

# INTERTEMPORAL INCOME SHIFTING AND THE TAXATION OF BUSINESS OWNER-MANAGERS

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**Abstract**—We use newly linked tax records to show that the large responses of UK company owner-managers to personal taxes are due to intertemporal income shifting and not to reductions in real business activity. Around half of this shifting is short-term and helps prevent volatile incomes being taxed more heavily under progressive personal taxes. The remainder reflects systemic profit retention over long periods to take advantage of lower tax rates, including preferential treatment of capital gains. We find no evidence that this tax-induced retention increases business investment. It does, however, substantially reduce the tax revenue raised from high income business owners.

## I. Introduction

THE taxation of business owners is important—they are a growing part of the workforce,<sup>1</sup> and how they respond to tax is key for assessing the efficiency and equity properties of capital taxation. Politicians commonly grant business owner-managers preferential tax treatment as a means to boost entrepreneurship and growth. The policies chosen—for example, favorable capital gains tax rates—often incentivise the shifting of taxable income across time. Such shifting can allow individuals to smooth tax payments when incomes are volatile but can also create inefficiencies and reduce government revenue.

The contribution of this paper is to study different forms of intertemporal income shifting and their implications for tax avoidance and capital allocation, in a setting of considerable policy interest. Previous work has shown that business owners are responsive to taxes, and that this is often driven by avoidance, notably through income shifting across tax bases<sup>2</sup>

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<sup>1</sup>In the United States, the share of total business income accruing to “pass-through entities” rose from 21% in 1980 to over 50% by 2011 (DeBacker & Prisinzano, 2015). In the UK, company owner-managers have been the fastest growing part of the labor force since the early 2000s (Cribb et al., 2019).

<sup>2</sup>This includes tax-motivated incorporation (e.g., Gordon & MacKie-Mason, 1994; MacKie-Mason & Gordon, 1997; Goolsbee, 1998; Gordon

and time.<sup>3</sup> We use newly linked personal and corporate tax records to show that all of the responsiveness of UK company owner-managers to marginal tax rate changes is due to intertemporal income shifting, and not to reductions in real business activity. We show that around half of shifting is short-term and helps prevent volatile incomes being taxed more heavily under progressive personal taxes. However, the remainder reflects systemic retention of profits within a company over long periods in order to access lower capital gains tax rates. We show that this tax-induced systematic profit retention does not increase investment in business capital; retained profits are held in financial assets. Older and higher income individuals are more likely to retain profits, with profit retention significantly reducing the tax liability of the highest profit owner-managers.

In the UK, as in many European countries, the corporate form is tax-advantaged both because capital income is taxed at lower rates than labor income and because business owners can choose when to withdraw income from the company and pay personal income taxes.<sup>4</sup> To empirically distinguish between the ways that UK company owner-managers respond to tax changes, we use a new match between the personal tax records of individuals who are major shareholders and directors of incorporated businesses and the associated company’s corporate tax records. This allows us to distinguish between the total income created each year by the owner-manager (measured at the business level), personal taxable income paid to the owner-manager and the net retention of profits in the company.

Owner-managers face a progressive personal tax schedule and can access a preferential capital gains tax rate if they retain profits until liquidation. These tax features provide two different incentives to shift taxable income across time. First, individuals whose profit fluctuates around kinks in the tax schedule can retain when profits are high and withdraw when profits are low to avoid paying the higher rate. It is well understood that people will save and dissave to smooth consumption in the face of income fluctuations. However, we highlight that shifting in this case (which corresponds to saving in the company) exists because of the variation in tax rates that individuals face as their profit fluctuates. The second form of intertemporal income shifting is the systematic retention of profits within the company to take advantage of the fact that

& Slemrod, 2000) and the relabeling of labor income as capital income (Gordon & Slemrod, 2000; Harju & Matikka, 2016).

<sup>3</sup>For example le Maire and Schjerming (2013); Alstadsæter and Fjærli (2009); Alstadsæter et al. (2014).

<sup>4</sup>In many European countries, corporate forms that provide vehicles for intertemporal income shifting have been the most tax advantaged form of business ownership and incorporation the source of most business growth for decades (de Mooij & Nicodème, 2008).

the tax rate faced at liquidation is lower than the rate faced during company life. Owner-managers may also respond to personal taxes by changing investment and labor supply.

We use two complementary empirical approaches that exploit different forms of tax variation to show that all of the responsiveness of owner-managers to tax rate changes is due to intertemporal income shifting and not reductions in real business activity. First, we use a bunching estimator<sup>5</sup> applied to different income measures around the higher rate threshold, above which the marginal personal income tax rate increases by 20 percentage points. We show that while there is sharp bunching in *taxable (personal) income*, there is no evidence of any bunching in the *total income at the company level*.<sup>6</sup> This indicates that the bunching in taxable income is entirely driven by strategic profit retention and withdrawal. Second, we find similar patterns using a difference-in-differences approach to assess responses to policy reforms that increased marginal tax rates on incomes above £100,000. There were large responses in taxable income but no evidence of a change in the total amount of income generated, even 5 years after the reforms. Company owner-managers face significantly fewer constraints on their labor supply choices than other types of workers, such that the attenuating effects of adjustment costs on estimated labor supply elasticities are less of a concern.<sup>7</sup>

We empirically study the different motivations for intertemporal income shifting by exploiting the panel nature of the tax records. We argue that those who are smoothing volatile total incomes in the face of tax kinks will not bunch in all years. This is supported by the fact that, on average, net retention is zero for these “sometimes bunchers,” and we see them retaining when their incomes are high and withdrawing when their incomes are low. In contrast, we argue that those who bunch consistently are systematically retaining to access lower future rates; in line with this, such individuals accumulate positive net retained profits. We find that around half of the observed bunching at the higher rate threshold is due to shifting to smooth volatility. The ability to engage in this short-run form of shifting is beneficial as it allows individuals with volatile incomes to smooth their tax liability and not be penalized by a progressive tax schedule, relative to individuals with more stable incomes (Meade, 1978; Bradford, 1982).

Much of the existing literature on intertemporal income shifting focuses on short-run responses.<sup>8</sup> However, there is also evidence of substantial, systematic profit retention to take advantage of lower future tax rates. The incentive for UK

owner-managers to retain over long periods exists largely as a result of “Entrepreneurs’ Relief,” a 10% capital gains tax rate for gains realized on shares in closely held companies.<sup>9</sup> We find that owner-managers retain substantial sums over several years—among those generating £150,000 of total income, half retain in excess of £50,000 each year and 25% retain more than £90,000. However, owner-managers almost never retain to the tax minimising extent, which suggests that there are costs to doing so. Most likely, individuals cannot fully and costlessly borrow at the personal level against income retained in the company for long periods, and, as a result, the intertemporal allocation of consumption is distorted. In support of the existence of these costs, we find that profit retention is higher for individuals closer to retirement age.

Policy makers often perceive a trade-off when setting capital taxes: because capital incomes accrue disproportionately to high earners, higher rates are desirable for redistributive reasons, but they can generate large efficiency losses if they reduce savings and investments (Chetty & Saez, 2005). The rationale for “Entrepreneurs’ Relief” is to boost closely held business investment. We argue that preferential capital gains tax rates increase the incentive to retain earnings in a company but do not directly change investment incentives; capital investment will only change if higher retained earnings affect the asset portfolio choice within the business.<sup>10</sup> Empirically, we find that retained profits are held in the form of cash and other equivalent financial assets and lead to no change in a company’s capital stock, even among those companies that do have significant capital holdings.<sup>11</sup> At the same time, lower capital gains tax rates are costly in terms of foregone revenue and provide disproportionate benefit to the highest income business owners: among owner-managers claiming Entrepreneurs’ Relief, mean capital gains are £500,000, corresponding to a tax saving (relative to taxation on accrual) of £75,000 over the company’s life.<sup>12</sup>

There is a growing literature, dating back to (Feldstein, 1995, 1999), which uses the elasticity of taxable income (ETI) to estimate the marginal welfare change from raising tax rates. However, the conditions under which this is valid are known to break down if there are spillovers to other tax bases (Slemrod, 1995; Slemrod & Yitzhaki, 2002). We show that there is substantial bunching at tax kinks by owner-managers; Adam,

<sup>5</sup>As developed by Saez (2010) and Chetty et al. (2011); see Kleven (2016) for a summary.

<sup>6</sup>We may not expect to see bunching in annual total income if it is volatile and individuals can easily shift income across time. Following the approach of le Maire and Schjerning (2013) we consider bunching in average total income but find no evidence of this.

<sup>7</sup>See, for example, Chetty et al. (2011); Kleven and Waseem (2013); Bastani and Selin (2014).

<sup>8</sup>Goolsbee (2000) finds that the taxable income response of executives to tax rises disappears after one year. le Maire and Schjerning (2013) study short-run shifting by the Danish self-employed.

<sup>9</sup>The UK government’s March 2020 Budget reduced the lifetime amount of gains eligible for Entrepreneur’s Relief from £10 million to £1 million and renamed it Business Asset Disposal (BAD) relief.

<sup>10</sup>We do not study business entry in this paper, but note that preferential tax rates for business owners are similarly poorly targeted on this margin and can lead to tax-motivated incorporation (Crawford & Freedman, 2010).

<sup>11</sup>This is consistent with the ‘new view’ of dividend taxes (changes in rates of dividend taxes do not affect the incentive to invest out of retained earnings; Auerbach, 1979; Bradford, 1981) and evidence that the 2003 U.S. dividend tax cut did not led to increased investment (Yagan, 2015).

<sup>12</sup>Advani and Summers (2020) show that preferential rates of tax on capital incomes lead to average tax rates falling at the very top of the UK income distribution. Smith et al. (2019) highlight the importance of private business income at the top of the U.S. wealth distribution; tax policies that encourages the long-run retention of income within businesses contribute to private business wealth accumulation.

Miller, and Pope (2017) estimate the elasticity of taxable income of this group of around 0.1 (compared to 0 for employees). However, we show that this is entirely driven by shifting income across time, which means that it will be taxed *at some point*. Failure to account for these intertemporal spillovers would thus lead to an overestimate of the deadweight loss of tax (see, e.g., Chetty, 2009).<sup>13</sup>

The key institutional features of our setting—notably the tax advantage associated with the corporate form, the freedom to decide when income is taxed at the personal level and the preferential rate of capital gains tax for businesses assets—are common across, and therefore of interest in, many tax systems. This includes the United States: the 2017 Tax Cuts and Jobs Act reduced the U.S. corporate tax rate and is likely to lead more U.S. owner-managers to choose a C-corporation form (Looney, 2017). This legal form offers a means to shift income intertemporally and the exemption of qualified small business stock from U.S. capital gains tax provides an incentive to do so.<sup>14</sup>

In the next section, we describe the data, and in section III, we outline the institutional setting and tax incentives faced by owner-managers. In section IV, we present our empirical results, and a final section concludes and discusses the implications of our findings.

## II. Data

Our population of interest are UK owner-managers of “closely held” companies that is company directors (managers) who are also major shareholders (owners), such that they have significant control over the business. We use company level data from company accounts matched to administrative corporate tax records and newly matched to administrative personal tax records of company directors. We study closely held companies that have nonmissing information on the number of shareholders and directors and that file 12 month accounts in the years 2005–2015. The match between corporate and personal records is available for companies that are active in at least one year between 2013 and 2015. We summarize the data here and provide more details, including on precise variable definitions and samples, in appendix A.

### A. Closely Held Companies

We use data on companies from two sources. We use information on turnover, costs and profits contained in corporate tax records filed at the UK tax authority (HM Revenue & Customs (HMRC)). This information is matched to company accounts data (specifically *Financial Accounting Made Easy (FAME)* provided by Bureau van Dijk), which provides information on company age, the number of directors and

shareholders, industrial classification, and assets and liabilities listed on companies’ balance sheet. The majority (68%) of UK companies have strictly fewer than three directors and three shareholders; in 90% of these companies, at least one director is also a shareholder (see appendix A for more details). In what follows we refer to companies with at most two directors and two shareholders as closely held. In some parts of the analysis we consider the subset of closely held companies with one director and one shareholder. This is the configuration that has seen the largest growth, partly a result of a change in UK law that effectively meant that companies were no longer required to have two directors.<sup>15</sup>

Table 1 compares the characteristics of closely held companies to those of all UK companies. Closely held companies are slightly younger and are smaller in terms of turnover, profits and assets than all companies. Closely held companies do, however, have higher median profit-to-turnover ratios. Closely held company owner-managers have a strong incentive to take their income, including that part which reflects a return to their labor, in the form of returns to capital (i.e., as dividends or capital gains); see section III for more details. As a result, a significant amount of corporate profit will reflect returns to labor of the owner-manager.

For part of our empirical analysis, we study the subset of closely held companies that have only one director and one shareholder. This allows us to more cleanly identify to whom the income generated at the company level flows. These companies are slightly less profitable than the larger closely held companies, but have larger ratios of profit-to-turnover, again reflecting the fact that profit for these companies includes at least some part of the returns to labor of the owner-manager. The incomes of these companies are volatile. Around 40% of the variation in log total income is due to the transitory component of income; this compares to an estimate for all U.S. workers of roughly 10% in Kopczuk et al. (2010) (details of this decomposition are provided in appendix A.6).

*Capital and investment.* On average, closely held companies’ balance sheets record just under £200,000 in total assets. Current assets, which include liquid financial assets (i.e., cash or cash equivalents), investments and any stock of products yet to be sold, account, on average, for over 75% of total assets.<sup>16</sup> Fixed assets measure a company’s stock of “productive capital” and include plant, machinery, fixtures, buildings and intangible assets. The mean closely held company has total recorded fixed assets of £90,000, but the distribution is highly skewed; the median value of fixed assets is around £7,000. We also see evidence of this skewness in the use of capital

<sup>15</sup>The UK Companies Act 2006 meant that from 6 April 2008 limited companies were no longer required to appoint a company secretary. It is common for company secretaries to be directors.

<sup>16</sup>Companies may make investments in other companies (directly or indirectly via indexes). However, there are a number of reasons why a trading company will not want to hold investments that are sufficient to have them classified as an investment company, including the fact that investment companies are excluded from many of the preferential tax treatments given to trading companies.

<sup>13</sup>Gorry et al. (2018) study income shifting by executives and show that accounting for the fact that shifted income is taxed at a future date decreases the estimated welfare loss from personal taxes.

<sup>14</sup>In contrast, S-corporations offer limited scope to shift intertemporally because personal taxes are levied on accrual.

TABLE 1.—SAMPLE DESCRIPTIVE STATISTICS

(1) Source	(2) Variable	(3) All companies				(7) Closely held companies								
		Mean	Median	P10	P90	≤ 2 directors, ≤ 2 shareholders				1 director, 1 shareholder				
						Mean	Median	P10	P90	Mean	Median	P10	P90	
FAME	Number of directors	2.2	2.0	1.0	4.0	1.6	2.0	1.0	2.0	1.0	1.0	1.0	1.0	
FAME	Number of shareholders	2.1	2.0	1.0	3.0	1.4	1.0	1.0	2.0	1.0	1.0	1.0	1.0	
FAME	Firm Age (years)	9.9	6.0	1.0	22.0	7.6	5.0	1.0	16.0	4.0	3.0	1.0	9.0	
CT600	Turnover (£th)	576.3	106.2	15.5	1,398.4	223.6	82.0	14.4	599.1	123.4	60.7	11.5	303.8	
CT600	Profit (£th)	38.5	16.5	-5.0	115.7	30.4	16.8	-2.5	88.8	21.7	11.7	-2.8	66.9	
CT600	Profit/Turnover (%)	30.9	22.4	3.6	73.5	33.8	27.3	4.4	74.9	36.5	32.2	4.2	77.3	
CT600	Ever use capital allowances (%)	69.9				70.4				58.7				
CT600	Capital allowances (£th)	14.0	2.5	0.2	38.6	6.3	1.7	0.2	18.4	4.3	1.3	0.2	13.2	
CT600	Capital allowances/Profit (%)	12.6	2.4	-0.9	52.3	11.3	2.0	-0.0	46.7	10.5	0.9	0.0	45.8	
FAME	Total assets (£th)	624,561.0	70.1	7.0	1,669.4	190.4	42.8	5.7	495.8	81.6	23.5	3.5	199.8	
FAME	Fixed assets (£th)	225,616.8	14.1	1.0	1,041.5	90.9	7.2	0.7	244.0	33.9	4.0	0.6	84.3	
FAME	Current assets (£th)	280,268.3	45.0	4.5	912.1	110.2	30.0	3.7	272.5	51.8	17.9	2.5	131.2	
FAME	Current/Total assets (%)	72.9	86.5	18.9	100.0	75.3	88.7	24.7	100.0	78.5	93.2	29.8	100.0	
FAME	Shareholder equity (£th)	135,420.0	10.2	-11.0	514.6	55.1	6.0	-8.2	152.8	17.6	2.2	-7.1	59.0	
CT600/FAME	Profit/Total assets (%)	75.3	40.5	3.1	217.1	92.3	56.7	7.0	249.1	117.6	78.9	11.0	300.3	
	Number of companies		1,578,706					1,093,340					339,504	

Table shows descriptives for three samples. The first sample (columns 3–6) contain all UK companies that operate at some point between 2013 and 2015, have nonmissing information on the number of shareholders and directors and file 12 month accounts (see appendix A for more details). The second sample (columns 7–10) is a subset of the first sample that have ≤ two directors and ≤ two shareholders. The third sample (columns 11–14) is a subset that have only one director and one shareholder. For each company, we observe the variables listed in column 2 annually in the data source listed in column 1; for a description of the variables see appendix A. For each company we take the mean of each variable across the period of time they are in the data. The statistics shown in the table are mean, median, 10th and 90th percentiles across companies. Mean calculations (across companies, not when constructing company means) are winsorized at the 1st and 99th percentiles. All monetary values are in 2014–2015 prices.

Source: Authors' calculations using accounts data from Financial Accounting Made Easy (FAME) and from administrative corporate tax records (CT600) provided by HMRC.

allowances (tax deductions for investment in components of fixed assets as recorded on corporate tax returns): around 70% of companies use allowances, with a median value of £1700, and a mean of £6300. Any profits that are not paid out in dividends nor invested in fixed assets will appear as current assets. We use the information on fixed assets to investigate whether changes in the marginal rate of personal income tax affect owner-managers' capital investment decisions.

*Industries and business models.* There is growing recognition that business owners are a highly heterogeneous group spanning many industries and business models, and not synonymous with entrepreneurs (Humphries, 2017). This is true in the UK, with significant heterogeneity in the activities of closely held companies, including across and within industries. Some company owner-managers are carrying out innovative activity, making (possibly risky) investments and employing others. However, others are effectively just selling their own labor services (IT contractors and locum doctors are common examples of this), and are not making any significant investments.<sup>17</sup>

Consistent with this heterogeneity, there are systematic differences in the activities and returns across industries.

<sup>17</sup>In some cases, such as when an individual contracts solely and regularly with a single third-party company, owner-managers may in effect be operating as a “disguised” employee. There are laws that seek to prevent genuine employment (i.e., where there is effectively a contract of employment between an individual and a third party) being disguised as a more tax advantaged legal form (IR35 rules). While these rules provide some constraint on who operates through a corporate form, they are imperfect.

Table A3 in the appendix lists the top 15 industries among the closely held company population, and describes variation in profits, turnover and assets across industries. Over 1 in 5 closely held companies have the industrial classification “other business activities”, which principally includes accountants, (management) consultants, architects, and those in human resources. A further 7% are in the computer services sector (e.g., IT consultants). Companies in these industries have higher ratios of profit to turnover and assets, consistent with the expectation that a significant share of the income of these reflects returns to labor of the owner-manager. There are also substantial numbers of company owner managers operating in construction, retail, health and social work (e.g., doctors), and land transport (e.g., taxi drivers).

*B. Linking Company and Owner-Manager Information*

We use a new match between the company data (company accounts and corporate tax returns) and the personal tax records of UK company directors. Without the match, it is possible to observe the income and capital investment decisions of the company and, separately, the incomes (by type) of owner-managers. The match makes it possible to link these outcomes and to accurately compute how much income is retained within the company.<sup>18</sup> It is only by combining the data sources that we can study whether the responsiveness

<sup>18</sup>Company accounts data contain a measure of director salaries, but in most cases this variable is missing for our population of interest as it is not a mandatory reporting requirement.

TABLE 2.—SUMMARY STATISTICS FOR CLOSELY HELD COMPANY OWNER-MANAGERS

Variable	Mean	Median	P10	P90
Age (years)	49.1	49.0	35.0	63.0
Share female (%)	28.5			
Wages (£th)	14.4	8.4	1.7	31.0
Dividends (£th)	21.3	17.8	0.0	42.5
Personal taxable income (£th)	39.5	34.1	10.7	75.7
Share in top 1% of income taxpayers	2.5			
Number of owner-managers		689,258		

The table presents descriptive statistics for the sample of owner-managers (directors) of matched closely held companies. For each owner-manager, we observe variables annually and take the mean of the variable across the period of time they are observed in the data (including the dichotomous indicator variable of whether their income is high enough to be in the top 1% of taxpayers). Appendix A contains details of the sample and variable definitions.

Source: Authors' calculations using HMRC administrative datasets.

of owner-managers' personal taxable income reflects adjustment in the real economic activity by the owner-managers, which will show up at the company level, or different forms of tax avoidance, such as changing the timing of taxable income.

The match between administrative corporate and personal tax records was performed by HMRC (the UK's tax authority). The match is between all company directors that are listed in company accounts in 2013–2014 (with a nonmissing date of birth and address) and all self-assessment income tax filers in that year. For matched directors, we have an unbalanced panel of personal and corporate data from 2005–2006 to 2014–2015.

The data are matched on director name, date of birth and address; more details on this are provided in appendix A.5. Our matched sample of closely held companies (i.e., that have least one director matched to the personal tax records) is around half our full sample. Of those closely held companies not in the matched sample, 45% were not matched because the director's date of birth or address is missing in company accounts and a further 5% are excluded because they have a director with more than one company directorship. In appendix A, we compare the matched sample with the full sample of closely held companies. The matched companies are of a similar age and have similar turnover, on average, to the full sample of closely held companies. The matched companies do, on average, have higher recorded profit than the full sample; we find that these differences are driven mainly by the fact that companies with zero or negative profits are less likely to be matched. Median asset holdings and the split between current and fixed assets are similar for the matched and full samples, although there are fewer companies in matched sample with very high asset levels, which skews the mean downwards for this sample. Overall, we conclude that our matched sample is broadly representative of those owner-managed companies that do not lie at the very extremes of the profit or asset distribution.

*Company owner-managers.* Table 2 presents summary statistics for directors of closely held companies. These individuals are disproportionately male and have an average age of just under 50. For comparison, UK employees are around

50% male and have an average age of 40 (Cribb et al., 2019). The age of owner-managers is relevant as it will likely affect their ability and willingness to retain profits until they dissolve their company, or until retirement, when they may choose to draw down the stock of profits through dividend payouts. In section IV, we show that older owner-managers systematically retain more profits.

The personal taxable income of owner-managers is relatively high—the median is £34,000, compared with a median income of £27,000 for a full-time employee in April 2014.<sup>19</sup> Owner-managers are disproportionately located in the top of the income distribution; 2.5% of them are in the top 1% of UK income taxpayers (which, in recent years, reflect the top 0.6% of UK adults) and 10%–15% of the top 1% are owner-managers in any given year. How the tax system treats these individuals, and how they respond to this treatment, is therefore important both for the progressivity of the tax system and post-tax income inequality.

*Variable construction.* We observe company  $f$ 's post-corporate tax profit,  $\pi_{ft}$ , in year  $t$  in the corporate tax returns, and the wage,  $y_{it}^w$  and dividend income,  $y_{it}^d$ , of the owner-manager  $i$  in the personal tax returns. Let  $\mathcal{F}_f$  denote the set of owner-managers belonging to company  $f$ . We define the total income of company  $f$  in year  $t$  ( $z_{ft} = \pi_{ft} + \sum_{i \in \mathcal{F}_f} y_{it}^w$ ) as corporate profit minus corporate tax paid, plus any wage income paid to the owner-managers.<sup>20</sup> This is income that flows into the company each year (turnover), after deducting allowable costs (excluding the labor costs of the owner-manager) and corporate tax liability. The total taxable income of owner-manager  $i$  in year  $t$  ( $y_{it} = y_{it}^w + y_{it}^d$ ) is measured directly from the individual's tax returns as the sum of dividend and wage income.

The flow of retained profits of company  $f$  are the difference between the total post-corporate tax income of the company and what is withdrawn as taxable income by the company's owner-managers,  $r_{ft} = z_{ft} - \sum_{i \in \mathcal{F}_f} y_{it}$ . For a subset of our empirical analysis we focus on one director one shareholder companies, where  $\mathcal{F}_f$  is a singleton for each company. This is because, in the case of one director one shareholder companies, if these individuals were adjusting real activity (i.e. the total amount of income they generate at the company level), then the relevant tax threshold is the same as for taxable income.

### III. Tax System and Incentives

Closely held companies are, like all UK companies, subject to corporation tax at the company level in the year in which profits are earned. Corporate taxable profits are calculated, broadly, as annual revenue (turnover) net of allowable deductions, the most notable of which are employees' costs

<sup>19</sup>Source: Office for National Statistics, Annual Survey of Hours and Earnings.

<sup>20</sup>This is unobserved when there are multiple directors and both are not matched to the personal tax records.

(including wages, employer social security and pension contributions), interest expenses and capital allowances. From 2006–2007 onwards, companies with profit below £300,000 (97% of closely held companies) have faced a flat and stable “small companies” corporation tax rate of between 19% and 21%.<sup>21</sup> Thus corporate tax changes did not change the incentives to shift personal taxable income across time, nor to reduce the total amount of income generated by the company.

Our interest is in how the personal income tax system affects company and owner-manager behaviour. When income is distributed to the owner-manager (either as wages, dividends or capital gains) it is subject to personal taxes in the year the income is paid out, not necessarily in the year it flows into the company. The tax treatment of UK company owner-managers means that they can freely choose whether to take their income in the form of returns to labor (wages) or capital (dividends or capital gains) and, by choosing when to take income out of a company, they can choose when to pay personal taxes.<sup>22</sup> The combination of lower rates of tax on capital incomes relative to salaries, and the ability to smooth taxable income over time makes operating as a company owner-manager the most tax advantaged legal form in the UK (Adam, Browne et al., 2017). Further details of the tax system are provided in appendix B.

In this section, we discuss the incentives that the tax system creates—to shift income intertemporally and to adjust investment and labor supply—and how these inform our empirical approach. We formalize the intuition described in this section using a model of owner-manager choices in appendix C.

#### A. Personal Tax Incentives

*Taxation of wage and dividend income.* While the company is active, an owner-manager can choose to pay themselves either in salary or dividend income. Income paid as salary is deducted from corporate tax, but is subject to both personal income tax and social security contributions (National Insurance Contributions (NICs)). Income paid as dividends is taxed first at the corporate level in the year income arises, and then attracts personal taxes in the year dividends are paid out. Dividends fall within the personal income tax and are subject to the same thresholds as salary but are taxed at lower income tax rates and do not attract NICs.

<sup>21</sup>In 2005–2006, there was a 0% “starting rate” of corporation tax on the first £10,000 of nondistributed profit. There was a system of “marginal relief” in place that increased the rate from 0% for companies with £10,000 profits to the small companies’ rate at £50,000. As such, owner-managers with total incomes close to the higher-rate threshold (i.e., just below £50,000) faced a rate (on retained profits) only slightly below the full small companies’ rate.

<sup>22</sup>In the UK, there is no equivalent to “reasonable compensation” rules that apply to shareholders of S-corporations in the United States and require that the salary portion of the shareholder’s remuneration is a reasonable compensation of their labor input. The self-employed (owners of *unincorporated* businesses) are taxed on total income in the year it arises and, as such, have substantially less scope than company owner-managers to shift income intertemporally.

The tax minimising way to take income out of the company in all years we study involves taking a salary equal to the point at which personal taxes become payable and withdrawing the remainder as dividend income. This is the most commonly used strategy by owner-managers.<sup>23</sup> In appendix A.4, we show the composition of taxable income for individuals at different taxable income levels; up to around £10,000, most income is taken as salary, after which point, most income is taken as dividends. Dividend payments are usually less frequent than salary payments, making them less attractive in some cases. However, owner-managers can use “director’s loans” to borrow against the income in their company in order to smooth an income stream.<sup>24</sup>

Figures 1a and 1b plot the marginal tax rate schedules faced by owner-managers assuming that they pay themselves according to the salary/dividend split described above; the marginal tax rate is the combined corporate and personal tax rate on an extra £ earned and taken out of the company. The left hand panel shows the schedule for the 2009–2010 tax year. The marginal tax rate increases from 0% to 20% when taxable income exceeds the point at which NICs start to be due (the primary threshold), and from 20% to 40% at the higher rate threshold in income tax—roughly £40,000. This structure is representative of the marginal rate schedules in the tax years before 2009–2010, albeit with small changes in the value of thresholds over time. Since the 2010–2011 tax year, there have been additional marginal tax rate bands at £100,000 and £150,000, illustrated in the right-hand panel.<sup>25</sup>

There is clear evidence that owner-managers bunch at the thresholds (kinks) in the personal tax system. Figure 1c plots the distribution of taxable income up to £90,000 in 2014–2015, and panel d plots the distribution of taxable income from £90,000 to £180,000 across the period 2010–2011 to 2014–2015 (the distributions are similar across tax years). There is strong evidence of bunching at the higher rate threshold, as well as at the kink points at £100,000 and £150,000 from 2010–2011 onwards. In section IV, we disentangle the drivers of this high responsiveness of owner-managers to marginal tax rate changes. In principle, while the bunching could reflect reductions in labor supply in the face of higher tax rates, it could also reflect intertemporal income shifting.

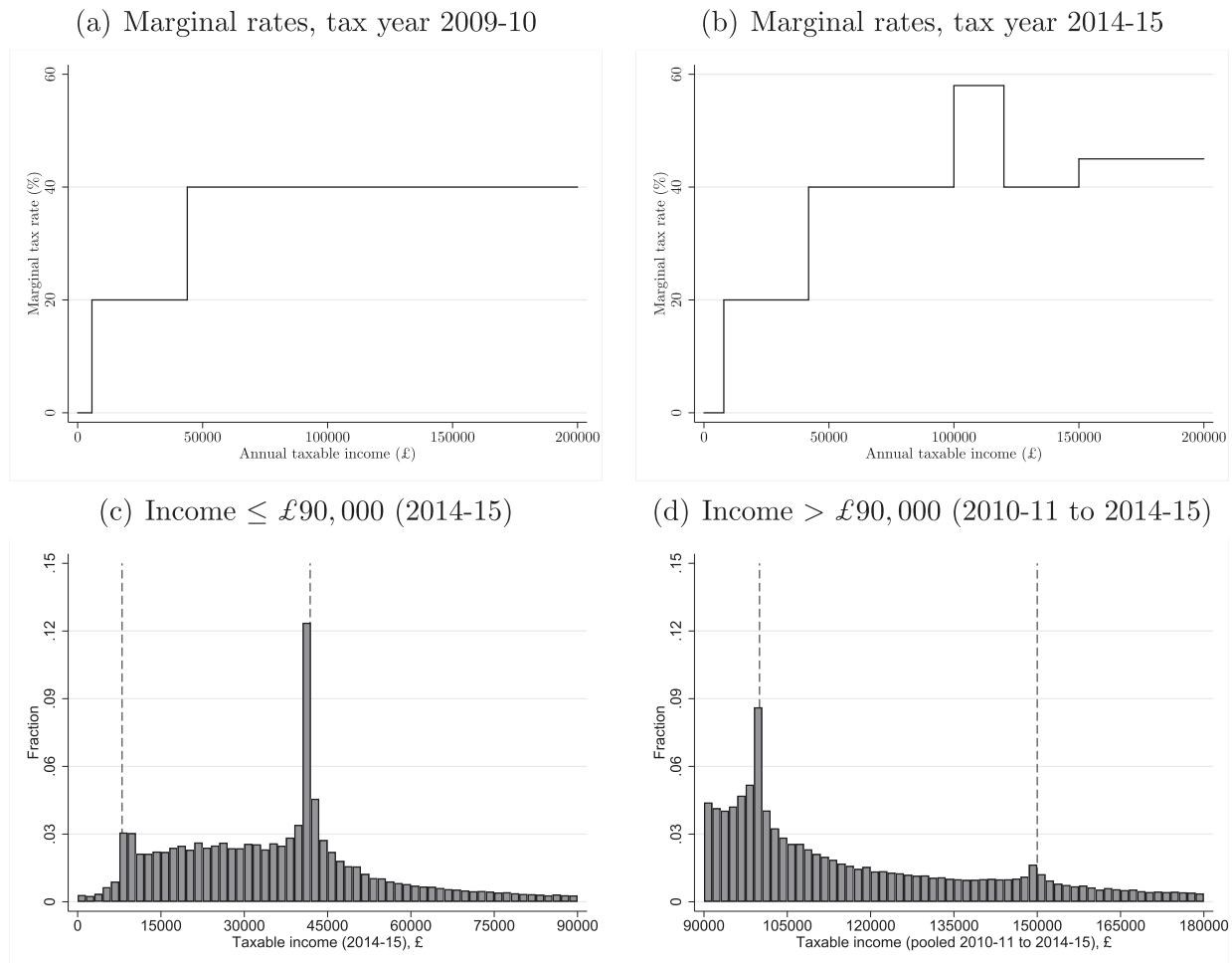
For owner-managers whose total income fluctuates around a kink, there is an incentive to retain income in the company to smooth this volatility. Consider an owner-manager with average total income below the higher rate threshold.

<sup>23</sup>Owner-managers can also reduce their tax liability by making a spouse a shareholder and paying them dividends. These will be included in our sample of companies with at most two directors and two shareholders. We do not, however, observe spousal income.

<sup>24</sup>The tax implications of a director’s loan depends on the amount, the interest and when it is paid back. Broadly, for relatively small (£10,000 or less) short term (repaid in full within nine months of the company’s accounting year-end) loans no tax is due.

<sup>25</sup>The nonconvex nature of the schedule at £100,000 is a result of a policy that withdraws the personal allowance above £100,000: an individual loses 50p of personal allowance for every £1 she earns above £100,000 until the personal allowance has been reduced to zero.

FIGURE 1.—MARGINAL PERSONAL TAX RATE SCHEDULES AND TAXABLE INCOME DISTRIBUTIONS



Marginal tax rate is the combined corporate and personal tax rate for earning and paying out of the company an extra £1. It assumes an owner-manager follows the strategy of paying him/herself a salary equal to the starting point of NICs (the primary threshold) and paying the remainder in dividends. Thresholds are in nominal terms. In the bottom two panels, black dotted lines indicate increases in marginal rates at the primary threshold (£7,956 in 2014–2015), the higher-rate threshold (£41,865 in 2014–2015), the beginning of the withdrawal of the personal allowance (£100,000 in each year from 2010–2011) and the additional-rate threshold (£150,000 in each year from 2010–2011). Bin widths in both panels are £1500. Source: Various government sources and authors' calculations based on HMRC administrative datasets.

If total income temporarily rises above the threshold, then they can retain this and withdraw in later years (when total income is lower) and avoid paying the higher rate of tax. Owner-managers can simply switch from saving in a personal asset to the company asset, leaving consumption unaffected. Note that this shifting acts to smooth the owner-manager's marginal tax rate across time, and exists *in addition* to the usual consumption smoothing motive in the face of income volatility. As long as individuals have access to personal savings vehicles, they do not need to retain profits to smooth consumption, but will do so only if there is a tax benefit (see appendix C). If owner-managers are primarily engaging in this form of shifting, then we would expect to see, on average, that they are not systematically retaining income. We would also expect to see them only bunching at the threshold in some years, for example, when their income exceeds the threshold, if, on average, total income is below the threshold.

*Taxation of savings and capital gains.* When an owner-manager chooses to sell their company or to liquidate the shares on company dissolution, the resulting income is subject to capital gains tax at the personal level. Capital gains are calculated as the difference between the current value of the shares (which is the net value of all assets, including accumulated retained profits) and the value of the shares when the company was started (which is the initial shareholder equity if the whole company is being sold or dissolved).

In general, over the period we study, capital gains are taxed more lightly (heavily) than dividend income above (below) the higher rate threshold. For example, from 2011–2012, dividends were taxed at 0% below, and 25% above, the higher rate threshold and owner-managers were eligible for a reduced 10% rate of capital gains tax under “Entrepreneurs’ Relief.” As a result, the marginal effective rate (including corporate tax) was 20% for dividend income below, and 40% above, the higher rate threshold and 28% for capital

gains.<sup>26</sup> This provides a tax incentive for owner-managers of companies with total income above the higher rate threshold to retain profits in the company and to withdraw it as capital gains upon liquidation.<sup>27</sup>

Shifting income over a long period can lead to substantial tax savings but also comes at a cost to owner-managers if it requires them to delay their consumption. If owner-managers could costlessly borrow against income held in the company, they could adjust taxable income so that they bunch at the higher rate threshold in every period (thereby minimising their tax liability), and then borrow to fund today's consumption above current income. In this case there would be no distortion to the intertemporal allocation of resources. If owner-managers are borrowing constrained, they must effectively choose how much consumption to delay; they will face a kink in their intertemporal budget constraint and the optimal amount owner-managers choose to retain will depend on their marginal rate of substitution between today and the future. The fact that many owner-managers report taxable income above the kink suggests that they cannot costlessly borrow against income held in the company. We would expect agents who are shifting to access lower rates to systemically retain profits and, in some cases, to consistently choose taxable income at the kink.

If an owner-manager is willing to delay taking income until retirement then an alternative, tax advantaged option is pension saving.<sup>28</sup> For an owner-manager who expects to be a basic rate income tax payer in retirement, taking remuneration in the form of pension income attracts the least tax. It does however come at the cost of inflexibility: while earnings retained in a company can be used for investment or withdrawn at any time, pension pots can only be accessed when the individual reaches 55 years of age and, over our period of study, only 25% could be withdrawn as a lump sum with the remainder having to be used to purchase an annuity. There are also annual and lifetime limits (£40,000 and £1,078,900 respectively in 2021–2022) on how much can be saved in a pension. We cannot observe pension contributions or savings. However, pension saving is a cost that is deducted when calculating company taxable profits. This means that our measure of total income is net of pension contributions. If we saw total income responding to marginal tax rates (and, as shown in section IV, we do not), we would not be able to distinguish real responses from changes in pensions saving.

<sup>26</sup>Effective rates are calculated as  $[\text{corporate tax rate} + (1 - \text{corporate tax rate}) * x]$ , where  $x$  is either the dividend or capital gains tax rate.

<sup>27</sup>As well as realising capital gains on company liquidation, owner-managers with average total income above the higher rate threshold can avoid the higher tax rate by drawing dividends out of a company (up to the higher rate threshold) as it is wound down. The most tax advantaged option is to bequeath capital gains, since the UK tax system forgives capital gains tax at death.

<sup>28</sup>An owner-manager can make employer pension contributions which are free of all tax at the point at which the saving is made (contributions are deductible from corporation tax and exempt from income tax and NICs). Upon withdrawal, 25% of pension savings are tax free and the remainder subject to income tax (and not NICs).

## B. Investment Incentives

The parts of the corporate tax system that determine investment incentives—notably the corporate tax rate and capital allowances—are not a function of personal tax rates and do not change across personal tax thresholds. There is also no incentive for someone to use investment as a way to reduce corporate level (total) income below a personal tax threshold because doing so does not directly affect how much income is taxed at the personal level.<sup>29</sup>

As discussed above, personal taxes do affect incentives to retain income within a company; the opportunity cost of retaining income falls for individuals with annual personal taxable income at or above a personal tax threshold. However, the incentive to use retained profits to invest in productive capital does not depend on the level of personal tax nor change across personal tax thresholds.<sup>30</sup>

The effect of personal taxes on marginal corporate investments is central to the “new view” versus “old view” discussion of dividend taxation. The so-called “new view” argues that personal taxes (on dividends) are irrelevant for marginal investments financed from retained equity because they equally affect the opportunity cost of retaining today and the post-tax returns generated tomorrow (Zodrow, 1991). We would expect this line of reasoning to hold for an owner-manager who becomes a higher-rate tax payer today and expects to remain so in future. The irrelevance of dividend tax rates does not hold when returns are expected to be taxed at a lower rate in future (e.g., as a result of preferential capital gains tax rates). In this case, there is an incentive to generate or realize returns in the future. *If retained income could only be invested in productive capital* (and not held as cash or other investments), we would therefore expect to see increased investment incentives as individuals cross personal tax thresholds. In our setting, we argue that this restriction on portfolio choice does not hold—individuals can realize returns in the future simply by holding cash assets within the company.

Whether a tax-motivated increase in retained profits leads to increased investment in the company's capital stock therefore depends on the portfolio choice of how to hold the retained income within the company—that is, whether to hold the income as cash (or third party investments) or as business capital. This choice will be determined by the relative rates of

<sup>29</sup>Investment may be used to increase consumption if owner-managers purchase assets for personal use but claim them as business assets that attract capital allowances. Antiavoidance rules seek to prevent such tax evasion but are imperfect. While there is always an incentive to evade taxes in this way, it may be more attractive for owner-managers who choose to bunch at a personal tax kink since it provides a way to extract additional value from the company without increasing tax paid. Brockmeyer (2014) shows that companies increased investment, especially in fast depreciating assets, in response to the £10,000 kink in the corporate tax schedule in the early 2000s.

<sup>30</sup>There is also no change in the incentive to undertake debt financed investments, since the related costs and available deductions are not linked to the personal tax system. Higher personal taxes do reduce the expected return on investment out of new equity; evidence suggests that this source of finance is rare for closely held company owner-managers.



return on the different asset choices. In appendix C, we show that when there is a constant return to saving in the company's cash asset then personal tax rates do not affect investment in the company's capital stock. However, if this is not true—for example because the rate of return varies with the amount invested, or because investment is lumpy—then investment may increase as an *indirect* result of tax-motivated increases in retained profits. We investigate empirically whether there is any evidence of changes to investment decisions as a result of changes in marginal personal tax rates.

#### IV. Results

In this section we present our empirical results. We quantify the importance of income reduction and intertemporal income shifting—the two key ways that company owner-managers can respond to changes in the marginal tax rate faced. We distinguish between intertemporal shifting that can be attributed to a desire to smooth volatility in taxable income around a tax kink versus to take advantage of lower rates in some future period. Having shown that income shifting accounts for all of observed responses and that a large part of this response is the result of the systematic retention of profits, we investigate whether there is evidence that tax motivated increases in retained profits lead to higher investment.

##### A. Income Reduction versus Intertemporal Shifting

We use two different methods with different samples of owner-managers to investigate how owner-managers respond to changes in their marginal tax rates. First, we analyze bunching behaviour around the higher rate income tax threshold—an increase in the marginal tax rate of 20 percentage points at approximately £40,000. Second, we study the effect of two policy changes in 2010–2011 that increased the marginal tax rate for individuals earning above £100,000.

*Bunching at the higher rate threshold.* Figure 1 shows that there is large bunching in annual (personal) taxable income around the higher rate threshold. This will capture the combined effect of all responses to the increase in the marginal rate at the kink. To disentangle the different ways that owner-managers may respond to the higher marginal rates we compare the bunching mass in annual taxable income to the bunching mass in total income (we use both an annual and an average measure). Responses in total income will reflect changes in labor supply as well as capturing evasion (e.g., in how much total income is declared) and pension savings (as discussed in section IIIA), but will not include changes due to intertemporal income shifting.

To estimate the excess mass in income due to bunching we follow Chetty et al. (2011) by using a flexible polynomial fitted to the observed distribution of income as an estimate of the counterfactual income distribution in the absence of the kink. For each income measure,  $x$ , we exclude observations in

a window,  $[x_-, x_+]$ , around the threshold  $x^*$  and account for the fact that owner-managers who bunch come from above the kink point by imposing the integration constraint that the area under the counterfactual distribution of income must equal the area under the empirical distribution.<sup>31</sup>

The key identifying assumptions are (i) that the only thing that changes across the kink is the marginal tax rate (that is, all other owner-manager characteristics are smoothly distributed) and (ii) our parametrization of the counterfactual distribution (Blomquist & Newey, 2017). In appendix D.2, we show robustness of our results to the degree of polynomial,  $p$ , and the excluded region around the kink,  $[x_-, x_+]$ .

We use the sample of one director, one shareholder companies who are observed in the data for at least three years. This is so total income reflects the total output of the owner-manager and the personal tax threshold is relevant for total and taxable income; if there were two owners who reduced effort to bunch at the personal tax kink, this would translate to total income of twice the kink. Restricting the sample to owner-managers present in multiple years ensures we can calculate an average total income.<sup>32</sup> Figure 2a shows the distribution of annual taxable income (centered at zero around the kink), pooling observations across the tax years 2005–2006 to 2014–2015. There is a large excess mass at the kink, reflecting the high degree of responsiveness of owner-managers' taxable income to changes in the marginal rate.

Figure 2b shows the distribution of annual *total* income. There is no evidence of bunching in this income measure, that is, owner-managers are not adjusting total income to locate at the kink point. However, given that total income is subject to volatility, and owner-managers can easily shift personal income from year to year, we may not expect to see bunching in this measure, even if income is being reduced because of the kink (le Maire & Schjerning, 2013). Figure 2c plots the distribution of *average* total income around the threshold.<sup>33</sup> If owner-managers were, on average, reducing their work effort, and hence total income generated, in response to the tax increase at the kink, we would expect to see some, at least diffuse, bunching in this measure. There is no evidence of any bunching in average total income.

The tax records do not allow us to distinguish between dividends received from an owner-manager's company and any

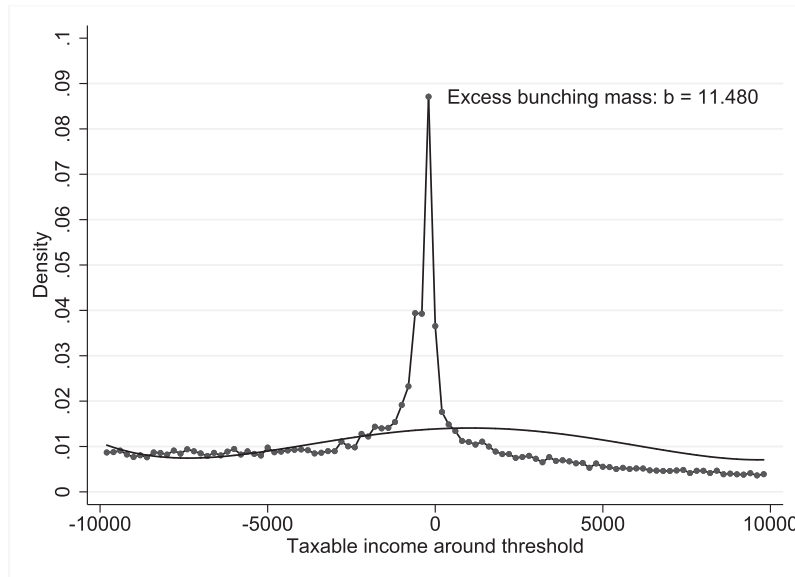
<sup>31</sup>We group owner-managers into income bins indexed by  $j$ ;  $c_j$  is the number of owner-managers in bin  $j$ ,  $x_j$  is the income level in bin  $j$ ,  $[x_-, x_+]$  is the excluded range and  $p$  is the order of the polynomial. We use an iterative procedure to estimate the counterfactual distribution,  $\hat{c}_j = \sum_{i=0}^p \hat{\beta}_i (z_j)^i$  as the fitted values from:  $c_j \cdot \left(1 + \mathbf{1} \cdot [j \geq x_+]\frac{\hat{B}_N}{\sum_{j=x_+}^p c_j}\right) = \sum_{i=0}^p \beta_i \cdot (z_j)^i + \sum_{i=x_-}^{x_+} \gamma_i \cdot \mathbf{1}[z_j = i] + v_j$  where  $\hat{B}_N = \sum_{i=x_-}^{x_+} \hat{\gamma}_i$  and we define  $\hat{b}_x$  as the excess mass around the kink relative to the average density of the counterfactual income distribution between  $x_-$  and  $x_+$ :  $\hat{b}_x = \frac{\hat{B}_N}{\sum_{j=x_-}^{x_+} \hat{c}_j / (x_+ - x_-)}$

<sup>32</sup>We show that the distribution of taxable income for all one director, one shareholder companies is very similar to both the distribution for those present for at least three years (see appendix D) and to the distribution for all closely held company directors (see appendix A).

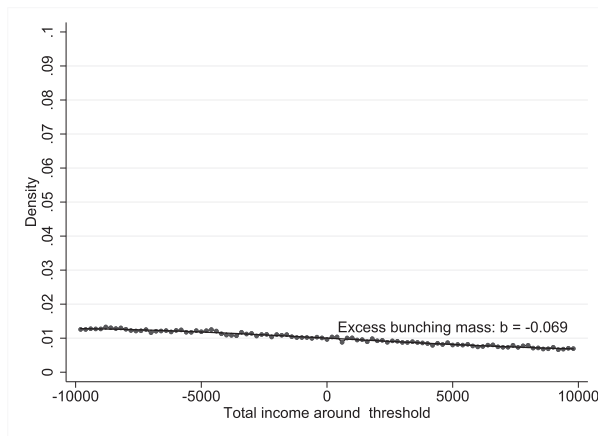
<sup>33</sup>We take a 3 year average for each agent; we get the same results if we take averages over 2, 3, 4, or 5 years.

FIGURE 2.—BUNCHING AROUND THE HIGHER RATE THRESHOLD

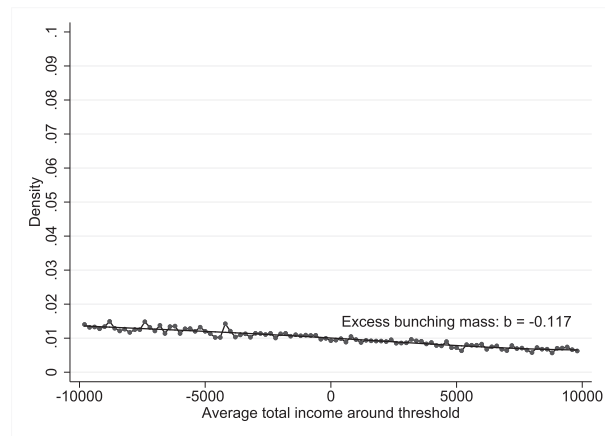
(a) Annual taxable income



(b) Annual total



(c) Average total



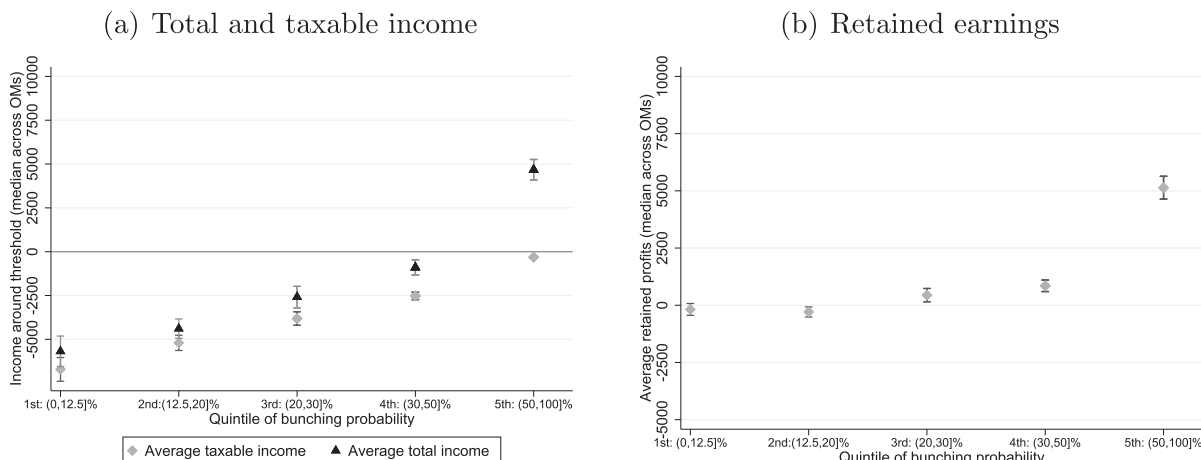
The top panel shows the distribution of annual taxable income, the bottom left panel the distribution of annual total income and the bottom right panel the distribution of average total income. Method for estimating the counterfactual density described in the text. Bin width is £200. The distribution is drawn for the sample of owner-managers of one director one shareholder companies who are present in the data for at least 3 years. Details on sample definition are provided in appendix D.1 and robustness to order of polynomial and excluded region in appendix D.2. Source: Calculations based on HMRC administrative datasets.

third party dividends they may receive. Although this does not affect our analysis of bunching in taxable income, a potential concern is that it could affect our analysis of bunching in total income (since the effective kink that the owner-managers face is now shifted by the amount of third party dividends that they receive). However, we think that this is unlikely to overturn our results for three reasons. First, our measure of retained profits (i.e., company profit minus income paid out to owner-managers) lines up well with an alternative measure that we construct using shareholder equity from company accounts. This would not be the case if large amounts of dividend income were, in fact, from third parties, as opposed to the individual's own company. Second, only 15% of taxpayers who are not directors of closely held companies receive dividend income; although company directors will be differ-

ent, it seems reasonable to expect the majority of them to also have no other dividend income.<sup>34</sup> In the absence of significant third-party dividend income, the higher rate threshold is still the relevant threshold for bunching in the majority of cases. In addition, our difference-in-differences approach does not require that we separate out any third party dividends from those of the company, and we still find no effect of personal taxes on the profit of treated closely held companies (described fully below).

<sup>34</sup>The 15% statistic is calculated using data from the Survey of Personal Incomes (which is also based on HMRC tax records and covers a representative sample of UK taxpayers). 15% refers to taxpayers with income between £20,000 and £60,000, and are therefore more comparable to the owner-managers who are likely to bunch at the higher rate threshold.

FIGURE 3.—TOTAL INCOME, TAXABLE INCOME, AND RETAINED PROFITS CONDITIONAL ON FREQUENCY OF BUNCHING



We use the sample of single director single shareholder companies that we observe in the data for at least three years. For each owner-manager, we calculate the fraction of years they bunch at the higher rate threshold in annual taxable income. We place owner-managers into one of five quintiles based on this fraction, shown on the horizontal axis in each panel. For each owner-manager, we take their average taxable and average total income (centered around the higher rate threshold) and average retained profits across years that we observe them. The left hand panel shows the median of average taxable and average total income, and the right-hand panel shows the median of average retained profits, across owner-managers within each fraction group. Source: Calculations based on HMRC administrative datasets.

The difference between total and taxable income is driven by the retention of income within the company. The absence of any discernible response in average total income to the kink at the higher rate threshold indicates that the main margin of response is intertemporal shifting.

*Separating the motivations for intertemporal shifting.* In section III, we argue that there are two main reasons why owner-managers may shift taxable income across time in response to changes in their marginal tax rate. First, to smooth out volatility in their total incomes, which allows them to avoid being penalized by the progressivity of the tax system if their total income fluctuates around the kink. Second, some owner-managers may systematically retain profits in their company in order to take advantage of lower tax rates in the future. To understand the relative importance of these two motivations, we consider persistence in bunching and retention behaviour.

We expect owner-managers who shift to smooth income volatility to (i) only bunch at the threshold intermittently for example when their total income temporarily goes above the threshold; (ii) to not systematically retain income, that is, on average their total incomes equal their taxable incomes. For the set of owner-managers that bunch at least once during their time in the sample we calculate the fraction of years that we observe them bunching (“bunching probability”), and use this to proxy whether they are bunching to smooth volatility or to systematically retain income and access lower future rates. We group owner-managers into quintiles on the basis of their bunching probability.

Figure 3a shows that owner-managers who bunch in fewer than 50% of the years in which we observe them—and that we will refer to as “sometimes bunchers”—have bunching behaviour that is consistent with smoothing out volatility in

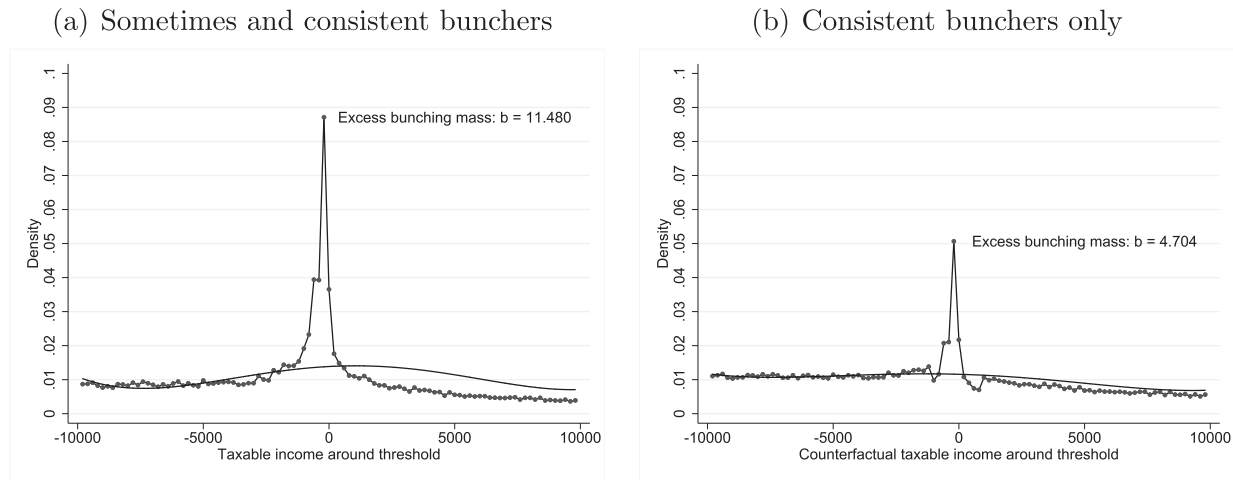
total income. Their average total income is below the higher rate threshold and very close to their average taxable income. We also find that those with average total income below the threshold are much more likely to bunch when their income is higher than usual (i.e., when there are benefits to retaining), compared with when their income is lower than usual. Similarly, those with average total income above the threshold are more likely to bunch when their income is lower than usual (i.e., when there are benefits to withdrawing).

In contrast, owner-managers who bunch in 50% or more of years—and that we will refer to as “consistent bunchers”—have average total incomes significantly above average taxable incomes and, as a result are systematically retaining profits (figure 3b). Retention is substantially higher, on average, for those bunching consistently. We also note that there is no difference in total income volatility across the fraction of years spent bunching—it is not the case, for example, that those that bunch more have more volatile incomes.

To quantify the extent to which shifting to smooth income volatility explains the observed responsiveness in annual taxable income at the higher rate threshold, we construct a distribution of annual taxable income that seeks to remove the effect of shifting to smooth volatility. Specifically, we consider bunching in annual taxable income after replacing annual taxable income for “sometimes bunchers” with their annual total income. This essentially constructs a measure of the hypothetical distribution when those that shift to smooth volatility are restricted from doing so (and instead receive their annual total income). Figure 4b shows that “sometimes bunchers” make up around half of the excess mass in the annual taxable income distribution around the higher rate threshold.

We conclude that around half of the observed responsiveness of owner-managers’ taxable income to the kink at the higher rate threshold can be attributed to intertemporal shifting that allows volatility in total income to be smoothed. The

FIGURE 4.—HOW MUCH IS BUNCHING AT THE HIGHER RATE THRESHOLD EXPLAINED BY THE DIFFERENT MOTIVATIONS FOR SHIFTING?



Method for estimating the counterfactual density described in the text. Bin width is £200. The left hand panel shows the observed distribution for one director one shareholder owner-managers who are present in the data for at least 3 years (this repeats figure 2a above). The right-hand panel shows the distribution when we replace the annual taxable income of the “sometimes bunchers” (owner-managers who bunch less than or equal to half the number of years they are observed) with their annual total income in that year. Source: Calculations based on HMRC administrative datasets.

benefits of “tax smoothing” have been widely discussed, particularly in the context of savings taxation (Mirrlees et al., 2011), and date back to Meade (1978) and Bradford (1982). Although large avoidance elasticities often reflect poorly designed tax systems (Piketty et al., 2014), in this case allowing individuals with volatile incomes to smooth out fluctuations means that they are not penalized by the progressivity of the tax system relative to someone with the same average, but stable income. Effectively, smoothing allows the tax system to better approximate the taxation of lifetime incomes. There nonetheless remains a considerable excess mass due to owner-managers consistently bunching and retaining profits, which we describe further in section IVB.

*Tax rate increases on taxable incomes above £100,000.* We use an alternative method and sample of owner-managers to provide additional evidence on the responsiveness of owner-managers to personal tax rate changes. We use two policies that were announced in March 2009 and introduced in April 2010 and that resulted in individuals with incomes above £100,000 having their tax-free allowance withdrawn (at a rate of 50p for every £1, earned above £100,000) and individuals with taxable income above £150,000 facing a new higher 50% (subsequently reduced to 45% in 2013–2014) marginal rate. We exploit the variation in personal tax rates that these reforms created across time using a differences-in-differences estimator.

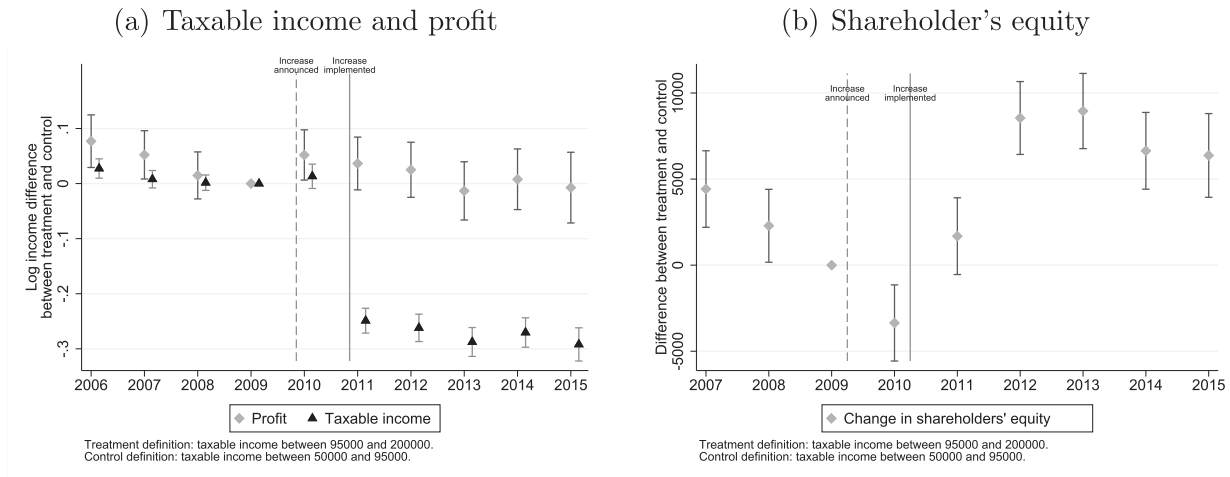
This approach does not require us to restrict our sample to only one director, one shareholder companies. We use the sample of closely held companies that have at most 2 directors and 2 shareholders and have at least one of the directors matched to the personal income tax records. This gives us more power, which is important as there are fewer owner-managers in this part of the income distribution. In this sam-

ple we cannot construct the total income measure,  $z_{ft}$ , for all companies because the match to the personal tax records of the owner-managers is incomplete. Instead, we look at whether there are changes in post-corporate tax corporate profit (which will capture dividends and any retained profit, but not any wages paid to directors); the incentives to pay dividends rather than wages did not change over this period at any income level. We use the year-on-year change in shareholders’ equity to proxy retained profits,<sup>35</sup> and study whether this increased for those subject to higher personal tax rates.

Let  $i$  index owner-managers and  $f$  indexes companies. We define a treated group of owner-managers as those whose taxable income was always between £95,000 and £200,000 in the tax years 2005–2006 to 2008–2009; let  $D_i = 1(y_{it} \in [95000, 200000] \forall t \leq 2009)$  denote the treatment dummy for owner-manager  $i$ . The control group of owner-managers is defined analogously as those whose taxable income was always between £50,000 and £95,000 in the preperiod:  $C_i = 1(y_{it} \in [50000, 95000] \forall t \leq 2009)$ . The treated group of companies is defined as the companies where all observed owner-managers are treated,  $D_f = \min_{i \in \mathcal{F}_f} D_i$ , and the control group of companies are those with at least one control owner-manager and no treated owner-manager,  $C_f = \max_{i \in \mathcal{F}_f} C_i \times \min_{i \in \mathcal{F}_f} (1 - D_i)$ . We show robustness to the treatment and control income cut-offs in appendix D.3. In our baseline scenario, we estimate on an unbalanced panel, but we also show robustness to estimation on a balanced panel in appendix D.3.

<sup>35</sup>Shareholders’ equity is the difference between total assets (including any equity retained in the company), and total liabilities (i.e., it measures the net value of the company). Additional retained profits (conditional on a level of liabilities) will appear as a one-for-one change in shareholder equity.

FIGURE 5.—COEFFICIENTS FROM DIFFERENCES-IN-DIFFERENCES REGRESSIONS



Left-hand panel: black markers show the estimated  $\beta_s^{\text{taxable}}$  coefficients from equation (1); grey markers show the estimated  $\beta_s^{\text{profit}}$  coefficients from equation (2). Right-hand panel: the grey markers show the estimated  $\beta_s^{\text{equity}}$  coefficients from equation (3). In both cases, the omitted year is 2009. Error bars show 95% confidence intervals. Years on the horizontal axis refer the calendar year in which the tax year ends, that is, 2007 refers to the tax year April 2006 to April 2007. Table of coefficients is available in appendix D.3. Source: Calculations based on HMRC administrative datasets.

We estimate the following three regressions:

$$\ln(y_{it}) = \sum_{s \neq 2009} \beta_s^{\text{taxable}} D_i \times 1[\text{year}_t = s] + \varphi_t + \alpha_i + v_{it}, \quad (1)$$

$$\ln(\pi_{ft}) = \sum_{s \neq 2009} \beta_s^{\text{profit}} D_f \times 1[\text{year}_t = s] + \varphi_t + \alpha_f + v_{ft}, \quad (2)$$

$$A_{ft} - A_{ft-1} = \sum_{s \neq 2009} \beta_s^{\text{equity}} D_f \times 1[\text{year}_t = s] + \varphi_t + \alpha_f + v_{ft}, \quad (3)$$

for [in the case of equation (1)] the sample of owner-managers in either the treatment or control groups ( $\max\{D_i, C_i\} = 1$ ) and [in the case of equations (2) and (3)] for the sample of companies in either the treatment or control groups ( $\max\{D_f, C_f\} = 1$ ).  $y_{it}$  is director taxable income;  $\pi_{ft}$  is company post-corporate tax profit, and  $A_{ft} - A_{ft-1}$  is the change in shareholder's equity.  $\varphi_t$  denote common year effects,  $\alpha_i$  and  $\alpha_f$  denote owner-manager and company fixed effects, respectively, and  $v_{it}$  and  $v_{ft}$  are unobserved error terms.

The key identifying assumption is the usual parallel trends assumption i.e. in the absence of the reform, the incomes and profits of the treatment and control groups would have evolved similarly. We have four years in the prereform period, which allows us to check whether the pretrends across the treatment and control groups look similar.

Figure 5a shows the estimated coefficients from equations (1) and (2); these are relative to 2009, the omitted year. Taxable income evolves similarly for the treatment and control group in the prereform period; for profit, there is some evi-

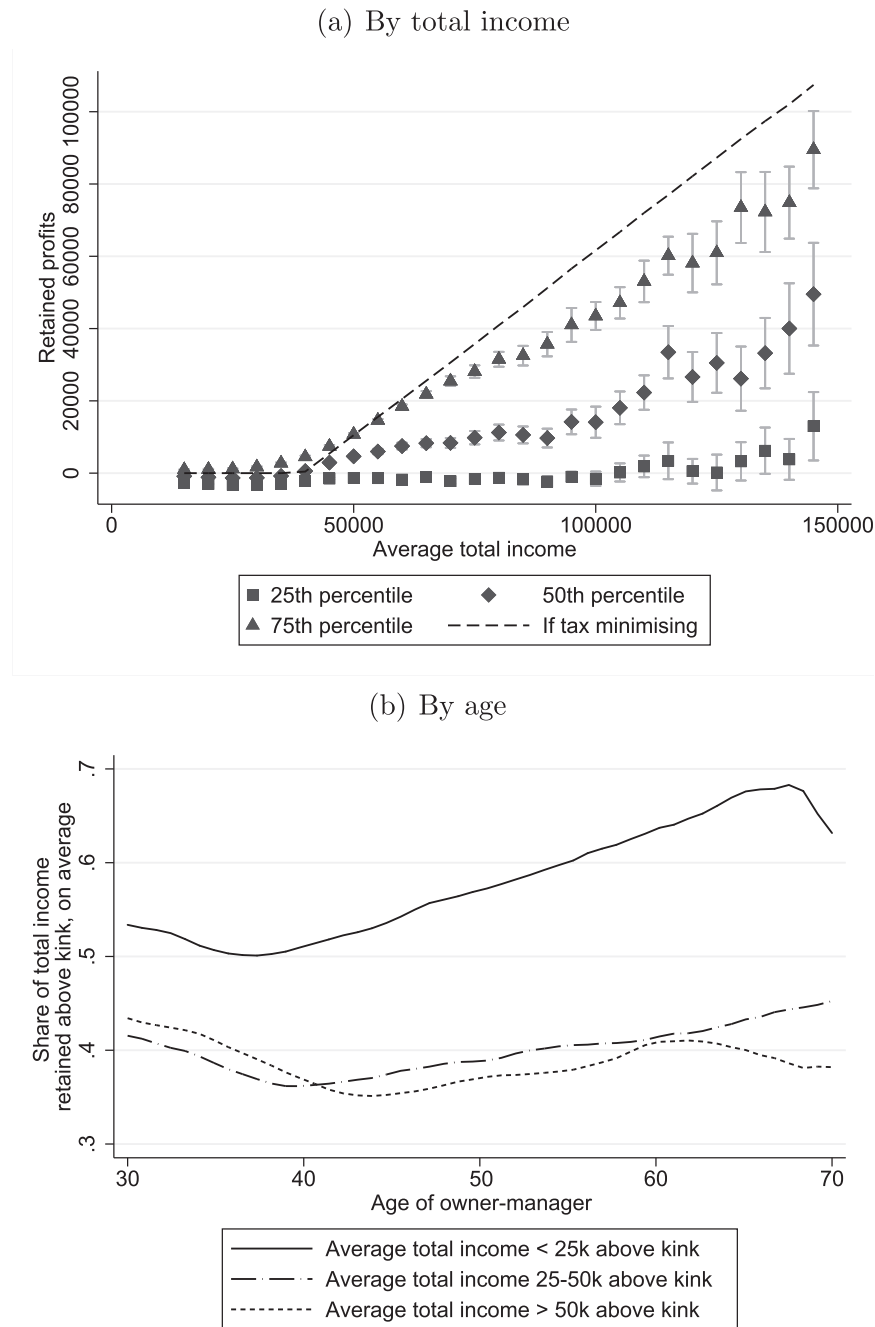
dence of a decline in the treatment relative to the control group in the prereform period, but these differences are not significantly different from zero. We see no statistically significant reduction in the corporate profit of companies with treated owner-managers compared with the control group following the introduction of higher marginal rates on high incomes after 2010. That is, the amount of underlying economic activity among the treated companies does not change in response to the reform. However, the figure shows a clear fall in taxable income for treated owner-managers. This effect persists over the following four years.

These results indicate that owner-managers responded to the reforms by retaining income within their companies and is therefore consistent with the bunching evidence that the high responsiveness of company owner-managers to marginal tax rate changes is entirely explained by intertemporal income shifting. Figure 5b shows this directly. The year-on-year change in shareholders' equity was higher for the treatment group relative to the control group in the post-reform period. That is, following the reforms (which increased the difference between current and future tax rates), owner managers persistently retained more income within their company. The estimated negative coefficient in 2010 is consistent with bringing forward dividend payments, and thus reducing shareholder equity, in anticipating of the reform. This is a form of short run shifting of taxable income in order to avoid a higher marginal tax rate.

### B. Who Retains Profits and How Do They Invest Them?

The results above show that the retention of profits is the main response of owner-managers to changes in marginal tax rates. The incentive to shift to smooth volatility is only relevant for those owner-managers whose total income

FIGURE 6.—RETAINED PROFITS ACROSS THE TOTAL INCOME DISTRIBUTION AND BY AGE

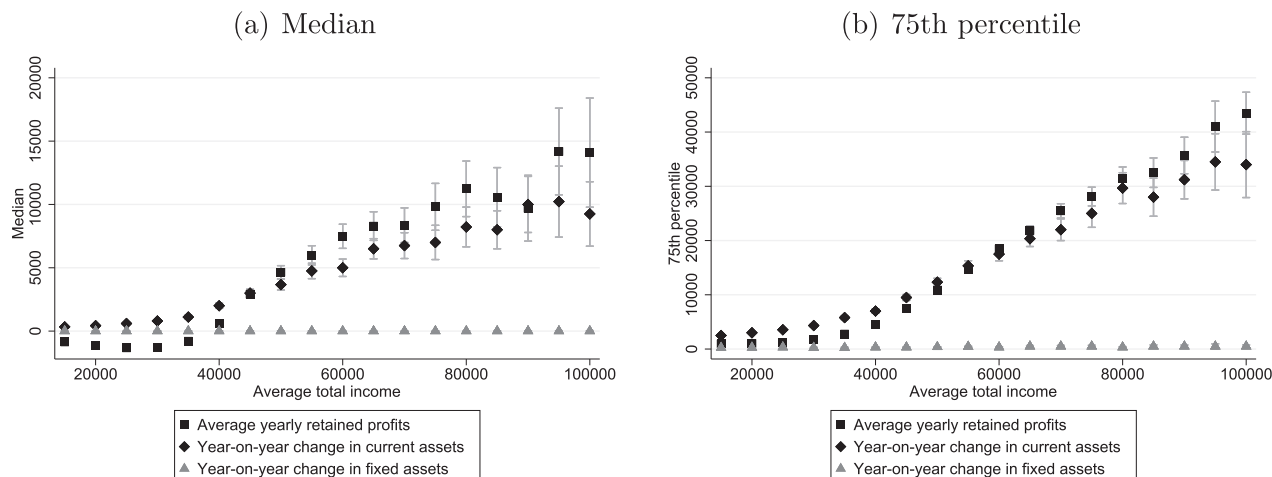


For each single shareholder single director company owner-manager, we construct their average total income, average retained profits and the share of total income above the higher rate threshold that each owner-manager retains, on average. The top panel shows the 25th, 50th, and 75th percentiles of average retained profits conditional on binned average total income, across owner-managers. Error bars show 95% confidence intervals. The bottom panel shows the conditional mean of the share of total income above the higher rate threshold that is retained, at ages of the owner-manager, by banded average total income. Source: Calculations based on HMRC administrative datasets.

fluctuates around a threshold. Among single director single shareholder companies, we find that 16% of owner-managers are “sometimes bunchers” around the higher rate threshold (that is, engage in bunching to smooth income volatility). A further 6% of owner-managers consistently bunch at the higher rate threshold and retain all income above this; this is the tax-minimising strategy that we would expect everyone to follow if there were no costs to shifting.

However, the incentive to retain to shift income to the future exists for all owner-managers whose average total income exceeds the higher rate threshold: many more owner-managers with average total incomes above the threshold retain substantial amounts, even if they are not “fully retaining.” Figure 6a shows that there is little systematic retention of profits by those with incomes below the higher rate threshold. Above the threshold (approximately £40,000) the

FIGURE 7.—RETAINED PROFITS AND ASSET GROWTH



For each single shareholder single director company owner-manager, we construct their average total income, average yearly retained profits, and average year-on-year change in current and fixed assets. The left hand panel shows the median and the right-hand panel shows the 75th percentile across owner-managers. Source: Calculations based on HMRC administrative datasets.

amounts retained are large and increasing: for those earning more than £150,000, half retain in excess of £50,000 each year and 25% retain more than £90,000.

We would expect retention to be highest for those individuals that face the fewest constraints (lowest costs) on their ability to retain and smooth consumption. Individuals may have relatively low costs associated with their retention because (i) there is a relatively short period between today and when they expect to access a lower rate of tax (e.g., they are closer to retirement or liquidating their company) and (ii) they have built up personal assets that they can draw down to offset the asset accumulation in the company, thus minimising the distortion to intertemporal consumption. Both of these factors are more likely to be true for older individuals. Figure 6b shows that retained profits increase as owner-managers approach retirement age, particularly for those with total incomes less than £25,000 above the higher rate threshold.

*Impact on capital investment.* Policy makers often support lower capital gains tax rates (relative to taxes on salaries or dividends) as a mechanism to encourage business owners to invest in their own enterprises. Preferential capital gains tax rates incentivise owner-managers to retain profits in their companies and we see clear evidence of this. But, as argued in section III, tax measures that incentivise profit retention do not directly change the incentives to invest in the capital stock of the company rather than hold retained profits in cash (or equivalents) or as investments in third parties. Additional tax-motivated retained profits would only be expected to lead to higher investment if the rate of return on investment relative to a cash asset is increasing in the size of retained profits.

We find that tax-induced increases in retained profits are held in cash (or equivalent financial assets) and do not change companies' capital stock. We show this in two ways.

First, we construct, for each owner-manager, the average year-on-year change in current and fixed assets. Figure 7 shows the 50th and 75th percentile of asset changes and average yearly retained profits, conditional on average total income. At all income levels, the increase in retained profits above the higher rate threshold is matched by an increase in current assets, but not fixed assets. This suggests that retained profits are held as cash, or cash equivalents, and not invested in the company's productive capital.

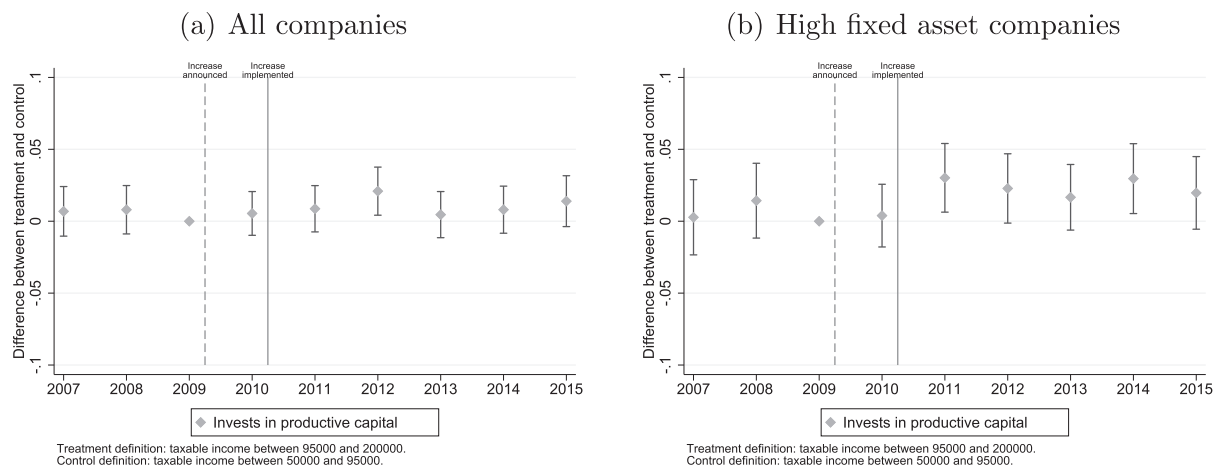
This analysis of average asset growth may not capture the fact that investment choices are lumpy, or respond to lagged increases in retained profits. Our second approach therefore uses a differences-in-differences approach, as described in section IVA, to analyze the impact of the policy reforms that increased tax rates on higher income individuals in 2010–2011 on subsequent investment in fixed assets. To allow for the lumpy nature of investment, we construct a dummy,  $\tilde{i}_t$ , equal to 1 if there was an increase in fixed assets greater than or equal to 20% of the stock of fixed assets.<sup>36</sup> That is, we consider whether tax induced increases in retained profits make it more likely that a company will subsequently undertake a significant investment. We estimate

$$\tilde{i}_t = \sum_{s \neq 2009} \beta_s^i D_f \times 1[\text{year}_t = s] + \varphi_t + \alpha_f + v_{ft}, \quad (4)$$

where the sample and variable definitions are the same as those used in section IVA.

<sup>36</sup>It is well documented that nonconvex capital adjustment costs (such as fixed costs) and indivisibility of investment projects lead to firm-level investment profiles characterized by periods of low or zero investment, punctuated by large discrete changes, commonly referred to as “spikes” or “lumps” (Doms & Dunne, 1998; Cooper & Haltiwanger, 1993; Caballero, 1999; Cooper et al., 1999; Nilsen & Schiantarelli, 2003; Cooper & Haltiwanger, 2006). Disney et al. (2019) use the same UK data, measure an investment “spike” as a change in fixed assets of at least 20% and discuss this choice.

FIGURE 8.—COEFFICIENT ESTIMATES FROM DIFFERENCES-IN-DIFFERENCES SPECIFICATION, INVESTMENT



The markers show the estimated  $\beta_1^i$  coefficients from equation (4); the omitted year is 2009. The dependent variable is a dummy equal to 1 if there is an increase in fixed assets greater than 20% of the fixed assets stock. Error bars show 95% confidence intervals. Years on the horizontal axis refer to the calendar year in which the tax year ends, that is, 2007 refers to the tax year that runs from April 2006 to April 2007. The left hand panel shows the estimates for all companies, and the right-hand panel shows the estimates for “high fixed asset companies,” which are defined to be those with an average fixed asset holding of above £100,000 over our sample period.

Source: Calculations based on HMRC administrative datasets.

Figure 8a shows that there is no difference in the capital investment of the treatment compared with the control group following the reform for the full sample of companies. Figure 8b shows that for a sub-sample of “high fixed asset companies,” which are defined as those with an average fixed asset holding of above £100,000 over our sample period, the year immediately preceding the reform, 2009, had lower levels of investment than either the pre- (2007–2008) or post- (2011–2015) period, likely capturing depressed investment during the Great Recession. This is consistent with evidence that the large fall in UK investment following the financial crisis happened in 2009 and was driven by large firms reducing the number of investment projects they undertook (Disney et al., 2019). The fact that we see little to no change in investment, alongside an increase in shareholders’ equity (figure 5b), suggests that the additional retained profits are held as cash rather than invested in productive capital.

By retaining income in a company (even when it is not used for investment), owner-managers can realize significant tax savings. Most notably, most owner-managers will be eligible for “Entrepreneurs’ Relief”—a preferential 10% rate of capital gains tax available to business owners. For a subset of owner-managers we can quantify the tax benefit associated with this relief.

In 2014 and 2015, there were 7,707 owner-managers of closely held companies (both one and two director) who ceased being a director (we cannot observe those who ceased being a director in earlier years in available tax records). Of these directors, 20% claimed Entrepreneurs’ Relief in 2016.<sup>37</sup> This rises to almost half for those with shareholders’ equity that exceeds £100,000 during our sample period. There is a strong positive, close to one-for-one, relationship between

the level of eligible capital gains on which relief was claimed and the value of shareholders’ equity in the preceding year. That is, on average, owner-managers take gains equal to the total value of shareholders’ equity in the year before they cease being a director: all of their accumulated retained profits are being subjected to the lower rate. The amounts of income taxed under Entrepreneurs’ Relief are large: the average eligible capital gains, conditional on claiming the relief, is around £500,000 *per owner-manager*. This can produce substantial tax savings. For example, total tax due is £75,000 lower if £500,000 is subject to a 10% rate of Entrepreneurs’ Relief than if the same amount had been taxed at 25% (the higher rate of dividend tax).

For some company owner-managers, retained earnings will represent retirement savings. Such savings may be higher as a result of the preferential capital gains tax rate. For example, some owner-managers will prefer saving within their company, even if the tax savings are lower than for regular pension saving, because it comes with significant additional flexibility. As such, from a policy perspective, there may be some beneficial effects from the preferential capital gains tax rate, that is, to the extent that the policy boosts savings in cases where government thinks that its desirable. However, this must be weighed against the costs of the policy. These include the revenue loss on retained earnings that not are retirement savings, or that are above the limits that the government sets for regular pensions saving. It also creates horizontal inequity because most people are not company owner-managers and therefore cannot access this tax-preferred and flexible form of savings.

## V. Summary and Discussion

We use a new link between personal and corporate UK administrative tax returns to investigate how personal taxes

<sup>37</sup>Those not observed claiming Entrepreneurs’ Relief in 2016 may do so in later years, outside of the scope of currently available data.



affect the behaviour of company owner-managers. Previous work has shown that owner-managers are very responsive to taxes and this is often driven by avoidance behaviour. By accurately measuring both the total amount of economic activity produced by a business owner and the amount of personal income withdrawn from a company each year, we are able to show that the entire response of owner-managers' taxable income to higher rates of personal tax is driven by intertemporal income shifting.

We show that around half of this shifting is to smooth volatile incomes around a tax kink. As well as implicitly allowing smoothing through the use of company structures, the UK operates explicit regimes that allow farmers and some artists and authors (groups which are known to have particularly volatile incomes) to smooth their tax liabilities over tax years. However, this option does not extend to those running unincorporated businesses, who also have volatile incomes. There is a case for governments extending the ability to smooth taxable income to more individuals so that a progressive income tax system does not penalize income volatility.<sup>38</sup>

However, we also find that there is substantial profit retention among owner-managers, motivated by the UK's preferential rate of capital gains tax. Policy makers often perceive a trade-off between, on the one hand, using lower taxes on capital income, particularly capital gains, as a way to boost investment incentives and, on the other hand, raising capital tax rates towards personal income tax rates to minimize tax avoidance, avoid distorting choices and limit post-tax inequality.

Reduced tax rates on capital incomes are not well targeted at removing distortions to investment that are created by the design of the tax base (Mirrlees et al., 2011) nor at dealing with any market failures associated with entrepreneurship (Gordon & Sarada, 2018).<sup>39</sup> We find no evidence that the preferential rate of capital gains tax distorts investment decisions of company owner-managers. Conditional on company formation, the policy is not correcting any market failures that may exist, but nor it is leading investment capital to be suboptimally allocated towards investment in the capital stocks of closely held companies. It does, however, raise important equity concerns. Company owner-managers are over-represented at the top of the UK's income distribution and, within the closely held company population, income retention (and therefore access to lower taxes) is skewed towards those with higher average total incomes.

All of the results in this paper are conditional on the institutional setting. We argue that the key institutional features— notably the tax advantage associated with the corporate legal

form, the significant freedom to decide when income is taxed at the personal level and the preferential rate of capital gains tax for businesses assets—are common across, and therefore of interest in, many tax systems. However, the results cannot be used to conclude that the real activities of owner-managers (which we find are not responsive to higher tax rates) would remain unaffected by personal taxes if the ability to shift income, or the associated tax advantages, were removed. Those working for their own business usually have significant flexibility over their labor supply, making it highly plausible that, absent the ability to shift intertemporally or engage in other forms of avoidance and evasion, their underlying labor supply would be more responsive to taxes than that of employees.

Understanding how company owner-managers respond to various features of the tax system has become more important as the number of people working through their own businesses has grown. Equally important, given this labor market trend, is understanding how various features of the tax system—including the interaction between corporate and personal taxes and the treatment of volatile incomes and losses—affect who starts a business and their choice of legal form, which we plan to explore in future work.

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<sup>38</sup>Denmark provides one example of how this can be done. There is an explicit savings vehicle to allow the self-employed to smooth total income across tax years (le Maire & Schjerning, 2013).

<sup>39</sup>In the UK—as in most places—capital taxes are levied on the normal return as well as any excess returns. The former creates a range of distortions, including deterring marginal investments. These distortions can be removed through careful design of the tax base, see Mirrlees et al. (2011).

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