*, 23, 640–669.

HMRC (2017): "Measuring Tax Gaps 2017 Edition," An Official Statistics Release.

Hurst, E. and B. W. Pugsley (2011): "What Do Small Businesses Do?" *Brookings Papers on Economic Activity*, 2011, 73–118.

Jensen, M. C. and W. H. Meckling (1976): "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure," *Journal of Financial Economics*, 3, 305–360.

Jones, D. (2012): "Inertia and Overwithholding: Explaining the Prevalence of Income Tax Refunds," *American Economic Journal: Economic Policy*, 3, 158–185.

Lim, K., A. Miller, M. Risch, and E. Wilking (2019): "Independent Contractors in the U.S.: New Trends from 15 years of Administrative Tax Data," Mimeo.

Liu, L. (2014): "Income Taxation and Business Incorporation: Evidence from the Early Twentieth Century," *National Tax Journal*, 67, 387–418.

Luna, L., M. N. Murray, and others (2010): "The Effects of State Tax Structure on Business Organizational Form," *National Tax Journal*, 63, 995–1022.

Lpez-Laborda, J., J. Valls-Gimnez, and A. Zrate-Marco (2017): "Income Shifting in the Spanish Dual Income Tax," *Fiscal Studies*.

MacKie-Mason, J. K. and R. H. Gordon (1997): "How Much Do Taxes Discourage Incorporation?" *The Journal of Finance*, 52, 477–506.

Miller, H., T. Pope, and K. Smith (2019): "Intertemporal income shifting and the taxation of owner-managed businesses," IFS Working Paper WP19/25.

Mooij, R. A. d. and G. Nicodme (2008): "Corporate Tax Policy and Incorporation in the EU," *International Tax and Public Finance*, 15, 478–498.

Onji, K. and J. P. Tang (2017): "Taxes and the Choice of Organizational Form in Late Nineteenth Century Japan," *The Journal of Economic History*, 77, 440–472.

Piketty, T., E. Saez, and S. Stantcheva (2014): "Optimal Taxation of Top Labor Incomes: A Tale of Three Elasticities," *American Economic Journal: Economic Policy*, 6, 230–271.

Pirttil, J. and H. Selin (2011): "Income Shifting within a Dual Income Tax System: Evidence from the Finnish Tax Reform of 1993," *Scandinavian Journal of Economics*, 113, 120–144.

Romanov, D. (2006): "The Corporation as a Tax Shelter: Evidence from Recent Israeli Tax Changes," *Journal of Public Economics*, 90, 1939–1954.

Scholes, M., M. Wolfson, M. Erickson, E. Maydew, and T. Shevlin (2002): *Taxes and Business Strategy: A Planning Approach*, New Jersey: Prentice-Hall.

Sivadasan, J. and J. Slemrod (2008): "Tax Law Changes, Income-Shifting and Measured Wage Inequality: Evidence from India," *Journal of Public Economics*, 92, 2199–2224.

Thoresen, T. O. and A. Alstadster (2010): "Shifts in Organizational Form under a Dual Income Tax System," *FinanzArchiv: Public Finance Analysis*, 66, 384–418.

Waseem, M. (2018): "Taxes, Informality and Income Shifting: Evidence from a Recent Pakistani Tax Reform," *Journal of Public Economics*, 157, 41–77.

Weber, C. E. (2014): "Toward Obtaining a Consistent Estimate of the Elasticity of Taxable Income Using Difference-in-Differences," *Journal of Public Economics*, 117, 90–103.

Zwick, E. (2018): "The Costs of Corporate Tax Complexity," NBER Working Paper 24382.

A APPENDIX FOR ONLINE PUBLICATION ONLY

A.1 Calculating Savings from Incorporation

Effective marginal tax rates in Table A.1 and tax savings from incorporation in Figures 1 and 2 are calculated assuming owner-managers distribute all earned profits by choosing the optimal allocation between wages and dividends. From 1996/97 through 1998/99, this meant paying a salary equal to the LEL (lower earnings limit). Since 1999/00, optimal salary equals the greater of PT (primary threshold) and ST (secondary threshold). In 2002/03 and 2003/04, optimal salary actually depends on owner-manager's total profits, but the difference is extremely small (it only affects how much tax is paid on £13 per year). For simplicity, I assume all owner-managers choose to pay a wage equal to the primary threshold in 2002/03 and 2003/04. (Note that from 2001/02 until 2010/11, primary and secondary thresholds coincided).

While savings from incorporation are calculated correctly in Figures 1 and 2, Table A.1 omits a few very small brackets due to the lack of space. Specifically, individuals earning between £3,432 and £4,316 in 1999/00 and between £3,952 and £4,368 in 2000/01 would be subject to 10% MTR under the corporate tax base. Similarly, individuals earning between £7,072 and £7,228 in 2011/12, and between £7,488 and £7,592 in 2011/12 were subject to 13.8% MTR under the corporate tax base.

These calculations also account for the reduction in personal allowance introduced in 2010/11 for individuals with incomes of £100,000 or more.

Finally, it is important to note that while tax rates have remained the same for many years, thresholds and bracket cutoffs have changed almost every year. For this reason, the savings curves do not coincide even in the years when MTRs remained the same.

Table A.1: Effective Personal and Corporate Tax Rates

		MTR	**LEL**	**MTR**	**1st**	**MTR**	**LPL**	**MTR**	**2nd**	**MTR**	**UPL**	**MTR**	**3rd**	**MTR**	**3rd**	**Top MTR**	
1996/	Personal			0	3765	20	6860	26	7665	30	23660	24	29265			40	
1997	Corporate	0	3172											24	30638	43	
1997/	Personal			0	4045	20	7010	26	8145	29	24180	23	30145			40	
1998	Corporate	0	3224											21	30486	40.75	
1998/	Personal			0	4195	20	7310	26	8495	29	25220	23	31295			40	
1999	Corporate	0	3328											21	31649	40.75	
		MTR	**ST**	**MTR**	**1st**	**MTR**	**2nd**	**MTR**	**LPL**	**MTR**	**UPL**	**MTR**	**3rd**	**MTR**	**3rd**	**Top MTR**	
1999/	Personal			0	4335	10	5835	23	7530	29	26000	23	32335			40	
2000	Corporate	0	4316											20	35837	40	
		MTR	**1st**	**MTR**	**2nd**	**MTR**	**LL**	**MTR**	**UPL**	**MTR**	**3rd**	**MTR**	**3rd**	**MTR**	**UL**	**Top MTR**	
2000/	Personal	0	4385	17	5905			29	27820	22	32785					40	
2001	Corporate	0	3952			10	14368					22.5	35755	41.875	54368	40	
2001/	Personal	0	4535	17	6415			29	29900	22	33935					40	
2002	Corporate	0	4524			10	14524					22.5	37066	41.875	54524	40	
2002/	Personal	0	4615	17	6535			29	30420	22	34515					40	
2003	Corporate					0	14628					23.75	36790	42.8125	54628	39.25	
2003/	Personal	0	4615	18	8375			30	30940	23	35115					41	
2004	Corporate					0	14628					23.75	37498	42.8125	54628	39.25	
2004/	Personal	0	4745	18	6765			30	31720	23	36145					41	
2005	Corporate					0	14732					23.75	38695	42.8125	54732	39.25	
2005/	Personal	0	4895	18	6985			30	32760	23	37295					41	
2006	Corporate					0	14888					23.75	40024	42.8125	54895	39.25	
		MTR	**LPL**	**MTR**	**PT**	**MTR**	**2nd**	**MTR**	**UPL**	**MTR**	**3rd**	**MTR**	**3rd**	**Top MTR**			
2006/	Personal	0	5035			18	7185	30	33540	23	38335			41			
2007	Corporate			0	5044							19	42034	39.25			
2007/	Personal	0	5225	0	5225	18	7455	30	34840	23	39825			41			
2008	Corporate		5200									20	44153	40			
		MTR	**LPL**	**MTR**	**PT**	**MTR**	**1st**	**MTR**	**UPL**	**MTR**	**2nd**	**MTR**	**2nd**	**MTR**	**3rd**	**MTR**	**3rd**	**Top MTR**
2008/	Personal	0	5435			8	6035	28	40040	21	40835							41
2009	Corporate			0	5460							21	45761					40.75
2009/	Personal	0	5715			8	6475	28	43875	29	43875							41
2010	Corporate			0	5720							21	48644					40.75
2010/	Personal	0	5715			8	6475	28	43875	29	43875			41	150000			51
2011	Corporate				5720							21	48644			40	168035	49.5
2011/	Personal	0	7225			9	7475	29	42475	29	42475			42	150000			52
2012	Corporate			0	7228							20	46900			40	167866	48.9
2012/	Personal	0	7605			9	8105	29	42475	29	42475			42	150000			52
2013	Corporate			0	7488							20	46848			40	167814	48.9

Notes: This table summarizes effective personal (income tax plus NIC) and corporate (corporate tax plus dividend tax) marginal tax rates. Each column specifies marginal tax rate (MTR) and corresponding bracket threshold. The header specifies what generates each tax change: LPL = lower profit limit, PT = primary threshold, ST = secondary threshold, UPL = upper profit limit (all apply to NICs); LL = lower limit, UL = upper limit (apply to corporate tax); 1st, 2nd and 3rd brackets (personal income tax). Note that income tax brackets slightly differ for personal and corporate tax bases. For further details see Section 1.1 and Appendix A.1.

A.2 Sample Construction and Robustness Checks

For the purposes of the survival analysis described in Section 2, I include individuals who did not report income from trades or partnerships and who did not report being a director of a company in 1996/97 (the first year of the data available). Starting from 1997/98, these individuals are included in the sample if they report income from trades or partnerships until and including the first year they report being the director of a company. The final sample only includes individuals who have had higher profits than the personal allowance in more than 50% of the years. In other words, if an individual reports being self-employed in 2001/02 – 2004/05, then his taxable profits must be greater than the personal allowance in at least 3 out of these 4 years. For individuals who satisfy this requirement, only the years in which taxable profits are greater than the personal allowance are included. Personal allowance represents the first kink in the personal income tax schedule, increasing one's marginal tax from 0% to a positive tax rate.

Incorporation is defined as a switch from reporting trade or partnership income to reporting a director status the following year. I allow for one year overlaps – thus allowing for mid-year incorporations – whereby individuals report both trade/partnership income and being a director in the same year. However, individuals who continue to report both statuses for more than one year are censored (only periods of self-employment are included). I allow for breaks within self-employment periods, e.g. years when individuals report trades/partnership incomes. However, incorporation is identified based on two consecutive years only. Finally, I allow for multiple spells for each person.

Let "se" stand for reported trade or partnership income, "dir" stand for director status, and ".." identify years with no entrepreneurial incomes reported. Then only the underlined entries are included in the survival analysis:

1. se, se, dir, dir
2. se, se, .., dir
3. se, dir, se, dir
4. se, se, dir, se, se
5. se, .., .., se, dir, se, se
6. se, .., .., dir, dir
7. se, se, dir+se, dir
8. se, se, dir+se, ..
9. se, se, dir+se, dir+se, dir

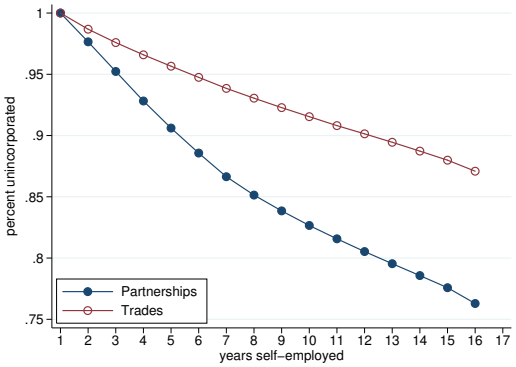
Table A.2: Cox HM Estimates: Sample Comparisons

	All	Tax Liability >0 in			Tax	Tax Liability >0 in		
		>25%	>50%	>75%	Liability	>25%	>50%	>75%
			of Years		This Year >0	of Years & Tax Liability This Year >0		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Saving Measures Based on Predicted Profits								
Log Savings %	0.108	0.050	0.196	0.233	-0.018	0.0095	0.225	0.234
	(0.002)	(0.002)	(0.003)	(0.004)	(0.002)	(0.002)	(0.003)	(0.004)
Log Savings £	0.065	0.029	0.125	0.155	-0.013	0.004	0.145	0.155
	(0.001)	(0.001)	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.003)
Savings %	3.544	2.911	5.758	5.657	1.624	2.223	6.146	5.620
	(0.071)	(0.076)	(0.088)	(0.097)	(0.078)	(0.079)	(0.090)	(0.099)
Saving Measures Based on Previous Profits								
Log Savings %	0.128	0.047	0.160	0.154	-0.018	-0.006	0.206	0.150
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.004)
Log Savings £	0.084	0.026	0.0946	0.090	-0.013	-0.006	0.124	0.087
	(0.002)	(0.001)	(0.0020	(0.0020	(0.001)	(0.001)	(0.002)	(0.002)
Savings %	1.393	1.840	3.102	2.905	1.427	1.655	3.337	2.869
	(0.074)	(0.079)	(0.089)	(0.100)	(0.081)	(0.083)	(0.091)	(0.101)
N of Observations	22,407,202	14,915,425	10,959,902	7,594,204	12,356,260	11,780,881	9,726,892	7,219,914

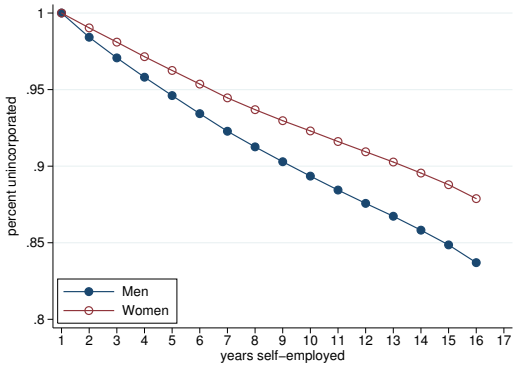
Notes: This table shows the results of estimating the proportional hazard model described in Section 2 using different samples. Column (1) includes all observations, columns (2)-(4) include individuals who experience a positive tax liability in more than 25%, 50%, or 75% of the years they appear in the sample. Column (5) only includes years in which individuals experience a positive tax liability. Finally, columns (6)-(8) include years in which individuals experience a positive tax liability, and only include individuals who experience a positive tax liability in more than 25%, 50%, or 75% of the years they appear in the sample. Column (7) is my preferred specification. Standard errors are clustered by individual. Each regression includes the following controls: individual demographics; year, geographic and industry fixed effects; and 10-piece splines of previous year profits, profits 2 years ago and profits 3 years ago respectively, with break points at £10,000. All £-values are inflation adjusted to 2013.

Figure A.1: Probability of Remaining Unincorporated

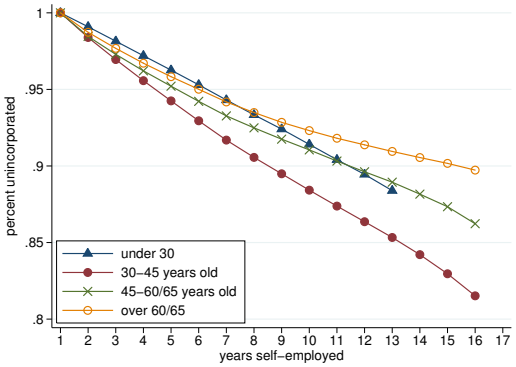
(a) By Self-Employment Type



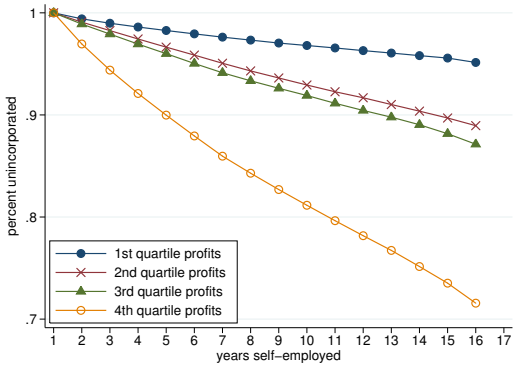
(b) By Gender



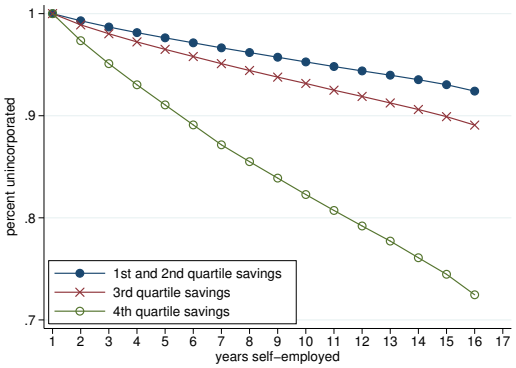
(c) By Age



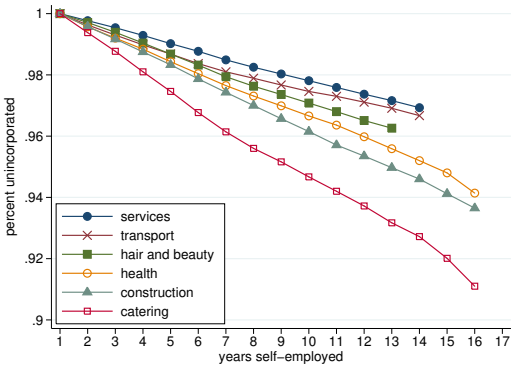
(d) By Profit Level



(e) By Potential Savings



(f) By Industry



Notes: These figures show Kaplan-Meier survival curves for the self-employed individuals (trades and partnerships) by self-employment type, gender, age, profit levels, potential savings from incorporation, and by industry.

Table A.3: Cox HM Estimates: Comparing Savings Measures (Predicted Profits)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Log(Savings %)	0.225***	0.198***							0.005	-0.402***	0.255***		
	(0.003)	(0.004)							(0.015)	(0.017)	(0.006)		
Time × Log(Savings %)		0.005***								0.104***			
		(0.001)								(0.002)			
Savings %			6.146***	8.235***									
			(0.090)	(0.124)									
Time × Savings %				-0.488***									
				(0.021)									
τ_{ave}^{NIC}					3.998***	24.755***							
					(0.511)	(0.667)							
$\tau_{ave}^{Personal-Dividends}$					12.653***	7.957***							
					(0.249)	(0.299)							
$\tau_{ave}^{Corporate}$					0.215*	2.635***							
					(0.117)	(0.171)							
Time × τ_{ave}^{NIC}						-2.698***							
						(0.065)							
Time × $\tau_{ave}^{Personal-Dividends}$						0.346***							
						(0.031)							
Time × $\tau_{ave}^{Corporate}$						-0.397***							
						(0.027)							
Log(Savings £)							0.145***	0.160***	0.142***	0.383***		0.135***	
							(0.002)	(0.003)	(0.009)	(0.011)		(0.003)	
Time × Log(Savings £)								-0.003***		-0.062***			
								(0.000)		(0.002)			
Log(Savings %) in Year $t+1$											-0.027***		
											(0.006)		
Log(Savings £) in Year $t+1$												0.012***	
												(0.003)	

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Table A.2: Cox HM Estimates: Comparing Savings Measures (Predicted Profits)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
													continued from previous page
Savings ∈(1000,2000]													0.464***
													(0.009)
Savings ∈(2000,4000]													0.704***
													(0.011)
Savings ∈(4000,6000]													0.875***
													(0.015)
Savings >6000													0.451***
													(0.028)
Male	0.122***	0.123***	0.146***	0.147***	0.007	0.018***	0.109***	0.108***	0.109***	0.111***	0.089***	0.095***	0.133***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Age	0.062***	0.062***	0.064***	0.064***	0.049***	0.050***	0.060***	0.060***	0.060***	0.060***	0.058***	0.059***	0.062***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age Squared	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age < State Pension	0.330***	0.330***	0.336***	0.339***	0.314***	0.316***	0.329***	0.329***	0.329***	0.334***	0.319***	0.326***	0.333***
	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)
Partnership	0.005	0.005	0.031***	0.034***	-0.178***	-0.159***	-0.016***	-0.017***	-0.016***	-0.016***	-0.050***	-0.044***	0.002
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Resident	0.607***	0.606***	0.597***	0.595***	0.909***	0.870***	0.649***	0.652***	0.648***	0.667***	0.703***	0.706***	0.681***
	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)	(0.072)	(0.072)	(0.071)
Dividends	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of Observations	9,726,892	9,726,892	9,726,892	9,726,892	9,726,892	9,726,892	9,726,892	9,726,892	9,726,892	9,726,892	9,254,103	9,254,103	9,726,892
Number of Individuals	1,945,310	1,945,310	1,945,310	1,945,310	1,945,310	1,945,310	1,945,310	1,945,310	1,945,310	1,945,310	1,916,722	1,916,722	1,945,310

Notes: This table shows the results of estimating the proportional hazard model described in Section 2.1 using tax-savings measures based on predicted profits. Standard errors are clustered by individual. Savings % and tax rates measured in fractions. Columns (4) - (5) and (9) - (10) include savings measures based on year $t+1$ tax schedule. Each regression includes the following controls: individual demographics; year, geographic, and industry fixed effects; and 10-piece splines of previous-year profits, profits 2 years ago, and profits 3 years ago respectively, with break points at £10,000. All £-values are inflation adjusted to 2013.

Table A.3: Cox Hazard Model Estimates: Various Savings Measures (Previous Profits)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Log(Savings %)	0.206***	0.250***							0.134***	-0.241***	0.102***		
	(0.003)	(0.004)							(0.014)	(0.016)	(0.006)		
Time × Log(Savings %)		-0.008***								0.087***			
		(0.000)								(0.002)			
Savings %			3.337***	6.955***									
			(0.091)	(0.124)									
Time × Savings %				-0.864***									
				(0.022)									
τ_{ave}^{NIC}					11.116***	31.978***							
					(0.501)	(0.607)							
$\tau_{ave}^{Personal-Dividends}$					4.949***	-0.618**							
					(0.249)	(0.299)							
$\tau_{ave}^{Corporate}$					-0.882***	1.916***							
					(0.105)	(0.177)							
Time × τ_{ave}^{NIC}						-2.400***							
						(0.063)							
Time × $\tau_{ave}^{Personal-Dividends}$						0.232***							
						(0.034)							
Time × $\tau_{ave}^{Corporate}$						-0.372***							
						(0.030)							
Log(Savings)							0.124***	0.169***	0.045***	0.296***		0.074***	
							(0.002)	(0.003)	(0.008)	(0.010)		(0.003)	
Time × Log(Savings)								-0.008***		-0.057***			
								(0.000)		(0.001)			
Log(Savings %) in Year $t+1$											0.129***		
											(0.005)		
Log(Savings) in Year $t+1$												0.056***	
												(0.003)	

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Table A.3: Cox HM Estimates: Comparing Savings Measures (Previous Profits)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
											continued from previous page		
Savings ∈ (1000,2000]													0.122***
													(0.010)
Savings ∈ (2000,4000]													0.278***
													(0.011)
Savings ∈ (4000,6000]													0.313***
													(0.015)
Savings > 6000													0.064**
													(0.025)
Male	0.187***	0.186***	0.183***	0.182***	0.184***	0.184***	0.187***	0.185***	0.187***	0.183***	0.186***	0.182***	0.183***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Age	0.068***	0.068***	0.067***	0.067***	0.067***	0.068***	0.068***	0.068***	0.068***	0.068***	0.069***	0.068***	0.067***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age squared	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age < Statutory pension	0.343***	0.342***	0.344***	0.343***	0.344***	0.337***	0.344***	0.342***	0.343***	0.344***	0.334***	0.335***	0.346***
	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)
Partnership	0.085***	0.083***	0.080***	0.078***	0.081***	0.076***	0.084***	0.079***	0.085***	0.073***	0.083***	0.071***	0.081***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Resident	0.563***	0.567***	0.584***	0.590***	0.580***	0.578***	0.565***	0.576***	0.563***	0.601***	0.597***	0.629***	0.582***
	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)	(0.075)	(0.075)	(0.071)
Dividends	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of Observations	9,726,892	9,726,892	9,726,892	9,726,892	9,726,892	9,726,892	9,726,892	9,726,892	9,726,892	9,726,892	9,726,892	9,726,892	9,726,892
Number of Individuals	1,945,310	1,945,310	1945310	1,945,310	1,945,310	1,945,310	1,945,310	1,945,310	1,945,310	1,945,310	1,945,310	1,945,310	1,945,310

Notes: This table shows the results of estimating the proportional hazard model described in Section 2.1 using tax savings measures based on previous year's profits. Standard errors are clustered by individual. Columns (4) - (5) and (9) - (10) include savings measures based on year $t+1$ tax schedule. Each regression includes the following controls: individual demographics; year, geographic and industry fixed effects; and 10-piece splines of previous year profits, profits 2 years ago, and profits 3 years ago respectively, with break points at £10,000. All £-values are inflation adjusted to 2013.

Table A.4: Cox HM Estimates: Varying Controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Savings measures based on predicted profits												
Log(Savings %)	0.332***	0.170***	0.182***	0.198***	0.225***	0.193***						
	(0.002)	(0.004)	(0.004)	(0.004)	(0.003)	(0.002)						
Time × Log(Savings %)		0.032***	0.012***	0.005***								
		(0.001)	(0.001)	(0.001)								
Log(Savings)							0.264***	0.232***	0.156***	0.160***	0.145***	0.136***
							(0.002)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)
Time × Log(Savings %)								0.006***	0.001***	-0.003***		
								(0.001)	(0.000)	(0.000)		
Panel B: Savings measures based on previous profits												
Log(Savings %)	0.282***	0.260***	0.207***	0.250***	0.206***	0.204***						
	(0.002)	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)						
Time × Log(Savings %)		0.004***	-0.001***	-0.008***								
		(0.000)	(0.000)	(0.000)								
Log(Savings)							0.195***	0.213***	0.140***	0.169***	0.124***	0.133***
							(0.001)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)
Time × Log(Savings)								-0.003***	-0.003***	-0.008***		
								(0.000)	(0.000)	(0.000)		
Year, Geo, Industry FE	no	yes	yes	yes	yes	no YFE	no	yes	yes	yes	yes	no YFE
Lag-1 Year Splines	no	no	yes	yes	yes	yes	no	no	yes	yes	yes	yes
Lag-1, Lag-2, Lag-3 Splines	no	no	no	yes	yes	no	no	no	no	yes	yes	yes
Number of Observations	9,728,733	9,728,733	9,728,733	9,728,733	9,728,733	9,728,733	9,728,733	9,728,733	9,728,733	9,728,733	9,728,733	9,728,733
Number of Individuals	1,945,397	1,945,397	1,945,397	1,945,397	1,945,397	1,945,397	1,945,397	1,945,397	1,945,397	1,945,397	1,945,397	1,945,397

Notes: This table shows the results of estimating the proportional hazard model described in Section 2.1 with tax savings measures based on predicted and previous year's profits. Standard errors are clustered by individual. All £-values are inflation adjusted to 2013. Lag-1, Lag-2, and Lag-3 year splines represent 10-piece splines of previous year profits, profits 2 years ago, and profits 3 years ago respectively, with break points at £10,000, £20,000,..., £100,000.

Table A.5: Cox HM Estimates: Noise Additions

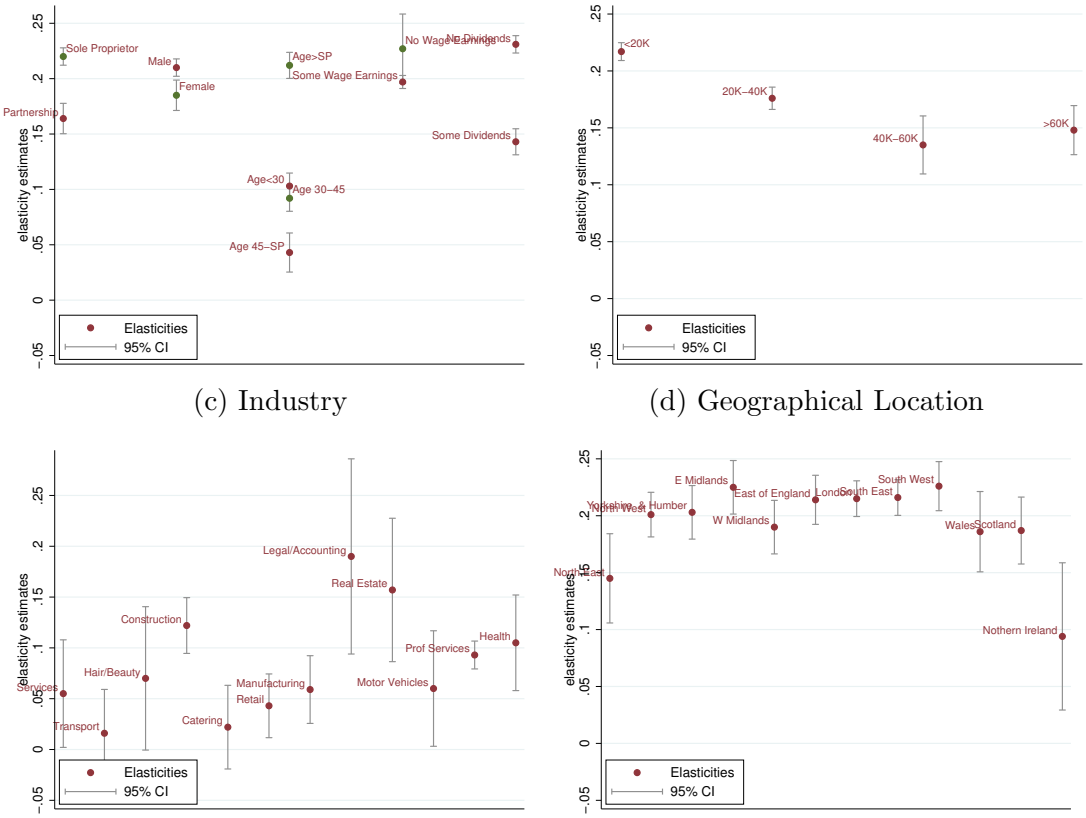
	No Noise	Noise added to: savings measures			Noise added to: profits measures		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Saving Measures Based on Predicted Profits							
Noise amount	0	0.005	0.0125	0.025	1000	5000	10000
Savings %	6.146	5.898	4.91	3.04	4.010	3.216	2.195
	(0.090)	(0.088)	(0.080)	(0.0630)	(0.081)	(0.075)	(0.068)
Log Savings %	0.225	0.227	0.186	0.100	0.171	0.117	0.068
	(0.003)	(0.004)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)
Noise amount	0	170	425	850	1000	5000	10000
Log Savings £	0.145	0.125	0.075	0.041	0.121	0.075	0.040
	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)
N of Observations	9,726,892	9,726,892	9,726,892	9,726,892	9,726,892	9,726,892	9,726,892
Saving Measures Based on Previous Profits							
Noise amount	0	0.005	0.0125	0.025	1000	5000	10000
Savings %	3.337	3.187	2.616	1.544	3.725	2.699	1.516
	(0.091)	(0.089)	(0.081)	(0.064)	(0.085)	(0.078)	(0.068)
Log Savings %	0.206	0.157	0.106	0.049	0.173	0.096	0.045
	(0.003)	(0.004)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)
Noise amount	0	170	425	850	1000	5000	10000
Log Savings £	0.124	0.051	0.027	0.014	0.109	0.058	0.027
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
N of Observations	9,726,892	9,726,892	9,726,892	9,726,892	9,726,892	9,726,892	9,726,892

Notes: This table shows the results of estimating the proportional hazard model described in Section 2. Each cell represents an estimate from a separate regression. In columns (2), (3), and (4) I add random noise to savings measures directly. For savings measured in %, I add noise that is distributed normally with mean zero and standard deviation of 0.005, 0.0125, or 0.025. For savings measured in £, I add noise that is distributed normally with mean zero and standard deviation of £170, £425, or £850. In columns (5), (6), and (7), I add random noise to profits. Random noise is distributed normally with mean zero and standard deviation of £1000, £5000, or £10000. Standard errors are clustered by individual. Each regression includes the following controls: individual demographics; year, geographic and industry fixed effects; and 10-piece splines of previous year profits, profits 2 years ago, and profits 3 years ago respectively, with break points at £10,000. All £-values are inflation adjusted to 2013.

Figure A.2: Cox HM Estimates: Heterogeneity Analysis (Previous Profits)

(a) Demographics

(b) Profit Level



(c) Industry

(d) Geographical Location

Notes: This figure shows the results of estimating the proportional hazard model described in Section 2.1 using Log(Savings %) based on previous profits. Standard errors are clustered by individual. Each regression includes the following controls: individual demographics; year, geographic and industry fixed effects; and 10-piece splines of previous-year profits, profits 2 years ago, and profits 3 years ago respectively, with break points at £10,000. All £-values are inflation adjusted to 2013.