ENTREPRENEURIAL ENTRY VS INCOME SHIFTING, AND THE HIGH COST OF INCORPORATION

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Abstract

Drawing on administrative panel data covering the full population of entrepreneurs in the UK, I study the effects of lower corporate tax liability on entrepreneurial entry and income shifting. I find that a 10% increase in savings from incorporation leads to a 2.64% increase in the number of new entrepreneurs, and a 2.25% increase in income shifting. Nonetheless, despite large tax savings to incorporation (exceeding 10 pp in some years), a substantial proportion of business owners fails to incorporate. Using a revealed-preference approach, I estimate an average yearly cost of incorporation of more than £3,750.

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The 2017 Tax Cuts and Jobs Act in the United States sharply decreased the statutory corporate tax rate from 35% to 21% and introduced a new deduction for pass-through businesses. A common rationale for lowering corporate taxes is their inefficiency: in the words of President Trump, lower taxes "increase investment in the American economy and in U.S. workers, leading to higher growth, higher wages and more jobs."[1] Opponents of such reforms, however, argue that although the positive benefits of lowering corporate taxes are uncertain, the reforms most certainly lead to large income shifting, by creating a wedge between corporate and personal tax rates. Understanding the consequences of corporate tax cuts is increasingly important, as corporate rates continue to decrease as a result of international competition (Mooij and Nicodème (2008)).

The consequences of differential taxation of personal and corporate bases have also been a concern for the academic literature. First, income shifting leads to tax avoidance, resulting in a larger deadweight loss than a model without income shifting would predict (Gravelle and Kotlikoff (1989); Slemrod (2001)). Second, tax-motivated changes in organizational form can lead to misleading estimates of corporate rates of return and macroeconomic indicators, such as labor and capital shares, and significantly complicate measurement of income inequality (Clarke and Kopczuk (2017)). As summarized by Gordon and Slemrod (2000), "income shifting plays havoc with the usual interpretation of many kinds of data."[2] Yet lack of income shifting is not necessarily good news, because it may indicate that incorporation costly. This burden may be detrimental to entrepreneurial activity, by preventing firms from deriving the non-tax benefits of incorporation. 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: To what extent does lower corporate tax liability increase entrepreneurial entry? And does it lead to income shifting?

Despite the importance of income shifting for theoretical and policy analysis, available empirical estimates establish lower bounds on the magnitude of income

[1] Donald J. Trump twitter account, December 16, 2017.

[2] An exception to the generally negative view of income shifting is a recent paper by Selin and Simula (2017), who argue that income shifting can be used as a form of an "endogenous tagging device" when individuals experience fixed costs of income shifting and labor supply elasticities are heterogeneous.

shifting and upper bounds on the effect of lower tax liability on entrepreneurial entry. Prior estimates suffer from attenuation bias, because of reliance on aggregate data or data from countries that restrict income reclassification. In this paper, I avoid these limitations by using panel microdata from the UK, which has no restrictions on the choice of legal form or the payout structure. Previous studies also struggled to separate the two margins of response by using data from one tax base only, precluding the ability to observe switches of legal form. The data used in this paper allow me to differentiate between incorporations by existing unincorporated self-employed in response to tax incentives, and changes in the number of first-time entrepreneurs and their initial choice of legal form. Finally, the setting offers rich variation in tax liability across time and income, stemming from varying schedules and thresholds that determine corporate, dividend, income, and payroll tax rates. This setting allows me to differentiate between and estimate unbiased measures of income shifting and genuine entry into entrepreneurship, and quantify the implied compliance costs associated with incorporation in the UK.

Three main results emerge from my analysis. First, relying on the entire universe of entrepreneurs in the UK, I estimate how the number of new businesses responds to tax incentives. I show that although lower corporate taxes increase entrepreneurial entry, they also reduce revenue collected from existing business owners, and that the two responses are of similar magnitude. Using a fixed-effects model, I estimate the magnitude of three types of responses: new incorporations due to income shifting by the existing unincorporated self-employed; changes in the choice of legal form by first-time entrepreneurs; and changes in the number of first-time entrepreneurs. I find that a 10% increase in the difference between effective corporate and personal tax rates increases the number of first-time entrepreneurs by 2.62%. At the same time, higher tax savings from incorporation lead to income shifting, increasing the number of tax-base switchers by 2.25% for a 10% increase in tax savings. Interestingly, I find that the first-time entrepreneurs' choice of legal form is less responsive to tax incentives than that of experienced entrepreneurs.

Second, to better understand what drives income shifting, I focus on unincorporated self-employed and use a proportional hazard model to estimate elasticities of incorporation with respect to expected tax savings. The model includes year fixed effects to control for yearly changes in other features of the tax code that

affect all entrepreneurs, and includes splines of past incomes to control for natural propensities to incorporate. I estimate an elasticity of hazard rate of incorporation with respect to tax savings of 0.23, implying that income shifting is not the primary channel of tax avoidance among low-to-mid-income business owners.[3] I show that individuals make the incorporation decision based on the tax incentives in a given year only, exhibiting no anticipatory responses with respect to future tax rates. Further, although various demographic groups exhibit substantial heterogeneity in incorporation levels, the variation in elasticities is significantly smaller, suggesting information is unlikely to be the key determinant of legal form. Finally, I show that both fixed and variable costs of incorporation matter.

Third, I quantify the implied compliance costs of incorporation in the UK, by studying how the stock of incorporated firms responds to tax incentives. I find a striking relationship between tax savings and the stock of incorporated firms across profit groups and across time. Nevertheless, a substantial proportion of individuals makes suboptimal choices: approximately 30%-40% of business owners choose the tax-disadvantaged legal form, forgoing savings of more than £4000 per year (or 6% of profits). These findings imply a very large cost of incorporation: using a revealed-preference approach, I estimate an average fixed cost of incorporation of £3,750 and an average variable cost of 1.97% of profits per year. The fixed and variable costs are positively correlated, with an estimated correlation of 0.34. The compliance requirements thus act as a barrier to incorporation, reducing undesirable income shifting while potentially preventing entrepreneurs from taking advantage of non-tax benefits of incorporation, and possibly reducing entrepreneurial entry. I explore potential explanations for the high costs of incorporation and conclude that a lack of information or the practical costs of incorporation are unlikely to account for the high costs observed.

This paper relates to three strands of the literature that studies income and entrepreneurial responses to tax incentives. First, it contributes to literature that explores how taxes affect entrepreneurial activity by estimating changes in the

[3]Hazard-model estimates match seamlessly my estimates from a fixed-effects model described in the previous paragraph. The hazard-model specification differs in two aspects. First, by using micro data rather than counts of entrepreneurs, I track individuals' savings from incorporation over time. Second, the independent variable of interest represents expected – based on past profits – savings from incorporation rather than realized savings.

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. (2016)). Because these studies use personal *or* corporate tax data, they do not differentiate between undesirable income-shifting responses by existing entrepreneurs and desirable entrepreneurial entry. Within this literature, Devereux and Liu's (2015) paper is the closest to this study. The authors use UK corporate tax return data to investigate how corporate taxation affects incorporation and investment, by observing changes in new entries into corporate firm ownership. In this paper, I show that approximately half of the increased rates of incorporation in the UK are due to income shifting rather than entrepreneurial entry.

Second, this paper contributes to a small 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. First, the micro data allow me to avoid aggregation bias. Second, the UK has no restrictions on the the organizational form or the payout structure. Third, I focus on smaller companies that are very flexible, and for which incorporation decision is primarily motivated by tax incentives. Fourth, entity splitting does not affect my estimates.[4] Previous studies, on the other hand, relied on aggregate data that combined individuals with varying or even opposite level of incentives, resulting in attenuation bias (Gordon and MacKie-Mason (1994); MacKie-Mason and Gordon (1997); Goolsbee (1998); Goolsbee (2004); Mooij and Nicodème (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)). Finally, 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., Alstadsæter and Wangen (2010); Edmark and Gordon (2013)).[5]

[4]Goolsbee (2004) documents that when corporate tax rates are higher than personal tax rates, and the corporate tax rate is progressive, firms may split into multiple corporate entities rather than switch legal forms. This type of behavior is not attractive in the UK, because the combined sole-proprietorship income is subject to personal income taxes.

[5]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); Fjærli and Lund (2001); Sivadasan and Slemrod (2008);

Finally, this paper contributes to a small literature that investigates the importance of bureaucratic and other regulatory costs associated with entrepreneurship and taxation in general. Djankov et al. (2002) and Klapper et al. (2006) show that market-entry regulations hinder entry into entrepreneurship, whereas Slemrod and Blumenthal (1996) and Collard and Godwin (1999) provide evidence of large compliance costs of business taxation.[6] Aghion et al. (2017) estimate that self-employed individuals value tax simplicity by up to €650 per year in France. This study shows that individuals find incorporation costly and are willing to forgo large amounts of money to avoid the compliance costs associated with corporate taxation, and that the costs are a mixture of fixed and variable costs.

1 Institutional Setting and Data Description

1.1 Tax Incentives for Incorporation

In the UK, entrepreneurs 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.[7] 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 "entrepreneurs." Effective tax rates applicable to each type of organizational form are summarized in the Appendix Table A.1, whereas Figures 1 and 2 show how savings from incorporation – defined as the difference between taxes paid under the personal and corporate tax rules – change across

Thoresen and Alstadsæter (2010); Pirttilä and Selin (2011); Harju and Matikka (2016a); Alstadsæter and Jacob (2016); Harju and Matikka (2016b); López-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 detail regarding *how* income is shifted, thus making policy recommendations difficult.

[6]Individuals also experience high costs of complying with tax systems, as evidenced by Blumenthal and Slemrod (1992), Benzarti (2015), Tazhitdinova (2017).

[7]For an excellent review of small business taxation in the UK, including an overview of organizational forms and related regulations, see Crawford and Freedman (2010).

time and across profit levels from 1996/97 until 2012/13.[8]

"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 ranged 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 further benefits.[9] Proportional NICs are charged on profits above the *Lower Profit Limit* (LPL), set around £4,385–7,605. Until 2003, these contributions were capped by the *Upper Profit Limit* (UPL) – set around £23,000-42,000 – but starting from 2003, a 1%-2% proportional NIC is due on all profits above the UPL.

"Owner-managers," on the other hand, are subject to corporate, dividend, and personal income taxes, and NICs. The amount of tax they must pay depends on how they choose to distribute profits. Profits paid out as wages are not subject to corporate tax (because wages are deducted for corporate tax purposes) but are subject to personal income taxes and NICs. On the other hand, profits distributed as dividends are first subject to a corporate tax and then to a dividend tax. Because dividend tax rates are set in a way to approximately equalize the effective corporate tax rates to personal income tax rates, most tax savings from incorporation stem from differences in NICs, as described below.

An interesting feature of the UK National Insurance system is that for wage-earners (and thus owner-managers), 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.[10] Dividend distributions are thus

[8]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 1996/97 tax year.

[9]Individuals who earn less than the *small earnings exception*, an amount roughly equal to the LEL defined below, can request to be exempt from NIC by submitting form CF10. Most self-employed individuals, however, choose to pay NIC, even when they could apply for exemption, to ensure continuous NIC credit history.

[10]Employee NICs start once wage earnings exceed the *primary threshold*, whereas employer NICs start from the *secondary threshold*. In practice, primary and secondary thresholds coincided

superior to wage distributions because they allow owner-managers to avoid paying NICs while maintaining NIC credit record, equivalent to that of the self-employed individuals. An optimal distribution of profits thus involves paying a salary equal to the LEL prior to 1999/00, and equal to the max{PT,ST} from 1999/00 on.[11]

Although wages are subject to personal income tax and dividends are subject to the dividend tax rate, the total income (salary plus dividends) is subject to the same personal income tax brackets as the self-employed individuals' income. In practice, such schedule implies that another benefit to incorporation is that owner-managers are able to "push" the top marginal tax bracket up because of the use of notional tax credits. Specifically, for a dividend distribution d, individuals are assumed to have received $\frac{d}{1-t^{Notional}}$ worth of dividends and have already paid $t_{Notional}\frac{d}{1-t^{Notional}}$ worth of dividend tax. For many years, however, $t_{Notional}$ was nearly half as large $t_{Corporate}$. To see why this matters, consider an entrepreneur with before-tax profits £x and full dividend distribution $d = x(1-\tau^{corp})$. Under a 20% notional credit, £$x\frac{(1-\tau^{corp})}{0.8}$ is subject to dividend tax. With the corporate tax rate fluctuating around 20%, the calculations imply that almost all of the profits are subject to a dividend tax. However, under a 10% notional credit, only £$x\frac{(1-\tau^{corp})}{0.9}$ is subject to a dividend tax. Because dividend tax brackets match those of the self-employed individuals, then under lower notional credits, owner-managers pay a lower total tax for the same levels of profits.[12]

Figures 1 and 2 and Table A.1 highlight several changes to savings from incorporation over time. First, NICs have been increased thrice by 1%, 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 2009/09 by 1%) and decreased four times (in 1997/98, 1999/00, 20002/03, 2011/12 by 1 to

for almost all years, and at most differed by £416 per year. The joint employee plus employer NIC rate has ranged from 13% to 25.8% depending on the year and wage level, and is nearly twice as high as NIC rate for the self-employed. NICs on wages are reduced once wage earnings exceed the *Upper Earnings Limit*.

[11]For more details, see Appendix A.1.

[12]Further, the alignment of personal income and corporate plus dividend tax rates is not perfect. For example, in 2008, an individual with profits $p =$£80,000 would be subject to a 21% corporate tax rate, 10% notional credit and 32.5% dividend tax rate, or a $21+(100-21)/(100-10)(32.5-10) = 40.75\%$ tax rate, which is 0.75% higher than the top personal income tax rate of 40%. However, a year later in 2009, same individual would be subject to a 20% corporate tax rate, and therefore a $20+(100-20)/(100-10)(32.5-10) = 40\%$ effective tax rate, which precisely equals the top personal income tax rate of 40%.

3%). Moreover, a special starting corporate tax rate was introduced in 2000/01, initially set at 10%, decreased to 0% in 2002/03, and was abolished in 2006/07. This starting rate applied to profits below £10,000 and was gradually phased out to the regular corporate tax rate until profits reached £50,000. Third, the notional tax credit rate decreased from 20% to 10% in 1999, again making incorporation more attractive. Finally, a higher income tax rate of 50% was introduced in 2010/11. Although this higher rate applies both to the self-employed and 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. Savings from incorporation, however, start to decrease when profits cross £300,000, because the corporate rate increases to 28%-30%.

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 (sex, age, place of residence) and industry of business for self-employed individuals.

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 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 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 director of a new business venture that individual owns or as a third-party director of an existing business that 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.[13] Second,

[13]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).

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 3, because the analysis only relies on information from years when individuals are self-employed. However, this limitation may affect estimates in Sections 2 and 4 and is therefore discussed in greater detail in those sections.

The left panel of Table 1 presents overall summary statistics. Because the dataset covers the universe of entrepreneurs in the UK, the total number of observations is very large – 81 million observations over 17 years covering 12 million taxpayers. About 75% of observations record periods of self-employment (trades or partnerships). Average age of entrepreneurs is between 40 and 44, with some heterogeneity by income type. Most individuals – 60%-75% of entrepreneurs – 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.[14] Owner-managers show higher median profits of £37,734. Because benefits to 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.[15]

2 Distinguishing between Income Shifting and Entrepreneurial Entry

The literature has well established that taxation is likely to have a large effect on entrepreneurial activity. On the one hand, lower corporate tax rates encourage risk-taking and thus increase entry into entrepreneurship (Cullen and Gordon (2007); Gentry and Hubbard (2005)). On the other hand, differences between personal and effective corporate tax rates lead to income shifting: individuals will

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

[15]The pound estimates in Table 1 and the rest of the paper are inflation adjusted to 2013 using the Consumer Price Inflation (CPI) time series (MM23) published by the Office of the National Statistics (ONS). Because tax years end on April 5, I use March values of the CPI to adjust yearly profits.

choose the legal form that minimizes their tax liability (MacKie-Mason and Gordon (1997)). Yet previous research has struggled to differentiate between the two effects because of the data limitations – studying changes in the number of incorporated or unincorporated businesses is insufficient to estimate the magnitude of each response.

In this section, I show that 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. Unless incorporation itself improves these businesses' productivities, income shifting does not generate positive benefits to society, but rather leads to reductions in revenue collected. Thus, 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 entrepreneurs, 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,

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

I estimate the components of (1) by studying how the number and types of new businesses respond to tax incentives. I focus on five outcomes: changes in (a) the number of new entrepreneurs (incorporated or not), (b) the number of new incorporated entrepreneurs, (c) the number of new incorporated entrepreneurs that were previously unincorporated, (d) the number of new first-time incorporated entrepreneurs, and (e) the share of incorporated businesses among first-time entrepreneurs. Specifically, I estimate a fixed-effects model:

$$\log(Outcome_{it}) = \gamma_i + \lambda_t + \beta(Corporate - Personal)_{it} + \varepsilon_{it}, \tag{2}$$

where $(Corporate - Personal)_{it}$ measures the differences between effective personal and corporate tax rates for each profit bin i in year t.

For the purposes of this analysis, the available data present two limitations. First, new entrepreneurs are defined as individuals who have previously not reported receiving self-employment income (from trade or partnership) or being a director on their tax return. Because 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 entrepreneurs, even though they have had previous entrepreneurial experience. This data limitation only affects the early years of the sample. 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. For these two reasons, I match my main specification to that of Devereux and Liu (2015), who use corporate tax return data to investigate how changes in savings from incorporation affect the number of newly incorporated firms in the UK. Because Devereux and Liu (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 entrepreneurs. Thus, my main specification focuses on years 2002/2003–2008/2009 and profit levels between £0 and £100,000, broken down into £100 bins.[16] When measuring the difference in effective tax rates and following Devereux and Liu (2015), I consider both possibilities: that earned profits are fully distributed and thus incur dividend tax, or are retained and thus are not subject to dividend taxation.

The results are summarized in Table 2. Panel A replicates Devereux and Liu (2015) (henceforth, DL) to assess the importance of measurement errors and shows the results are very 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.[17] Panel B of Table 2 breaks down estimates from Panel A into the three channels following (1), separately in semi-elasticities (to match the analysis in DL) and in elasticities (to match the analysis in the Section 3.2).[18] Altogether, Panel B shows that optimal policymaking must account for

[16]The results do not change when later years, 2009/10 to 2012/13, are included. The results are sensitive to inclusion of earlier years, particularly, 1996/97 to 1998/99.

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

[18]Note that in any year, roughly half of the new incorporations represent switching from

the fact that lowering corporate tax rates has both positive effects (higher rates of entrepreneurship) and negative effects (income shifting from personal tax base): elasticities in column (2) are of approximately equal value to elasticities in column (4). Interestingly, new entrepreneurs appear to be less responsive to tax incentives (column (5)) than experienced entrepreneurs (column (2)). Overall, the estimated elasticities in rows (a) – (d) are low: row (b) suggests that a 10 pp increase in tax savings from incorporation would only lead to a 2.6% increase in switching from a personal to corporate tax base, and a 2.7% increase in entrepreneurial entry.

A likely explanation for the low elasticities is that the results in rows (a) – (d) are based on all observations, including taxpayers with very low levels of profits. However, as Table 1 shows, individuals with profits below £6,000-10,000 are unlikely to be sensitive to tax rates, because of the basic personal exemption. To avoid this limitation, I focus on entrepreneurs who are subject to personal tax liability, and hence earn profits of more than £6,000, or more than £10,000 in rows (e) and (f), respectively. Estimates in rows (e) and (f) are substantially larger: column (4) shows that a 10% increase in tax savings from incorporation leads to a 1.07-2.64% increase in the number of new entrepreneurs. At the same time, estimates in column (2) suggest that income shifting is also prevalent – a 10% increase in tax savings from incorporation increases incorporation rates by unincorporated self-employed by 1.26%-2.62%.

3 Estimating Income Shifting

3.1 Empirical Approach

Specification (2), unfortunately, does not allow us to learn about income shifting in greater detail. In this section, I take advantage of detailed micro data to better understand the choice of legal form, by estimating a proportional hazard model. I choose a survival-model approach over a discrete-choice model for two reasons. First, this choice allows me to avoid bias stemming from potentially unequal survival rates of unincorporated and incorporated firms. Second and

personal tax base, i.e., $\frac{Switchers}{New_Incorp} \approx 0.5$. Following DL, Table 2 measures savings as percent rather than as fractions, and therefore estimates of Panel A should be multiplied by 100 before comparing to columns (3) – (6) of Table 3.

more importantly, although entrepreneurs can switch between incorporated and unincorporated legal forms each year, such switches are practically costly and therefore unlikely. Because incorporation offers nonnegative tax savings for most small businesses starting from 1999/00, I focus on entrepreneurs who initially chose the personal tax base, and then estimate the relationship between tax changes and incorporation. I define incorporation as a switch from reporting trade or partnership income in one year to reporting being a director of a company the following year.

Let $h_{i,t}$ denote the incorporation hazard rate for 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. Therefore, I estimate the following Cox hazard model:

$$\log(h_{i,t}) = \alpha_t + \beta_1 \log(\mathbb{E}[Tax_{i,t}]) + \beta_2 \log(\mathbb{E}[Tax_{i,t}]) \cdot t + \beta_3 X_{i,t}, \tag{3}$$

where $\mathbb{E}[Tax_{i,t}]$ is a vector that measures the *expected* attractiveness of incorporation in year t, and therefore is based on the tax schedule in year t but profits in years $t-1$ or earlier, and $X_{i,t}$ is a vector of observed characteristics. From (3) 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 time-varying effects of tax savings on the hazard rate. Controls $X_{i,t}$ 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 Weber (2014). Besides controlling for potential serial correlation in profits, inclusion of both year fixed effects and income splines ensures identification is driven by variation in tax savings across both time *and* profit groups.

I focus on expected savings rather than realized, because profits cannot be subjected to a different tax base retroactively.[19] I consider four measures of ex-

[19] A business owner who wins a particularly profitable contract mid-year may choose to incorporate; however, only profits earned from that moment forward will be subject to new tax-base rates. Therefore, incorporation decision can be influenced by transitory shocks but to a lesser extent than, e.g., taxable income.

pected savings from incorporation. First, I let $\mathbb{E}[Tax_{i,t}]$ take on a vector of *average* tax rates (corporate, NIC, and difference between personal and dividend) in year t given the individual's expected income $\mathbb{E}[p_{it}]$. Second and third, I consider the overall expected tax savings from incorporation in year t, separately in pounds and as a percent of income. All three measures of savings do not take into account non-tax benefits of incorporation or the option value of profits deferment. I assume all profits are paid out optimally (see Appendix A.1 for optimal combination of wages and dividends), but also consider retaining profits as a robustness check.

My main measure of expected income relies on previous years' *taxable profits*, which are defined as the greater of zero and profits after losses carried over; hence, p_{it} is always nonnegative.[20] I focus on two measures of expected profits $\mathbb{E}[p_{it}]$. First, I use the previous year's taxable profits and set $\mathbb{E}[p_{it}] = p_{i,t-1}$. Second, I set $\mathbb{E}[p_{it}] = \hat{p}_{i,t}$, where I predict individuals' taxable profits $\hat{p}_{i,t}$ by estimating

$$p_{i,t} = \gamma_0 + \gamma_1 p_{i,t-1} + \gamma_2 p_{i,t-2} + \gamma_3 p_{i,t-3} + \gamma_4 RF_{i,t-1} + \gamma_5 RF_{i,t-2} + \gamma_6 RF_{i,t-3} + \gamma_7 X_{i,t}. \quad (4)$$

In (4), $p_{i,t}$ measures the individual's taxable profits in year t, and $RF_{i,t}$ is an indicator that a self-employment return was filed in year t.[21] As a robustness check, I also consider the maximum of the past three years' profits, as well as realized profits.

Because I can only observe individuals starting from 1996/97, I restrict the sample to entrepreneurs who report being self-employed in year t but were not self-employed in some *observed* year $t-1$. Hence, the main sample includes individuals who have entered self-employment in 1997/98 or later, and those who have had interruptions in the self-employment status prior to 1996.[22] Because most self-employed earn small incomes and therefore are not subject to taxes, I further restrict the sample to entrepreneurs who report taxable profits greater

[20] The attractiveness of each legal form depends on realized profits, deductions, and other earnings, so a measure of $\mathbb{E}[p_{it}]$ 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 few years of experience.

[21] Controls $X_{i,t}$ 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.

[22] The construction of the sample is described in detail in Appendix A.2.

than the personal allowance (first kink of the income tax schedule) in at least 50% of years, and only include person-year observations in which taxable profits exceed the personal allowance. The right panel of Table 1 provides summary statistics. 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.

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. 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 high-income individuals. This increasing relationship between income level and incorporation, however, seems to stop or reverse for higher-profit groups.[23] Second, for most income groups, partnerships exhibit higher rates of incorporation. Third, 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 entrepreneurs, I can observe incorporation shares among first-time entrepreneurs in Figure 4. Compared with experienced sole proprietors and partners in Figure 3, first-time entrepreneurs appear to be less responsive to tax incentives, confirming the findings of Table 2. Importantly, Figure 3 suggests that by focusing on entrepreneurs who initially chose a personal tax base, I am not estimating income shifting for a negatively selected group.

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 income or

[23]The relationship is more apparent in Figure 5 discussed in Section 4.

self-employment type.

3.2 Hazard-Model Estimates

Table 3 shows the results of estimating a proportional hazard model with savings based on predicted profits. Similar results based on the previous year's profits are available in Appendix Table A.3. All specifications include demographic controls, year fixed effects, and lag-1, lag-2, and lag-3 income splines. Specifications without controls are available in Appendix Table A.2. The inclusion of controls does not change the sign or statistical significance of the estimates, and has a small effect on the magnitude of the coefficients.

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. 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 (3) and (4) 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 (3) implies an elasticity of 0.38, which is slightly larger than 0.23 from column (1). Columns (5) - (6) further break down the average savings rate into average NIC rate, difference between income and dividend taxes, and average corporate tax rate. The results show that individuals are more responsive to changes in NIC rates and personal tax rates than to changes in corporate tax rates. These findings are consistent with the fact that the largest share of tax savings stems from differences in NIC liability as described in Section 1.1, and that corporate tax rates change more frequently than NIC or income taxes. Therefore, Table 3 suggests that entrepreneurs respond the strongest to the most salient features of the tax code.[24]

Columns (7) and (8) focus on savings in pounds, rather than as percent. The elasticity estimate of 0.15 is slightly smaller than when savings are measured as a percentage. The interaction term with the duration of self-employment, again,

[24]This finding is consistent with the results of Fjærli and Lund (2001) and Liu (2014), who also document stronger responses to the incentives generated by the personal rather than corporate tax schedule.

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 the fixed costs. On the other hand, savings as a percentage is more accurate if variable costs of incorporation matter the most. Including both measures in columns (9) and (10) leads to varying results depending on the specification: Table 3 suggests that fixed costs dominate, whereas Appendix Table A.3 implies the opposite. Overall, the relationship between savings and incorporation appears to be highly nonlinear: including indicators for various levels of savings, column (13) shows that incorporation rates increase until savings reach approximately £6000 and decrease thereafter. This nonlinearity suggests both fixed and variable costs matter.

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, and therefore could respond not only to the current tax rates, but also to the 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 (11) and (12). The results imply individuals primarily respond to the current year's incentives, with little or no response to future years' incentives. Two explanations are possible. First, individuals might simply not trust the government to honor the announced rates. Because 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.[25]

The estimates in Tables 3 and A.3 rely on variation in tax savings once controlled for year fixed effects. The upside of including year fixed effects is the ability to control for yearly changes in other features of the tax code that affect all entrepreneurs. The downside is that the year fixed effects absorb part of the variation in tax savings over time. Columns (6) and (12) of Appendix Table A.2 omit year fixed effects. Both elasticity estimates, based on savings in percent or in pounds, remain largely unchanged. In all specifications but one, elasticities

[25]The importance of salience has been documented in other settings, e.g., Chetty et al. (2009).

without year fixed effects are slightly smaller.

As a further robustness check, Table A.6 compares various measures of profits: columns (1) and (2) use predicted profits as in Table 3, columns (3) and (4) use the highest taxable profits in the past three years, columns (5) and (6) use the previous year's income as in Table A.3, and columns (7) and (8) use actual realized taxable profits in each year. Panel A assumes profits are distributed and are subject to that year's dividend tax (as was done in Tables 3 and A.3), whereas Panel B assumes profits are retained. Because retained profits are not subject to dividend tax, overall savings from incorporation are higher, and therefore estimated elasticities should be slightly lower. This pattern is precisely what we observe in Table A.6: 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. Finally, the results in this section are very similar to the estimates from Section 2. The most direct comparison can be made between column (2) of rows (e) and (f) of Table 2 and column (8) of Table A.6.

3.3 Who Incorporates? Heterogeneity of Response

In this section, I examine what factors affect the incorporation decision. I start by exploring how incorporation levels vary by demographic characteristics. Tables 3 and A.3 show 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 resident has a large effect on incorporation, whereas having larger dividends has a negligible effect. Table 3 shows varying effects of self-employment type on incorporation, whereas Table A.3 suggests partnerships are 8% more likely to incorporate than sole proprietors.

Next, I explore whether differences in levels of incorporation also translate into differences in elasticities. Tables 4 and A.4 present the results of estimating specification (1) of Table 3 for various demographic groups with savings measures based on predicted and the previous year's profits, respectively. The first panel focuses on demographic characteristics. Table 4 suggests elasticities do not vary

greatly by self-employment type, whereas Table A.4 suggests elasticities for partners are slightly smaller than sole proprietors, which is the opposite of the level evidence from Table A.3. The next two columns focus on gender and show that despite different levels of incorporation between men and women, both groups show similar elasticities. A test for equality of coefficients suggests differences are not statistically significant. Similarly, I find elasticities of the hazard rate of incorporation to be similar across age groups in the next four columns, with the exception of elderly individuals who appear to be significantly more responsive to tax changes than younger individuals. This finding is in stark contrast to the levels evidence from Table 3, which documents significantly lower incorporation hazard rates for elderly business owners. The next two columns show that individuals for whom self-employment is the only source of income exhibit slightly higher elasticities than individuals with wage incomes. Finally, the last two columns show that 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, Tables 4 and A.4 imply less financially savvy business owners are more responsive to tax incentives.

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 Tables 4 and A.4.[26] The mismatch between levels and elasticities instead suggests that individuals vary in perceived costs of incorporation.

The second panel of Table 4 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, the last panel shows elasticity estimates by geographical location. The results show some heterogeneity, but the differences in elasticities are small.

[26]Further, most of business owners rely on tax preparers' assistance to prepare their tax returns. Because corporate returns require more assistance, tax preparers should encourage or at the very least advise their customers on the benefits of incorporation.

Tables 5 and A.5 re-estimate specifications (1) - (2) and (7) - (8) from Table 3 for individuals with different profit levels. I break down the core 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. Note, however, that the relative incentives are strongest for low-income individuals; therefore, low elasticities among higher-income individuals may simply reflect their unwillingness to optimize.[27]

4 The Cost of Incorporation

The previous section explored whether entrepreneurs who have originally chosen the personal income tax base switch to corporate tax base to take advantage of lower tax rates. In this section, instead of focusing on the flow of incorporations over time, I focus on the stock of incorporated businesses. I then use a revealed-preference approach to estimate the cost of incorporation.

4.1 Shares of Incorporated Businesses over Time

Figure 5 shows the percent of incorporated individuals by taxable profit bin (left axis) against potential savings from incorporation (right axis). The shares of incorporated firms are calculated as the number of directors divided by the number of all types of entrepreneurs (sole proprietors, partnerships, directors); only individuals for whom entrepreneurship is the only source of income are included. The incorporation shares in Figures 5 have been smoothed using the procedure described below; raw shares are available in Appendix Figures A.1. To construct Figure 5, I address two data limitations.

First, although self-employed profits are paid out in the year they are received, corporate profits can be paid out any time. Therefore, owner-managers of incorpo-

[27]Several papers in the labor literature have documented how weaker incentives are likely to lead to weaker elasticity estimates, because the welfare losses of mis-optimizing are weaker (e.g., Chetty et al. (2011); Chetty (2012))

rated businesses could distribute smaller dividends than the total earned profits in years of high profits and larger dividends in years of small profits, or defer profits indefinitely. This behavior results in large bunching at the top marginal tax rate (MTR) kink in the distribution of incorporated profits and a corresponding excess mass in the shares of incorporated firms (see Figure A.2). To address this issue, I follow the approach of Kleven and Waseem (2013) and redistribute the excess mass at the top MTR kink to the right. I then use the adjusted distributions of incorporated profits to generate Figure 5.[28]

Second, I do not observe the actual profits of incorporated firms; instead, I estimate these profits as a sum of total paid wages and dividends received. Most individuals in the UK have small investments, and therefore the error in the estimated dividend payments is small.[29] However, the inclusion of unrelated wages presents a larger problem: although I observe the number of employment schedules filed, I am not able to allocate received wages to respective employers.[30] For this reason, I focus on directors who report one wage source, and sole-proprietors and partners who do not report any wage income.

Figure 5 shows a striking relationship between the shares of incorporated firms and the potential tax savings from incorporation: as the savings from incorporation increase, a larger share of entrepreneurs choose the corporate form. However, when the slope of the savings curve flattens – at around the top MTR cutoff – so does the share of incorporated businesses. Two further observations are notable. First, at the lowest levels of profits, roughly 10% of entrepreneurs incorporate, despite gaining no tax benefits from doing so. Similarly, nearly 40% of entrepreneurs with high profits remained incorporated in 1996/97 even though incorporation led to a higher tax liability. Together, these facts suggest that either incorporation is attractive for non-tax reasons, or that some individuals are inert. Second, the overall levels of incorporation remain relatively low even at high levels of profits. Among individuals who could save substantial amounts – for example, £4,000 or more per year in 2012 – nearly 30% fail to incorporate, implying high costs of incorporation, or a presence of inertia.

[28] The approach used to smooth distributions is described in detail in Appendix A.3.

[29] Among the self-employed, more than 75% report no dividend income.

[30] Approximately 20% of all director-year observations report more than one source of wage income.

The observed pattern is best explained by a combination of fixed and variable costs of incorporation. Starting from 1999, potential savings from incorporation are increasing for profit levels above £10,000.[31] If individuals experienced *only* a fixed cost of incorporation, the share of incorporated entrepreneurs would continue to increase until it reached 100%. However, we do not observe this empirically. Variable costs alone are also unlikely to explain the observed pattern, because that would require some individuals to have a variable cost of greater than 7%, which is unlikely.

4.2 Estimates of the Cost of Incorporation

In this section, I use the observed levels of incorporation across profit levels and time to characterize and estimate distributions of fixed and variable costs of incorporation, using a revealed-preference approach. Suppose individuals experience a fixed cost of incorporation $\phi_F \sim F_F$ and a variable cost $\phi_V \sim F_{V|F}$. If the only benefit of incorporation is tax savings, then for profit level p_i in year t, the share of incorporated firms $\hat{q}_{i,t}$ should satisfy

$$\begin{aligned}\hat{q}_{i,t} &= P(\phi_V p_i + \phi_F \leq s_{i,t}) \\ &= \int\int_{\phi_V p_i + \phi_F \leq s_{i,t}} f_F(\phi_F) f_{V|F}(\phi_V) d\phi_F d\phi_V,\end{aligned}$$

where $f_{V|F}$ and f_F denote the respective probability density functions. Therefore, one can determine the distributions of fixed and variable costs by minimizing the sum of least squares between the observed levels of incorporation, $q_{i,t}$, and predicted levels, $\hat{q}_{i,t}$:

$$\min_{f_V, f_F} \sum_{i,t} \left(\int\int_{\phi_V p_i + \phi_F \leq s_{i,t}} f_F(\phi_F) f_{V|F}(\phi_V) d\phi_F d\phi_V - q_{i,t} \right)^2. \tag{5}$$

Empirically, I estimate $f_{V|F}$ and f_F using shares of incorporation from Figure 5. The estimation relies on the full sample – covering £1000-bins of profits

[31] However, savings from incorporation start to decrease once the profits reach £300,000, at which point individuals are subject to a higher corporate tax rate.

ranging from £0 to £300,000, from 1996 through 2012.[32] I consider three separate cases. First, I assume individuals experience only fixed costs of incorporation, with $\frac{\phi_F - \underline{\phi_F}}{\overline{\phi_F} - \underline{\phi_F}} \sim Beta(\alpha_F, \beta_F)$ and $\phi_V = 0$. Second, I assume individuals experience only variable costs of incorporation, with $\frac{\phi_V - \underline{\phi_V}}{\overline{\phi_V} - \underline{\phi_V}} \sim Beta(\alpha_V, \beta_V)$ and $\phi_F = 0$. I choose to fit beta distributions because of their high flexibility and because extreme (or infinite) values of costs are unlikely. Because the estimation procedure focuses on individuals with taxable profits between £0 and £300,000, savings vary between -£6,500 to £14,000, thus limiting the range of estimable fixed and variable costs. Therefore, I fix the range of fixed costs to $\underline{\phi_F} = -$£6,500 to $\overline{\phi_F}$ =£14,000, and of variable cost to $\underline{\phi_V} = -4\%$ to $\overline{\phi_V}$ =19% of profits. Third, I consider a bivariate Beta distribution based on the construction by Arnold and Tony Ng (2011), which allows for both positive and negative correlation between fixed and variable costs. The bivariate distribution is based on five parameters $(\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5)$, resulting in marginal distributions $\frac{\phi_F - \underline{\phi_F}}{\overline{\phi_F} - \underline{\phi_F}} \sim Beta(\alpha_1 + \alpha_3, \alpha_4 + \alpha_5)$ and $\frac{\phi_V - \underline{\phi_V}}{\overline{\phi_V} - \underline{\phi_V}} \sim Beta(\alpha_2 + \alpha_4, \alpha_3 + \alpha_5)$. Correlation $Corr(\phi_F, \phi_V)$ does not have a closed-form expression and instead is estimated empirically.

The results of these estimations are available in Figure 6. Panel A considers fixed and variable costs separately, whereas Panel B shows the marginal distributions and correlation for the joint distribution of costs. The estimated density functions f_V and f_F in Panel A of Figure 6 mimic closely the observed behavior in Figure 5: a disproportionately large number of individuals experience very small or very high costs of incorporation. Panel A implies an average fixed cost of £3,750, or an average variable cost of 8% of profits. The large share of individuals at the extremes of the distribution of fixed costs is evidence of inertia, whereby some individuals strictly prefer corporate or personal tax bases.

Panel B estimates a joint distribution of costs and shows somewhat different results than Panel A. Fixed and variable costs appear to be positively correlated (0.34), but the relationship is not strong. Estimates imply an average fixed cost of £3,750 and an average variable cost of 1.97%. Although the distribution of fixed costs appears to be symmetric, variable costs are skewed towards negative

[32] I censor at £300,000 as the number of entrepreneurs decreases rapidly and the shares become very noisy.

values, suggesting that the non-tax benefits of incorporation increase with profits. Overall, the results suggest that large positive fixed costs are the key explanation for the large share of unincorporated firms, whereas large negative variable costs likely explain the prevalence of incorporated firms in 1996, when the tax differential was reversed.

The high estimated costs are surprising in light of the actual expenditures incorporation entails. First, individuals face a number of one-time costs. Entrepreneurs 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 personal tax returns, owner-managers must file yearly corporate tax returns and statutory accounts, and maintain payroll. Although both of these costs can be significant, they are unlikely to reach £3,750 in yearly costs for most businesses: Collard and Godwin (1999) estimate an average cost of £400 to operate a payroll system, and a google search suggests tax filing costs of £500. Because many of the self-employed also rely on tax preparers, the marginal cost of tax filing due to incorporation is likely to be even smaller.

5 Conclusion and Policy Implications

In this paper, I estimate the effect of lowering corporate taxes on entrepreneurial entry and income shifting. I find that a 10% increase in the difference between effective corporate and personal tax rates leads to a 2.64% increase in entrepreneurship. Higher entrepreneurial entry, however, is offset by income shifting – increasing the hazard rate of incorporation of the existing self-employed by up to 2.25% for a 10% increase in tax savings. Because income shifting leads to large tax revenue and welfare losses, the results caution policymakers against using low corporate taxes as the primary tool to increasing entrepreneurship. Importantly, although I find that the number of newly incorporated businesses increases, I do not observe the nature of these individuals' prior employments, and therefore 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.

The estimated elasticities of income shifting are relatively small. This finding is particularly surprising because income shifting considered in this paper is unquestionably legal and involves minimum hurdles. Moreover, for low-to-mid-income businesses considered in this study, tax considerations are likely to be the primary factor when choosing a legal form. Altogether these 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. Therefore, the large deadweight loss of taxation estimates of Gravelle and Kotlikoff (1989) are likely to be exaggerated. To what extent these findings apply to high-income individuals, however, remains unclear. If high-income individuals experience lower costs of income shifting, for example, because of access to highly trained lawyers and tax specialists, income shifting among these individuals might be stronger. Unequal access to shifting opportunities would then further exacerbate inequality.

The observed patterns of legal form choice imply high costs of incorporation. The revealed preference estimates suggest an average entrepreneur is willing to forgo £3,750 and 1.97% of profits to avoid incorporation. Although high costs of incorporation are desirable for the purpose of minimizing tax avoidance, they might hinder entrepreneurial activity in general. In this respect, the results support previous findings that bureaucratic and taxation costs are high (Slemrod and Blumenthal (1996); Collard and Godwin (1999); Djankov et al. (2002); Klapper et al. (2006); Aghion et al. (2017)). High costs of incorporation might be the reason entrepreneurial entry elasticities, estimated in Section 2, are relatively low. These costs may also prevent entrepreneurs from taking advantage of non-tax benefits of incorporation, such as limited liability, better financing options, and separation of management and ownership. More work is needed to determine whether the observed high costs of incorporation are a desirable feature.

Income shifting estimated in this paper is at the upper bound of previous estimates, as summarized in Appendix Table A.1. This fact is unsurprising, because previous studies typically relied on aggregate data, which could lead to downward

bias, or focused on countries with limited shifting opportunities. Nonetheless, the low magnitude is surprising. Elasticities estimated in this study are unlikely to be biased downward. First, the estimation strategy does not account for non-tax benefits of incorporation or the tax savings stemming from the ability of incorporated business owners to shift profit distributions over time. Therefore, actual savings from incorporation are larger than estimated, and the obtained results present an upper bound on the true elasticities of income shifting.[33] Second, estimated elasticities are unbiased as long as the expected profit measures used in the analysis accurately predict entrepreneurs' own expectations of future profits. Because entrepreneurs are more likely to incorporate when they receive a positive signal about future profits that may not be observed in the data, estimated elasticities are again likely to present an upper bound on the true elasticities.[34] Finally, the low elasticity estimates among first-time entrepreneurs further confirm that initial sorting does not drive the low levels of income shifting.

So what could explain the low levels of incorporation? Beyond the actual costs of incorporation discussed in Section 4.2, individuals might be simply unaware of the potential savings from incorporation or find the tax code too complicated to act (Chetty et al. (2013); Bhargava and Manoli (2015); Abeler and Jäger (2015); Bergner and Heckemeyer (2017); Zwick (2018)). This explanation is not satisfactory for the long-term self-employed, because most entrepreneurs, at some point in their life, employ the assistance of tax preparers, who are incentivized to advise their clients about potential tax savings. Because corporate tax returns are more profitable for tax accountants, a conflict of interest is unlikely in this setting. The heterogeneity analysis in Section 3.3 also does not support this explanation, because individuals who are less prone to incorporation on average are not necessarily the least responsive to tax incentives.

Individuals might also fail to income shift, because of inertia (Jones (2012); Benzarti (2015)). Incorporation does not have a natural deadline, because earned profits cannot be subjected to the corporate tax schedule retroactively. Therefore, individuals might plan to incorporate and then procrastinate on this task forever.

[33]Recall the lower elasticity estimates under the assumption that all profits are retained in Panel B of Appendix Table A.6.

[34]However, estimates based on realized profits in columns (9) and (10) of Table A.6 again suggest that such bias is likely to be very small.

Finally, entrepreneurs might fail to incorporate, because of evasion. For example, individuals might believe that incorporation will lead to a higher probability of auditing or that cheating is easier under the personal tax base. Alternatively, business-owners mind 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.

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

	All Data				Survival Analysis Samples		
	Trades Only	Partnerships Only	Owner-Managers	Combination	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
No. of Obs. Per Taxpayer (median)	4	8	6	10	3	4	4
No. of 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
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
Percent Savings (mean)	3.18	3.75	5.42	4.63	3.23	6.17	5.39
Percent Savings (25th percentile)	0.00	0.00	2.72	0.43	0.00	2.44	1.13
Percent Savings (50th percentile)	0.57	2.67	5.34	4.22	0.05	4.95	4.50
Percent 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, and thus are not mutually exclusive.

Table 2: Entrepreneurial Entry and Income Shifting

Panel A: Replicating Devereux and Liu (2015)

	outcome variable: logarithm (new incorporated entrepreneurs)	
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				
	total new incorp. entrepreneurs (1)	switchers from personal base (2)	1st-time incorp. entrepreneurs (3)	1st-time entrepreneurs (personal & corporate) (4)	share of incorporated among 1st-time entrepreneurs (5)
(a) In semi-elasticities on retained earnings					
Savings % Retained	0.030	0.024	0.030	0.025	0.005
	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
(b) In semi-elasticities on distributed earnings					
Savings % Distributed	0.032	0.026	0.033	0.027	0.007
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
(c) In elasticities on retained earnings					
Log(Savings % Retained)	0.096	0.054	0.115	0.100	0.016
	(0.010)	(0.011)	(0.010)	(0.007)	(0.006)
(d) In elasticities on distributed earnings					
Log(Savings % Distributed)	0.107	0.070	0.123	0.107	0.017
	(0.010)	(0.010)	(0.010)	(0.006)	(0.005)
(e) In elasticities on distributed earnings with income >£6,000					
Log(Savings % Distributed)	0.170	0.126	0.190	0.141	0.049
	(0.009)	(0.009)	(0.009)	(0.007)	(0.005)
(f) In elasticities on distributed earnings with income >£10,000					
Log(Savings % Distributed)	0.330	0.262	0.347	0.264	0.082
	(0.010)	(0.013)	(0.011)	(0.009)	(0.006)
Year FE and Profit Bin FE	yes	yes	yes	yes	
Number of Observations	7000	7000	7000	7000	7000

Notes: Savings % Retained are calculated under the assumption 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. Savings % is measured in percent rather than fractions. All £-values are inflation adjusted to 2013.

Table 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)	

continued on next page

Table 3: 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 a proportional hazard model described in Section 3.1 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 4: Cox HM Estimates: Heterogeneity Analysis (Predicted Profits)

	Sole Prop.	Partnership	Male	Female	Age<30	Age 30-45	Age 45-SP	Age > SP	Also Wage Earnings	No Wage Earnings	Dividends>0	Dividends=0
Log(Savings %)	0.215	0.215	0.228	0.228	0.149	0.152	0.133	0.240	0.186	0.220	0.114	0.231
	(0.004)	(0.009)	(0.004)	(0.006)	(0.006)	(0.006)	(0.009)	(0.006)	(0.003)	(0.015)	(0.006)	(0.004)
Number of Observations	6962378	1483627	7293326	2433566	2773446	2117220	1038665	3797561	4696079	5030813	1184446	8542446
Number of Individuals	1481571	278649	1458655	486655	586409	456411	250133	652357	940368	1004942	311776	1806858
	Services	Transport	Hair/Beauty	Health	Construction	Catering	Retail	Manuf.	Legal Accnt.	Real Estate	Motor Veh.	Prof Services
Log(Savings %)	0.163	0.145	0.194	0.019	0.126	0.039	0.094	0.099	0.146	0.157	0.141	0.116
	(0.026)	(0.023)	(0.033)	(0.034)	(0.014)	(0.019)	(0.016)	(0.018)	(0.056)	(0.044)	(0.032)	(0.008)
Number of Observations	182332	312968	119517	389414	1035371	215436	307482	223940	184944	35897	91705	853387
Number of Individuals	41627	65975	23486	72943	243745	48752	60359	47100	29296	7999	16968	228056
	North East	North West	Yorkshire &Humber	E Midlands	W Midlands	East of England	London	South East	South West	Wales	Scotland	Northern Ireland
Log(Savings %)	0.200	0.222	0.226	0.232	0.238	0.228	0.188	0.219	0.243	0.209	0.205	0.162
	(0.019)	(0.010)	(0.012)	(0.012)	(0.011)	(0.011)	(0.010)	(0.008)	(0.011)	(0.017)	(0.015)	(0.030)
Number of Observations	262788	865908	675471	598077	720070	1017958	1763483	1537503	869121	362245	653120	271323
Number of Individuals	54476	181630	138939	126467	148554	211542	406796	324751	178309	73663	129020	49211

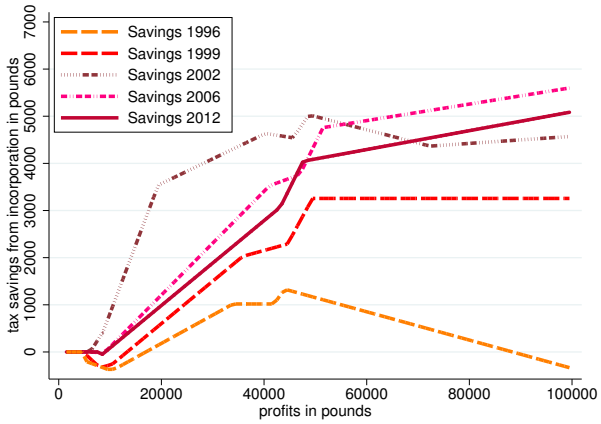
Notes: This table shows the results of estimating a proportional hazard model described in Section 3.1 using tax-savings measures based on predicted profits. Standard errors are clustered by individual. Each regression includes the following controls: individual demographics; year, geographic, and industry 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.

Table 5: Cox HM Estimates: By Income Levels (Predicted Profits)

	< £20,000		£20,000 - £40,000		£40,000 - £60,000		> £60,000	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log(Savings %)	0.162	0.104	0.088	0.043	0.110	0.133	0.140	0.075
	(0.004)	(0.006)	(0.004)	(0.006)	(0.010)	(0.013)	(0.010)	(0.016)
Time × Log(Savings %)		0.012		0.010		-0.006		0.012
		(0.001)		(0.001)		(0.003)		(0.003)
Log(Savings)	0.106	0.099	0.067	0.073	0.096	0.178	0.080	0.127
	(0.003)	(0.004)	(0.003)	(0.004)	(0.008)	(0.011)	(0.006)	(0.012)
Time × Log(Savings)		0.001		-0.001		-0.017		-0.007
		(0.001)		(0.001)		(0.001)		(0.001)
Number of Observations	5,383,910	5,383,910	2,981,350	2,981,350	611,216	611,216	750,417	750,417
Number of Individuals	1,174,499	1,174,499	539,928	539,928	112,252	112,252	118,632	118,632

Notes: This tables shows the results of estimating a proportional hazard model described in Section 3.1 using tax-savings measures based on predicted profits. Standard errors are clustered by individual. Each regression includes the following controls: individual demographics; 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. Year fixed effects are not included. All £-values are inflation adjusted to 2013.

Figure 1: Potential Savings from Incorporation

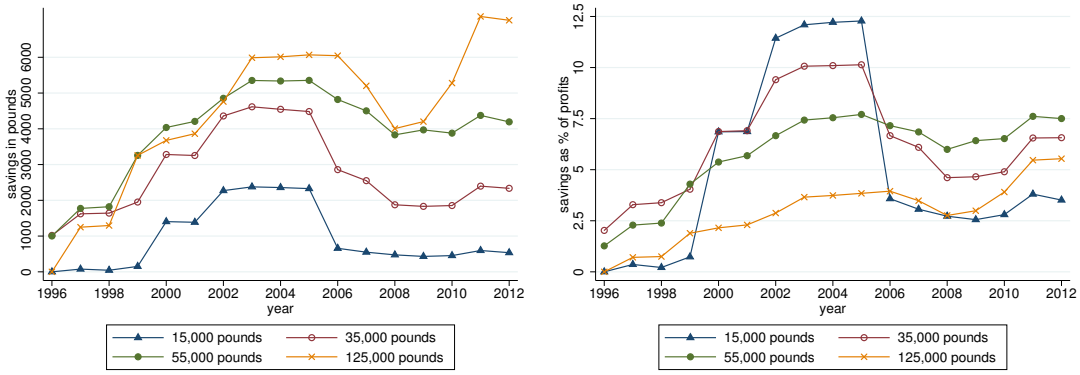


Notes: This figure shows how the potential savings from incorporation changed over time. Savings are calculated as the difference between the tax liability under the personal and corporate tax bases and assuming taxable income equals taxable profits. Between 1996 and 1999, the corporate tax rate gradually decreased from 24% to 20%, making incorporation more attractive. In 2000, a "starting" corporate tax rate was introduced reducing the corporate tax 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.

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

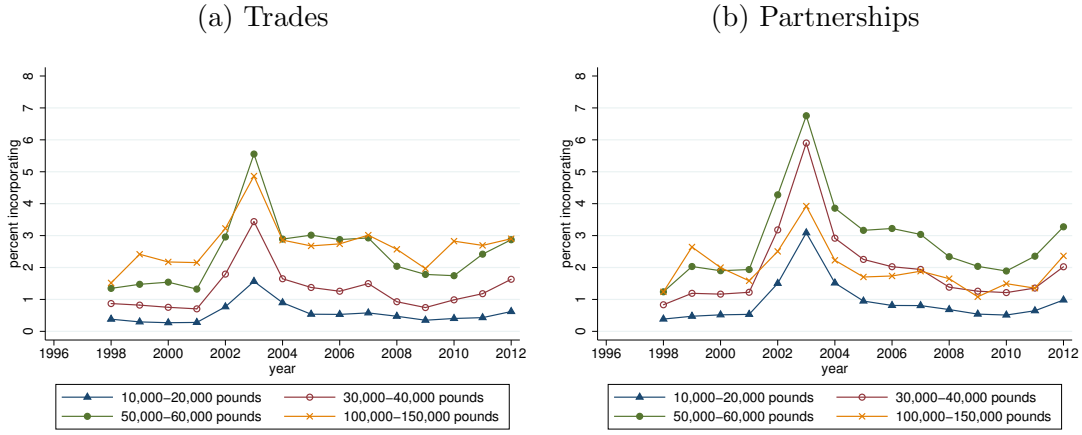
(a) Savings in Pounds

(b) Savings as Percent of Profits



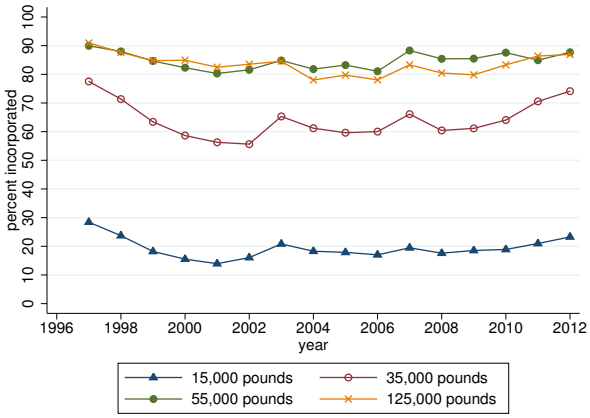
Notes: This figure shows how the potential savings from incorporation changed over time for individuals with profits equal to £15,000, £35,000, £55,000, or £125,000. Estimates are inflation adjusted to 2013 pounds. Savings are calculated as the difference between tax liability under the personal and 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.

Figure 3: Percent of Incorporations Over Time



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.

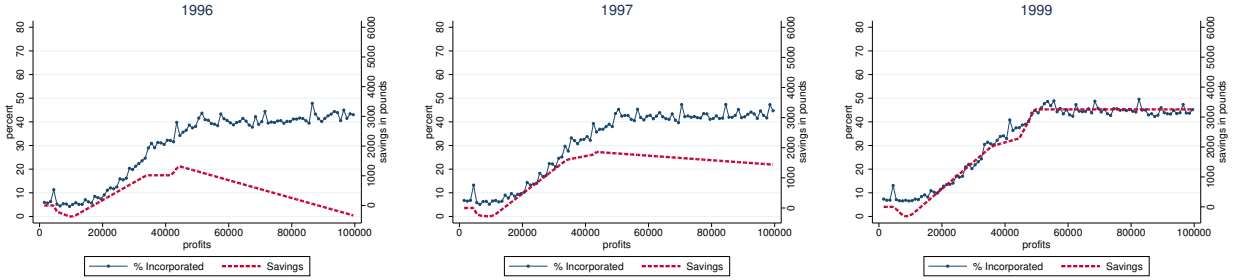
Figure 4: Percent Incorporated among 1st-Time Entrepreneurs over Time



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.

Figure 5: Savings from Incorporation and Percent Incorporated in Selected Years

(a) (b) $\tau^C \downarrow 3\%$ (c) $\tau^C \downarrow 1\%$, notional credit $\downarrow$



(d) new 10% τ^C bracket, $\tau^N \uparrow$ 1% (e) new 0% τ^C bracket (f) $\tau^N \uparrow 1\%$



(g) (j) 0% τ^C abolished (h) (l) $\tau^C \uparrow 1\%$ (i) (o) $\tau^N \uparrow 1\%$, $\tau^C \downarrow 1\%$

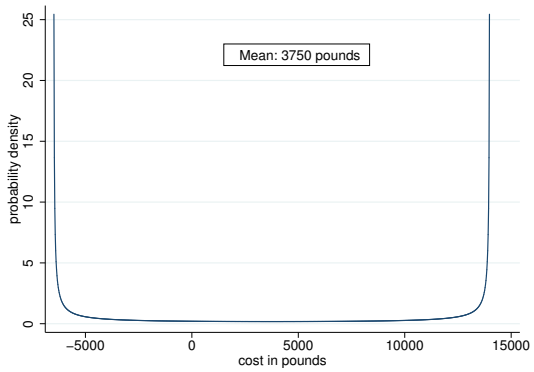


Notes: This figure shows the share of incorporated businesses (left axis) and corresponding potential savings from incorporation (right axis) by profit bin. τ^C denotes corporate taxes, whereas τ^N denotes National Insurance Contributions.

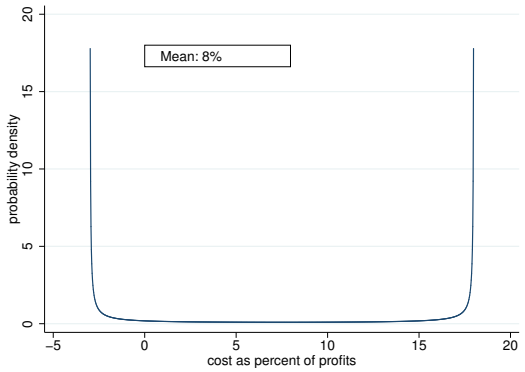
Figure 6: Estimates of the PDFs of Fixed and Variable Costs of Incorporation

Panel A: Only Fixed Cost or Only Variable Cost

(a) Fixed Cost Only

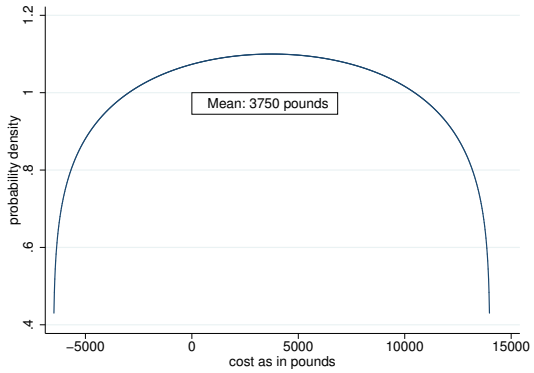


(b) Variable Cost Only

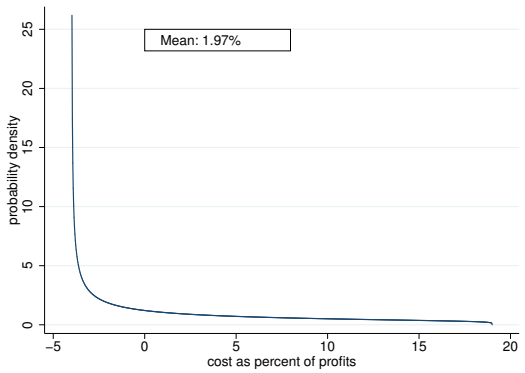


Panel B: Fixed Cost and Variable Cost Jointly: Corr(ϕ_F, ϕ_V)=0.34

(c) Fixed Cost



(d) Variable Cost



Notes: This figure shows the probability density functions of fixed and variable costs estimated using a procedure described in Section 4. Panel A assumes individuals experience either only a fixed cost or only a variable cost, each following a respective Beta distribution. Panel B assumes individuals experience both fixed and variable costs, jointly distributed.

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 for 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 in many years, thresholds and bracket cutoffs have been changing almost every year. For this reason, the savings curves do not coincide even in 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 for Survival Analysis

For the purposes of survival analysis described in Section 3 I includes 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 a director of a company. The final sample only includes individuals who have had higher profits than the personal allowance in 50% of the years. In other words, if individual reports being self-employed in 2001/02 – 2004/05, then his taxable profits must be greater than the personal allowance in 2 out of these 4 years. For individuals who satisfy this requirement, only 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.

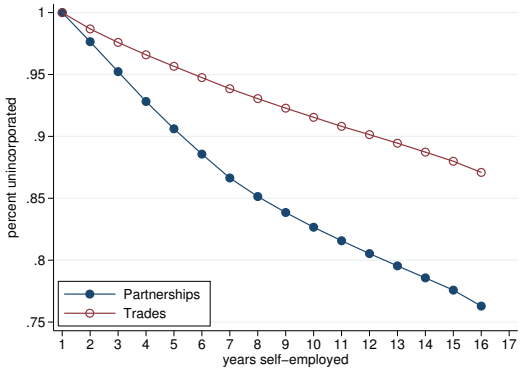
Incorporation is defined as a switch from reporting trade or partnership income to reporting a director status the following year. I allow for one year overlaps – thus allowing for mid-year incorporations – whereby individuals report both trade/partnership income and being a director in the same year. 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:

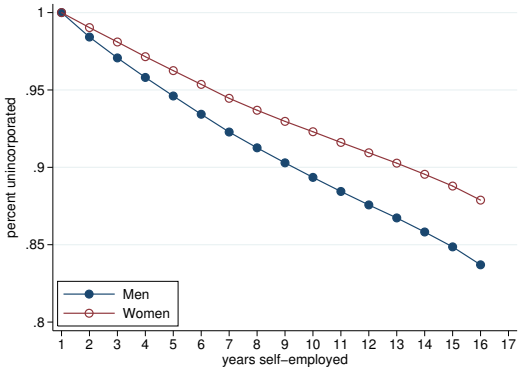
1. se, se, dir, dir
2. se, se, .., dir
3. se, dir, se, dir
4. se, se, dir, se, se
5. se, .., .., se, dir, se, se
6. se, .., .., dir, dir
7. se, se, dir+se, dir
8. se, se, dir+se, ..
9. se, se, dir+se, dir+se, dir

Figure A.1: Probability of Remaining Unincorporated

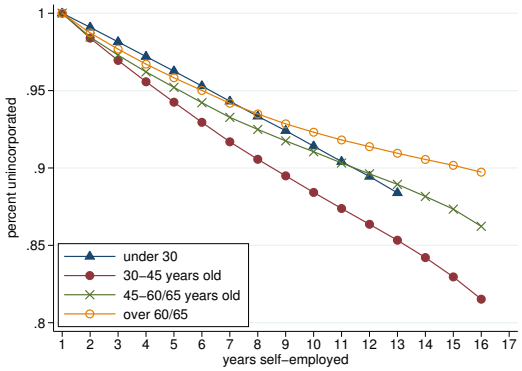
(a) By Self-Employment Type



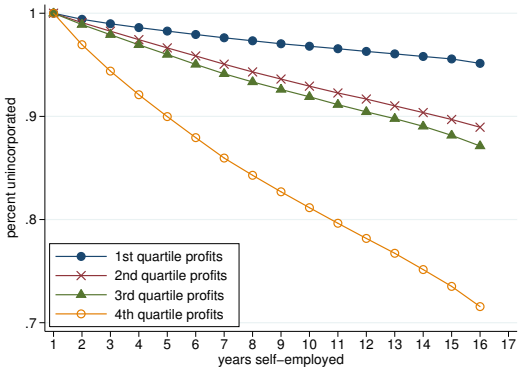
(b) By Gender



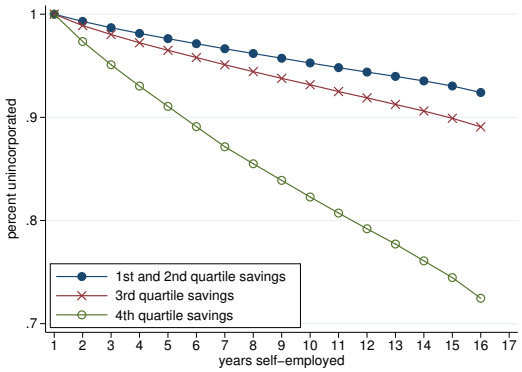
(c) By Age



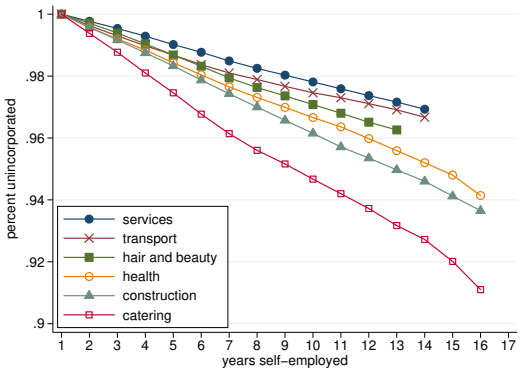
(d) By Profit Level



(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.2: 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 a proportional hazard model described in Section 3.1 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.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	0.198		
	(0.003)	(0.004)							(0.014)	(0.016)	(0.018)		
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		0.126	
							(0.002)	(0.003)	(0.008)	(0.010)		(0.019)	
Time × Log(Savings)								-0.008		-0.057			
								(0.000)		(0.001)			
Log(Savings %) in Year $t+1$											0.021		
											(0.004)		
Log(Savings) in Year $t+1$												-0.013	
												(0.003)	

continued on next page

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 a proportional hazard model described in Section 3.1 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: Heterogeneity Analysis (Previous Profits)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Sole Prop.	Partnership	Male	Female	Age<30	Age 30-45	Age 45-SP	Age > SP	Also Wage Earnings	No Wage Earnings	Dividends>0	Dividends=0
Log(Savings %)	0.220	0.164	0.210	0.185	0.103	0.092	0.043	0.212	0.197	0.227	0.143	0.231
	(0.004)	(0.007)	(0.004)	(0.007)	(0.006)	(0.006)	(0.009)	(0.006)	(0.003)	(0.016)	(0.006)	(0.004)
Number of Observations	6962378	1483627	7293326	2433566	2773446	2117220	1038665	3797561	4696079	5030813	1184446	8542446
Number of Individuals	1481571	278649	1458655	486655	586409	456411	250133	652357	940368	1004942	311776	1806858
	Services	Transport	Hair/Beauty	Health	Construction	Catering	Retail	Manuf.	Legal Accnt.	Real Estate	Motor Veh.	Prof Services
Log(Savings %)	0.055	0.016	0.070	0.105	0.122	0.022	0.043	0.059	0.190	0.157	0.060	0.093
	(0.027)	(0.022)	(0.036)	(0.024)	(0.014)	(0.021)	(0.016)	(0.017)	(0.049)	(0.036)	(0.029)	(0.007)
Number of Observations	182332	312968	119517	389414	1035371	215436	307482	223940	184944	35897	91705	853387
Number of Individuals	41627	65975	23486	72943	243745	48752	60359	47100	29296	7999	16968	228056
	North East	North West	Yorkshire &Humber	E Midlands	W Midlands	East of England	London	South East	South West	Wales	Scotland	Northern Ireland
Log(Savings %)	0.145	0.201	0.203	0.225	0.190	0.214	0.215	0.216	0.226	0.186	0.187	0.094
	(0.020)	(0.010)	(0.012)	(0.012)	(0.012)	(0.011)	(0.008)	(0.008)	(0.011)	(0.018)	(0.015)	(0.033)
Number of Observations	262788	865908	675471	598077	720070	1017958	1763483	1537503	869121	362245	653120	271323
Number of Individuals	54476	181630	138939	126467	148554	211542	406796	324751	178309	73663	129020	49211

Notes: This table shows the results of estimating a proportional hazard model described in Section 3.1 on a "New" sample with tax savings measures based on previous year's profits. Only individuals with positive savings are included. 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.

Table A.5: Cox HM Estimates: By Income Level (Previous Profits)

	< £20,000		£20,000 - £40,000		£40,000 - £60,000		> £60,000	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log(Savings %)	0.217	0.206	0.176	0.196	0.135	0.212	0.148	0.166
	(0.004)	(0.006)	(0.005)	(0.006)	(0.013)	(0.015)	(0.011)	(0.015)
Time × Log(Savings %)		0.002		-0.004		-0.018		-0.003
		(0.001)		(0.001)		(0.001)		(0.002)
Log(Savings)	0.140	0.155	0.140	0.173	0.122	0.203	0.069	0.132
	(0.003)	(0.004)	(0.004)	(0.004)	(0.010)	(0.011)	(0.006)	(0.009)
Time × Log(Savings)		-0.003		-0.006		-0.016		-0.009
		(0.000)		(0.000)		(0.001)		(0.001)
Number of Observations	5383910	5383910	2981350	2981350	611216	611216	750417	750417
Number of Individuals	1174499	1174499	539928	539928	112252	112252	118632	118632

Notes: This table shows the results of estimating a proportional hazard model described in Section 3.1 with tax savings measures based on previous year's profits. Only individuals with positive savings are included. Standard errors are clustered by individual. Each regression includes the following controls: individual demographics; 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. Year fixed effects are not included. All £-values are inflation adjusted to 2013.

Table A.6: Cox HM Estimates: Comparing Income Measures

	Predicted Profits		Highest 3-Year Profits		Previous Profits		Actual Profits	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
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)	
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)	
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
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

Notes: This table shows the results of estimating a proportional hazard model described in Section 3.1 using tax savings measures based on various measures of taxable 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.

A.3 Smoothing Incorporation Curves

I follow the general approach of Kleven and Waseem (2013) to smooth distributions in Figure A.1. I proceed in two steps. First, I generate distributions of profits for owner-managers shown in Figure A.2. I then identify a counterfactual distribution by estimating the following regression:

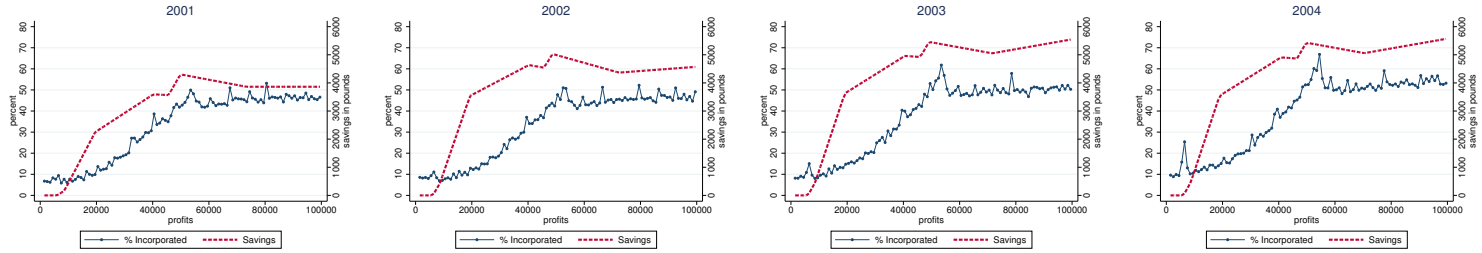
$$C_j = \sum_{i=0}^{q} \beta_i \cdot (Z_j)^i + \sum_{i=z_l}^{z_u} \gamma_i \cdot \mathbf{1}[Z_j = i] + \varepsilon_j^0, \tag{6}$$

where C_j represents the number of owner-managers in profit bin j, Z_j is the average profit level in bin j, q is the order of polynomial which is fitted to the counts, z_l and z_u determine the size of the excluded region around the top MTR kink, such that $z_l < K \leq z_u$. The counterfactual distribution is defined by the predicted values from (6) omitting the dummies: $\hat{C} = \sum_{i=0}^{q} \hat{\beta}_i \cdot (Z_j)^i$. Excess mass $\hat{B}^0$ and missing mass $\hat{M}^0$ are calculated as the difference between observed empirical density counts C_j and estimated counterfactual counts $\hat{C}_j^0$ in the earnings intervals $(z_l, K]$ and $(K, z_u]$ respectively: $\hat{B}^0 = \sum_{j=z_l}^{K}(C_j - \hat{C}_j^0) = \sum_{j=z_l}^{K} \hat{\gamma}_j^0$ and $\hat{M}^0 = \sum_{j=K}^{z_u}(\hat{C}_j^0 - C_j) = -\sum_{j=K}^{z_u} \hat{\gamma}_j^0$. The lower bound of the excluded region z_l is estimated visually. To estimate z_u, I make use of the fact that the amount of bunching due to the notch should be equal to the missing mass to the right of the threshold. I start by setting $z_u = K + 1$ and keep increasing z_u by one bin until the estimated excess mass due to the notch equals the estimated missing mass, i.e. until $\pi_{notch}^0 \cdot \hat{B}^0 = \hat{M}^0$.

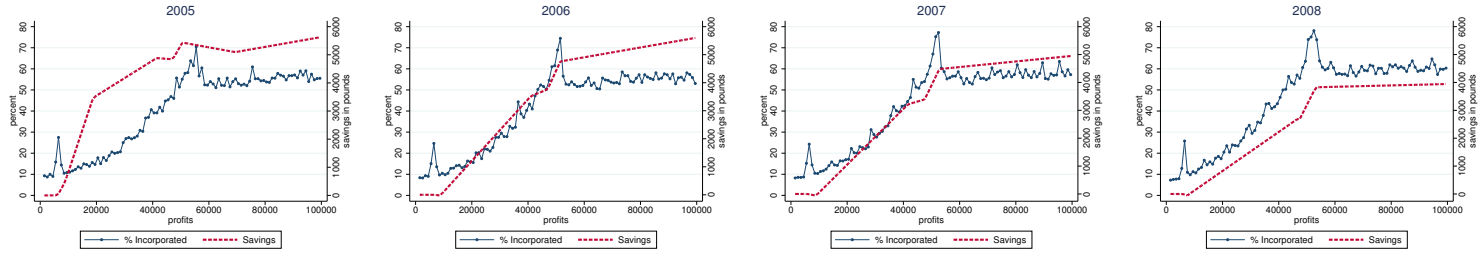
This procedure is repeated for each year separately. The resulting distributions of owner-managers' profits are shown in Figure A.2. The original incorporation shares are shown in Figure A.1, the smoothed incorporation shares are shown in Figure 5.

Figure A.1: Savings from Incorporation and Percent Incorporated (Unadjusted)

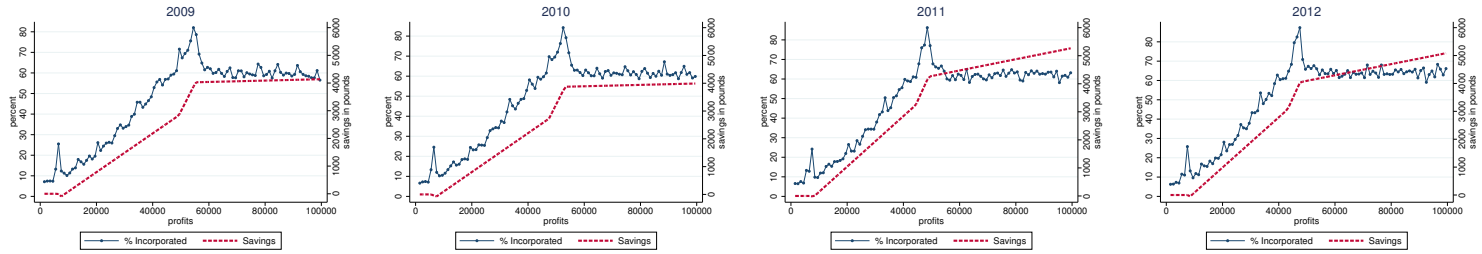
(a) small NIC limit change (b) new 0% τ^C bracket (c) $\tau^N \uparrow 1\%$ (d) no change



(e) (i) no change (f) (j) 0% τ^C abolished (g) (k) $\tau^C \uparrow 1\%$ (h) (l) $\tau^C \uparrow 1\%$

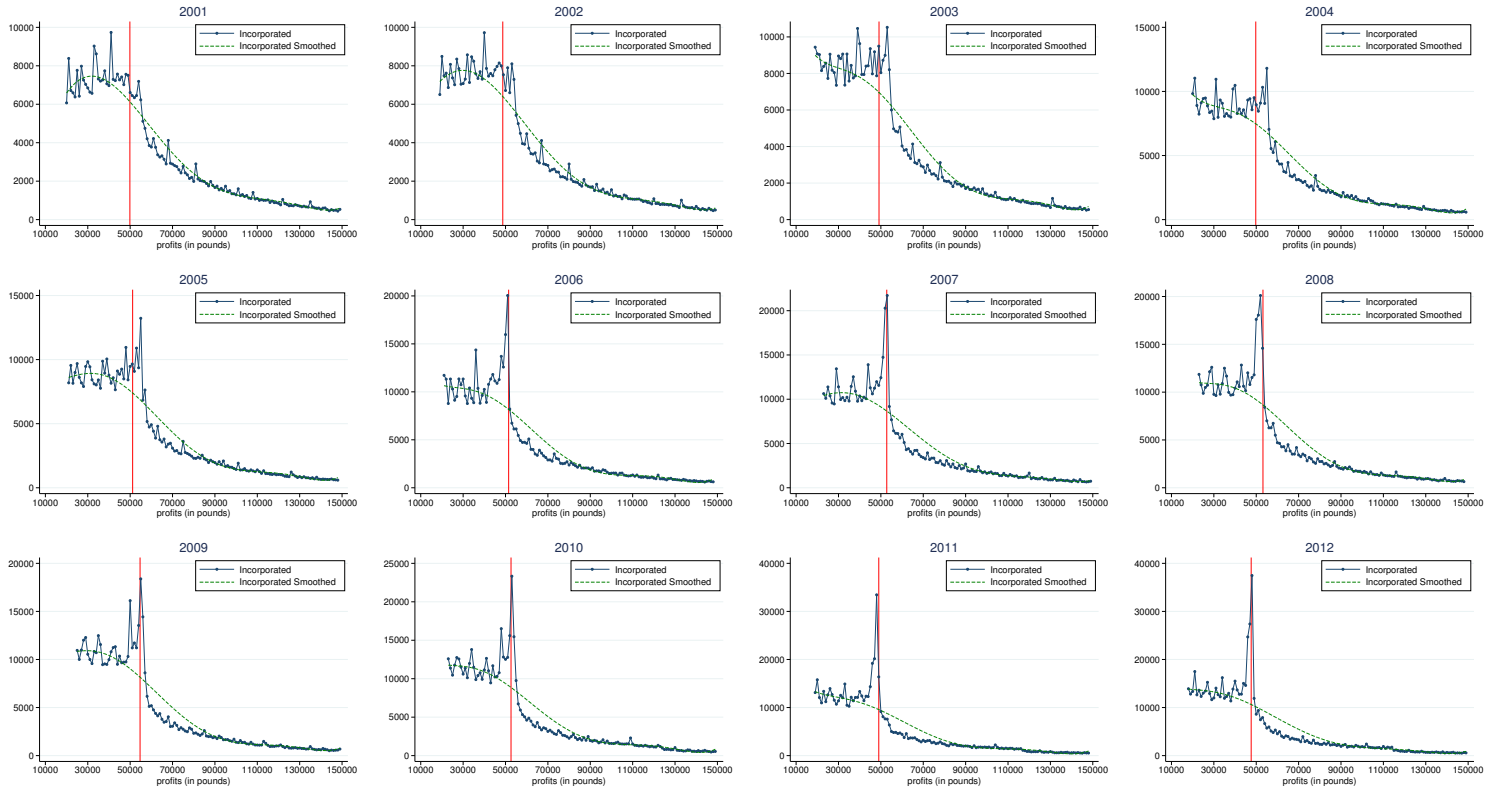


(i) (m) no change (j) (n) no change (k) (o) $\tau^N \uparrow 1\%$, $\tau^C \downarrow 1\%$ (l) (p) no change



Notes: This figure shows the share of incorporated businesses (left axis) and corresponding potential savings from incorporation (right axis) by £1000 profit bin. No adjustment necessary prior to 2001.

Figure A.2: Distributions of Profits for Incorporated Firms: Before and After Adjustment



Notes: This figure shows the distributions of profits for incorporated businesses before and after the adjustment over the years.

A.4 Literature Comparison

Notes on Goolsbee (1998): The author does not list mean values of shares of incorporated firms and tax rates. So I approximate elasticity bound as follows. I approximate the mean non-corporate share of capital in non-manufacturing industries from Table 1 to be about $(0.15 + 0.33)/2 = 0.24$. To calculate an upper bound on $\tau_c - \tau_p$, I use the fact that the tax rate on equity is less than personal income tax (see equations (1) and (4) in Goolsbee (1998)), hence, $\tau_c - \tau_p = \tau + (1-\tau)t_e - \tau_p \leq \tau + (1-\tau)t_p - \tau_p = \tau(1-\tau_p)$, where τ denotes corporate tax rate. From Table 2 follows that mean $\tau_c(1-\tau_p) \leq [(1908-1900+1)\cdot 0 + (1917-1909+1)\cdot 0.01 + (1938-1918+1)\cdot 0.12\cdot(1-0.25)]/[1938-1900+1] = 0.05$. Therefore, an elasticity bound on non-manufacturing industries can be approximated as 0.03567/0.24/(0.1/0.05)=0.074.

Notes on Carroll and Joulfaian (1997): An elasticity with respect to $(\tau_c - \tau_p)/(1-\tau_c)$ equals

$$\begin{aligned} e_1 &= \frac{\Delta Share/Share}{\Delta(\tau_c-\tau_p)/(1-\tau_c)/(\tau_c-\tau_p)/(1-\tau_c)} \\ &= \frac{\Delta Share/Share}{\frac{(\tau_c^2-\tau_p^2)/(1-\tau_c^2)-(\tau_c^1-\tau_p^1)/(1-\tau_c^1)}{(\tau_c^1-\tau_p^1)/(1-\tau_c^1)}} \\ &= \frac{\Delta Share/Share}{\frac{(\tau_c^2-\tau_p^2)\frac{1-\tau_c^1}{1-\tau_c^2}-(\tau_c^1-\tau_p^1)}{\tau_c^1-\tau_p^1}}. \end{aligned}$$

It can be compared to an elasticity with respect to $(\tau_c - \tau_p)$ that equals

$$e_2 = \frac{\Delta Share/Share}{\frac{(\tau_c^2-\tau_p^2)-(\tau_c^1-\tau_p^1)}{\tau_c^1-\tau_p^1}}.$$

It becomes clear that $e_1 < e_2$ if $\frac{1-\tau_c^1}{1-\tau_c^2} > 1$ and $e_1 \geq e_2$ if $\frac{1-\tau_c^1}{1-\tau_c^2} \leq 1$. While the authors do not list mean corporate tax rates τ_c before and after reform, the ratio $\frac{1-\tau_c^1}{1-\tau_c^2}$ appears to be less than 1. Authors define $\tau_C = \tau + (1-\tau)[(1-\alpha)\tau_{cg} + \alpha\tau_d]$. They set $\alpha = 0.6$, $\tau_{cg}^1 = 0.1$, $\tau_{cg}^2 = 0.14$, $\tau_d^1 = 0.37$, $\tau_d^2 = 0.28$. Using maximum corporate tax rates $\tau^1 = 0.5$ and $\tau^2 = 0.34$ would lead to an estimate of $\frac{1-\tau_c^1}{1-\tau_c^2} = \frac{1-0.6}{1-0.48} = 0.78 < 1$.

Table A.1: Previous Estimates

Study	Data	Results	Elasticity
MacKie-Mason and Gordon (1997)	Aggregate asset and income losses shares, U.S., 1959-1986	An increase in $\tau_c - \tau_p$ of 0.1 decreases the corporate share of assets by 0.002 and corporate share of gains by 0.028, and increases the corporate share of losses by 0.042.	
Goolsbee (1998)	Aggregate capital shares in the U.S., 1900-1939	An increase in $\tau_c - \tau_p$ of 0.1 increases the non-corporate share of capital by 0.00209 for farming, by 0.00304 for manufacturing and by 0.03567 for non-manufacturing.	<0.074 (non-manufacturing)
Goolsbee (2004)	Census of Retail Trade aggregate tabulations, U.S., 1992	An increase in $\tau_c - \tau_p$ of 0.1 increases the non-corporate share of firms by 0.25 and the share of establishments by 0.19. Average $\tau_c - \tau_p = 0.035$, mean share of corporate firms 0.626, mean share of establishments 0.698.	0.14 (firms), 0.10 (establishments).
Mooij and Nicodème (2008)	Eurostat business demography data on 17 countries and 60 sectors, 1997-2003	A decrease in $\tau_c - \tau_p$ of 0.1 increases the corporate share of new firms by 0.0554 and the corporate share of active firms by 0.1022.	0.287 (new firms)
Carroll and Joulfaian (1997)	Individual corporate tax returns, U.S., linked 1985 and 1990 years	Estimate elasticity of electing S-corporation over C-corporation with respect to $(\tau_c - \tau_p)/(1 - \tau_c)$ to be between 0.187 and 0.196.	<0.187
Luna et al. (2010)	State-level aggregated IRS data, U.S., 1997-2008	Estimate elasticity of corporate share or number of corporations and partnerships with respect to τ_c and τ_p	0.04-0.05 (corporate tax rate), -0.03-0.04 (personal tax rate, opposite sign
Liu (2014)	Census of Manufacturers, U.S., state-level data on manufacturing enterprises for 1904, 1909, 1914, and 1919	An increase of τ_c by 0.1 is associated with a 0.2-0.3% decrease in the corporate share of economic activities; an increase of τ_p by 0.1 raises the corporate share by 0.5-0.6%. Average $\tau_c - \tau_p = 0.064$.	0.128-0.192 (corporate tax rate), 0.32-0.38
Onji and Tang (2017))	Corporate genealogies edited by Yagura and Ikushima (1986)	Introduction of personal income taxation increased corporate share by 0.032. Average $\tau_p = 0.03$, average share of corporate firms 0.42.	
Edmark and Gordon (2013)	Detailed register based data at both the individual and the firm level over 2004–2008	An increase of $\tau_c - \tau_p$ of 0.01 increases the likelihood of incorporation by 0.25 to 0.37 percentage points.	
Devereux and Liu (2015)	Individual corporate tax returns, UK, 2002/03-2008/09	An decrease in $\tau_c - \tau_p$ of 0.1 generates a 22% increase in the number new incorporated firms. Average tax saving $\tau_c - \tau_p$ assuming profits are distributed is 0.0336 and assuming profits are retained is 0.0845.	0.09 (distributed profits), 0.37 (retained)

Notes: This table shows the results from selected previous studies. Not all results can be easily compared, see Appendix Section A.4 for details.