

Taxes, Regulations of Businesses and Evolution of Income Inequality in the US*

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Abstract

From 1980 to 2012 the share of U.S. business receipts from businesses organized as pass-through entities (for example LLCs and S-corporations) rather than traditional C-corporations nearly triples following a sequence of tax reforms that reduced the tax rate on business income that “passes through” to an entrepreneur’s individual income tax form. We show this shift in the pattern of business organization is economically significant. We provide novel evidence, using firm-level administrative data, that the tax reforms had significant effects on the employment dynamics of the US firms. We also propose a reduced form decomposition of data from the Survey of Consumer Finances, which reveals the increase in pass through entities explains over 50 percent of the increase in the share of *pre-tax* income for the top 1 percent of households. Importantly, this increase is not just accounting: there is an economic trade-off when choosing a legal form that affects the investment behavior of the entrepreneurs. We develop a heterogeneous agent equilibrium model with workers, entrepreneurs and endogenous choice of legal forms to capture a key trade-off between tax benefits and diversification of investment risk. We test the model using confidential firm-level microdata from the U.S. Census, and with the model calibrated to capture the actual firm dynamics across legal forms following several tax reform episodes, we quantify the contribution of tax reforms through the business reorganization channel on the evolution of income, wealth and consumption inequality of workers and entrepreneurs.

Keywords: Firm dynamics; Income inequality; Entrepreneurship; Taxes and regulations

JEL Codes: E60; H32; K2; L2

*Any opinions and conclusions expressed herein are those of the authors and do not necessarily represent the views of the U.S. Census Bureau, Federal Reserve Bank of New York or the Federal Reserve System. All results have been reviewed to ensure that no confidential information is disclosed.

1 Introduction

Top income shares grew substantially in the United States since 1980. From 1980 to 2012, according to U.S. tax returns, the *pre-tax* market income share of the top 1 percent of U.S. households grew from 8.2 percent to 18.2 percent¹. The same pattern is observed for other top income groups. Recently a large number of papers have studied the policy implications, theoretical foundations and statistical decomposition of this phenomenon². With a recent exception of [Smith et al. \(2017\)](#), what is less studied is the shift in the *composition* of income for these top income groups. The share of entrepreneurial income (from sole proprietors, partnerships and S corporations) within the top 1 percent income group almost tripled from 13.3 percent to 30.0 percent in this period. These secular shifts in the income distribution have been accompanied by the rise in the number of pass-through entities, which grew in terms of share of business receipts from 13.1 percent to 36.9 percent in 2012.³ In this paper we argue that the two phenomena are tightly related and that the rise of pass-through entities is an important, *non-mechanical*, contributor to the surge in pre-tax income inequality. A series of tax reforms and regulations introduced since 1980 made pass-through legal forms more attractive choice for a large class of businesses. Importantly, the change in the composition of legal forms is more than a change in taxation of profits and a shift from corporate to pass-through accounts. The shift from C corporations towards pass-through entities induced a behavioral change of firms and their owners. Smaller fractions of profits were retained within the pass-through businesses, which led to higher pre-tax income of their owners, driving largely the change in composition at the top of income distribution and rise of the top income shares. We show using firm-level administrative data that the tax reforms had significant effects on the employment dynamics of firms, which we take as indirect evidence of non zero behavioral elasticities on other factors of production.

This paper makes three contributions. First, we provide new evidence on the flows between the legal forms of organization of firms in the United States since 1980 from the US Census Bureau Longitudinal Business Database (LBD) and linked Business Register (BR).

¹In a recent note [Güvenen and Kaplan \(2017\)](#) compare the patterns of top income shares between the IRS and U.S. Social Security Administration (SSA) data sets. They conclude that the divergence between the two series is mainly due to the presence of income accrued to pass-through entities in the IRS data. This type of income is precisely the focus of this paper so we use the numbers from the IRS data as a motivation.

²See for example [Atkinson et al. \(2011\)](#), [Piketty and Saez \(2013\)](#), [Alvaredo et al. \(2013\)](#), [Bricker et al. \(2016\)](#), [Piketty et al. \(2016\)](#) among many others.

³Pass-through entities are businesses whose income is passed entirely to the owner and taxed based on the personal income tax code. The legal forms which are pass-through entities are: sole proprietorships, general partnerships, limited partnerships, limited liability companies and S corporations. In Section 2.1 of the paper we provide a detailed discussion on differences between various legal forms of organization.

This has two advantages over previous evidence based on the composition of tax returns released by the Internal Revenue Service: (1) we analyze transitions of actual U.S. employers, whereas IRS tax returns contain both employers and other shell companies with no employees or even expenses, and (2) we are able to measure the changes in legal forms at the business entity level. Exploiting the panel dimension of the data, we decompose the flows into the intensive margin (switching) and extensive margin (entry and exit). Having documented the significant firm-level reorganizations around the tax reforms (3) we show that choice of legal form has significant effects on firms choice of real quantities—a reorganization is not simply a change in accounting: among the set of firms that elect a pass through conversion, those that convert after the tax reform tend to shrink relative to those who converted before the tax reform.

Second, we establish the empirical link between trend in the distribution of legal forms of organization and income inequality dynamics using the data from the Survey Consumer Finances (SCF). Exploiting the information about business owners in the SCF data and about the legal forms of organization of their businesses we construct a time series of counterfactual top income shares, which allows us to quantify the impact of legal forms’ distribution for income distribution over time. Importantly, SCF allows us to separate the mechanical channel associated with shifting income from corporate to personal accounts from the behavioral responses of the business owners (economic channel). Focusing on the economic channel we isolate the composition effect and selection effect. The former informs us about the effect of shifts towards the pass-through entities among businesses held by business owners in the SCF, whereas the latter indicates the magnitude of changes in the business income received from running a business over time. We find that the composition effect accounts for 13 percent of the overall increase in the top 1 percent income share since 1988, which is the first year SCF provides information about the legal forms of business organization. The selection effect accounts for 39.8 percent of the overall increase in the top 1 percent income share, which together with the composition effect sums to 52.8 percent of increase in the top income share. Thus, our counterfactual top income shares imply that more than half of the income inequality increase post 1988 was due to the business owners changing the legal form of organization and furthermore drawing larger pre-tax income from their businesses. The counterfactual exercise is suggestive and useful to understand the link between distribution of legal forms or organization and income distribution dynamics. However, it is silent on the sources of the shift in the distribution of legal forms as well as on the economic mechanisms translating them into the changes in income distribution. Hence, one needs a structural macroeconomic model to address these issues.

The third contribution of the paper is to develop heterogeneous agent model with workers and entrepreneurs, in which the choice of the legal form of business organization is endogenous. The model captures stylized trade-off entrepreneurs face between running the C corporation versus pass-through entity. Profits of the pass-through businesses are entirely channeled to the owners and taxed according to the personal income tax code. Capital of the pass-through entities is financed only through owners' equity and thus owners are subject to undiversified investment risk due to idiosyncratic productivity shocks. In contrast, profits of the C corporation are taxed first at the entity level based on the corporate income tax code and further, whenever the dividends are paid out, the owners pay the dividend income tax. Unlike the pass-through owners, the owners of the C corporations are able to fully diversify the investment risk. Apart from double taxation of profits another downside of running C corporation is the overhead fixed cost. These features introduce trade-off for entrepreneurs between double taxation of profits and overhead costs but no investment risk while running a C corporation versus single taxation of profits and no fixed costs but being subject to the uninsurable investment risk while running a pass-through entity.

This trade-off between legal forms is central for the economic mechanism translating changes in the tax codes to the endogenous changes in the distribution of legal forms which further affect pre-tax income distribution. To illustrate it consider a reduction of the personal income taxes, which provides more incentives to run a pass-through business rather than C corporation. First, as entrepreneur switches to pass-through entity, pre-tax income increases due to the removal of the overhead costs. Second, there is a change in the capital allocation. The cost of organizing as a pass through is less access to outside equity. With some limitations on borrowing, the entrepreneur must now use her own equity to finance the business's capital stock, so that she saves more than she would with exclusively precautionary motives. Moreover, the undiversifiable private equity risk commands a risk premium. With decreasing returns, to generate a higher expected return on equity, the pass-through entrepreneur reduces the capital invested in business, hence the product of the larger savings and higher expected return determines the impact on the pre-tax income. Finally, the after tax risk free rate falls as a result of the tax reduction and the composition of income and substitution effects determines the response of workers labor supply. All these behavioral responses and general equilibrium effects associated with them lead to the changes in income distribution in the economy with the first two forces contributing to the higher pre-tax income of those entrepreneurs which switched to the pass-through form. Preliminary quantitative results confirm that personal tax reduction induces the sizable increase in the number of pass-through businesses and rise in the top income shares.

Related literature. This paper is related to several strands of literature. First, it corresponds to the empirical literature on firm dynamics in the US. Recently, there has been a large interest on the dynamics of businesses and number of papers have exploited microeconomic data to document various interesting facts on this topic. These papers look at issues such as dynamics of small and large firms over the business cycle - [Chari et al. \(2008\)](#), [Moscarini and Postel-Vinay \(2012\)](#) and [Kudlyak and Sanchez \(2017\)](#); cyclical reallocation of workers across employers depending on the firm size - [Haltiwanger et al. \(2013\)](#), job creation by firms of different size and age - [Haltiwanger et al. \(2015\)](#); the implications of gradual shift towards older firms in the population of US businesses due to start-up deficit - [Pugsley and Sahin \(2015\)](#); or finally the role of start-ups in the structural transformation of the US economy - [Dent et al. \(2016\)](#). In contrast, this paper sheds new light on the dynamics of the legal forms of businesses organization in the US since 1980, which has not been yet explored with the use of the micro data.

Second, this paper contributes to the vast literature on income inequality dynamics. A number of papers have documented income inequality dynamics in the United States - [Piketty and Saez \(2003\)](#), [Atkinson et al. \(2011\)](#), [Piketty and Saez \(2013\)](#), [Alvaredo et al. \(2013\)](#), [Bricker et al. \(2016\)](#), [Piketty et al. \(2016\)](#). There is no consensus in the literature about the sources of the recent income inequality increase. Some argue that executive compensations grew above the actual productivity growth in the financial services sector, leading to disproportional increase of the top executives' salaries - [Piketty and Saez \(2003\)](#). Other papers point at the skill-biased technological change as the main driving force of the recent changes in income distribution - [Krusell et al. \(2000\)](#), [Violante \(2001\)](#). There has been some interest in the role entrepreneurial income plays for the distribution of income in the society, but the analysis so far is restricted to the countries other than the US (see [Alstadster et al. \(2016\)](#)). One very recent exception is [Smith et al. \(2017\)](#), which like ours, tries to identify the economic forces behind the increasing contribution of pass through income to the growth in top income shares. In this paper, we develop a method to construct counterfactual top income shares in the United States using SCF data, to link empirically the distribution of legal forms and dynamics of income distribution and quantify the impact of the former for the latter. We also propose and evaluate a specific mechanism, namely the effects of the reduced diversification encouraged by organization as a pass through entity.

The paper also contributes to the growing literature on macroeconomic implications of entrepreneurship and its role for shaping wealth and income inequality (see [Buera et al. \(2015b\)](#) for an excellent survey). As illustrated in the seminal papers by [Quadrini \(2000\)](#) and

Cagetti and Nardi (2006) modeling of entrepreneurship is very important for generating the high concentration we observe at the very top of the wealth and income distribution. Given the success of models of entrepreneurship and financial frictions in producing reasonable wealth and income distributions vis-à-vis the data, these models have been used to analyze the impacts of tax policy (Cagetti and Nardi (2009); Kitao (2008); Lee (2012); Meh (2005); Scheuer (2014)). They have also been used to analyze business cycle fluctuations, particularly in the aftermath of the 2008 financial crisis (Buera et al. (2015a); Buera and Moll (2015); Bassetto et al. (2015); Kiyotaki and Moore (2012); Shourideh and Zetlin-Jones (2014)), where private entrepreneurs play a special role because of the interaction of consumption, saving, and risk that is linked with investment. There is also a literature that focuses on the consumption smoothing and self-insurance behavior of entrepreneurs (Angeletos (2007); Buera and Shin (2011); Karaivanov and Townsend (2014); Moskowitz and Vissing-Jorgensen (2002)). Albeit these papers make important contributions and cover a wide range of topics they abstract from modelling the choice of the legal forms of organization of entrepreneurs, which is the focus of this paper. Chen et al. (2014) investigate the effects of corporate tax cuts on the employment in a model, where the choice of legal form is endogenous. They abstract from the accumulation of capital by entrepreneurs and risk premium, the features which are central to our analysis and relevant for the economic mechanism we propose.

Finally, the paper is linked to the quantitative macro public finance literature. There is a vast literature studying the effects and designs of the tax systems in heterogeneous agents models with idiosyncratic labor income risk—see Domeij and Heathcote (2004), Conesa et al. (2009), Krueger and Ludwig (2013) or Poschke et al. (2012) among many others. At the same time there is also a large body of the literature inspecting the effects of the capital income taxes in the presence of the uninsurable investment risk - see Panousi (2008), Meh and Terajima (2009), Panousi and Reis (2012), Evans (2014). A number of interesting lessons emerge from these studies on the effects of capital income taxation in an environment with idiosyncratic and uninsurable shocks (be it investment or labor income shocks). Nonetheless, existing papers abstract from business legal forms of organization and the possibility of reorganization, which directly influence whether the same business activity is taxed as labor, capital or both. We show that incorporating an endogenous choice of business legal form is important to understand the full effects of both business and personal income tax reforms in a quantitative framework.

The rest of the paper is organized as follows. Section 2 describes our empirical findings on the dynamics of business legal form of organization in the U.S. Section 3 describes a

decomposition of income in the SCF data and constructs the counterfactual top income shares linking distributions of legal forms and income. Section 4 develops a structural, macroeconomic model with endogenous choice of legal forms of organization. Further, Section 6 discusses model properties.

2 Dynamics of business legal forms of organization

Since the 1980s the most significant shift in business legal forms of organization is a secular increase in limited liability pass through entities and decline in the traditional corporation. In this section we evaluate the actual dynamics of business legal forms in the United States. We find that the prominent increase in pass through limited liability companies follows entirely from two sources: first is a secular increase in the share of *new* businesses formed as pass through limited liability companies, offsetting nearly perfectly a decline in the share formed as traditional corporations; second an increase in the share of corporations converting to pass through entities, with notable bursts of conversions near tax-reform episodes. Interestingly, there was no change from differences in business survival. The characteristics of alternative legal forms of organization are significant, not just for their tax consequences. We first provide a brief summary of the important trade-offs between legal forms in the U.S., and then with these definitions in hand, we measure the dynamics of legal forms of actual U.S. businesses using confidential firm level Census data.

2.1 Overview of the legal forms of organization in the U.S.

The owners of businesses in the United States may organize their enterprises in a variety of ways, subject to the applicable laws of their state. The choice would usually reflect their need for capital, for flexibility and for personal protection from the liabilities that the business takes on. The choice of the organizational form largely determines how a business will be taxed at the federal level. The fundamental decision that the owner of the business has to make is whether to incorporate. Corporations may have any number of owners and they typically have four characteristics: (i) limited liability (ii) centralized management (iii) free transferability of interest (iv) continuity of life. Limited liability implies that each owner's liability for the debts of the firm is limited to the amount of his or her investment. The centralized management means that the decision making belongs to the board of directors and not directly to the general owners. Free transferability of interest implies that each owner may sell his or her interest without the permission of the other owners. The continuity of life ensures that the firm does not automatically dissolve upon the death, bankruptcy, or withdrawal of the owner.

The decision about incorporation affects how a business is taxed, but it is not the only one. All the unincorporated businesses are taxed in the same way but not all the corporations are taxed identically. The main legal forms of organization in the United States are: (i) sole proprietorship (ii) general partnership (iii) limited partnership (iv) limited liability company (iv) S corporation (v) C corporation. Their main characteristics are illustrated in Table 1. In terms of limited liability the owners of sole proprietorship and general partnership are not protected from the debts of the firm, whereas other unincorporated businesses (limited partnership, LLCs) offer some or full protection. In terms of the taxation, C corporation pay the corporate income tax on their profits at the entity level. Then, whenever the after-tax profits are distributed to the shareholders in forms of the dividends, shareholders pay dividend income tax. Also, shareholders pay tax on any capital gains they realize when they sell shares of stock in the corporation. In contrast, the S corporations together with all other nonincorporated businesses do not pay corporate income tax on profits. These businesses pass all profits through to their owners, who pay individual income tax on them, independently on whether the profits were actually distributed or not. Hence, the common names for these businesses - "pass-through" entities.

Table 1: Main Characteristics of Different Organizational Forms for Businesses

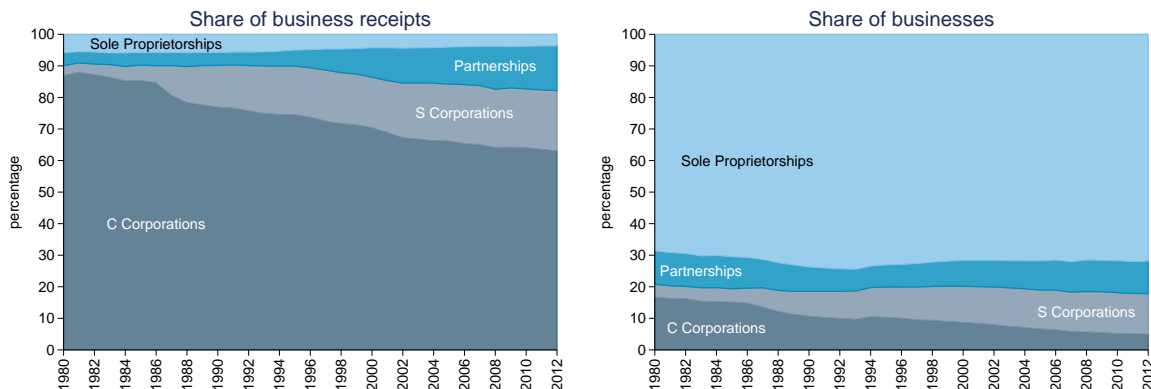
	Number of Owners	Liability Protection	Taxation of Profits
Sole Proprietorship	1	No	Pass-through
General Partnership	More than 1	No	Pass-through
Limited Partnership	1+	No for partners Yes for limited part.	Pass-through
LLC*	1+	Yes	Pass-through
S Corporation	1 – 100	Yes	Pass-through
C Corporation	1+	Yes	Entity level

*LLC - Limited Liability Company.

There has been a secular shift in the distribution of the legal forms of organization in the United States since 1980, which is illustrated in Figure 1. The share of business receipts

of pass-through entities (S corporations, partnerships and sole proprietorships) in the total business receipts in the US increased from 13.1 percent in 1980 to 36.9 percent in 2012. In terms of the share of businesses, the share of C corporations in total entities dropped from 16.6 percent in 1980 to 4.9 percent in 2012. In what follows we provide a decomposition of stock dynamics into the flows between C corporations, Partnerships, Sole Proprietors, S corporations and entry/exit state.

Figure 1: Distribution of organizational forms in the US, 1980-2012



Notes: Business receipts are the revenues businesses receive from their sales of goods and services. Source: IRS Integrated Business Data

2.2 Measuring the dynamics of legal forms in Census data

The IRS data does not provide a complete picture of the dynamics of business legal forms. We are only able to measure the stock of each legal form, and we are unable to differentiate actual businesses with employees from other pass through activity with no associated payroll such as shell companies. Using confidential firm level Census data, we can overcome these two shortcomings.

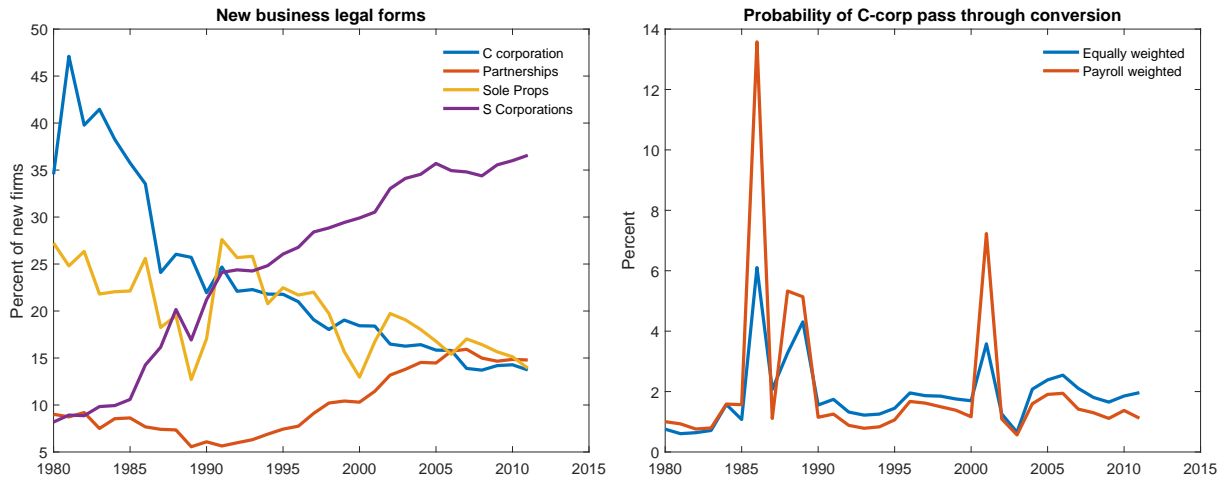
We measure both the stock and flows across the legal forms of employer businesses using Census data. To do this we merge the Longitudinal Business Database (LBD), which provides a complete enumeration of nearly all U.S. private sector establishments, with additional raw data from the Business Register. The Census Bureau compiles the LBD from business tax filings in the Business Register, with an extensive cleaning procedure to link establishments across years.⁴ Since corporations can elect to be taxed as a pass through entity (see above) the actual legal form of organization available in the LBD is not enough to identify limited liability

⁴See [Jarmin and Miranda \(2002\)](#) for details on the construction of the LBD.

pass through organizations. We merge in excluded raw data from the Business Register to determine which version of IRS form 1120 was filed and thus whether the business is actually a S-corporation.

Using this LFO enhanced version of the LBD, we construct matrices to measure transitions across legal forms for each year from 1980 to 2012. We define the following states: C corporations, Partnerships, Sole Proprietors, S Corporations and other.⁵ For each year, we match every establishment to its corresponding observation the following year. We use an entry and exit state in the reference and future year for establishments that are new entrants or exit. Then we estimate a transition matrix by averaging these transitions across all possible transitions across states. We do this both equally weighting across establishments and weighting by each establishments payroll. The latter "activity" weighted measure assigns more weight to large firms. We plot these transitions in Figure 2. The left panel plots the share of entrants choosing each legal form. The right panel plots the share of current C corporations who convert to an S corporation.

Figure 2: U.S. Employer Transitions across Legal Form of Organizations, 1980-2012



Source: Census LBD and Business Register

Consistent with the change in the stocks measured by the IRS data, the share of employer businesses organized as pass through entities also increases. This stems from two different sources. First the share of new entrants choosing to organize as a pass through increases sharply beginning in the mid 1980s. Second, starting in 1986, the share of C corporations converting to pass through entities also jumps. There is a surge in conversions

⁵Other encompasses all other types of legal forms such as non profits, trusts, etc...

during significant tax reforms: Tax Act Reform of 1986 and Economic Growth and Tax Relief Reconciliation Act of 2001 (see Figure A3 in the appendix). Interestingly, there is almost no change in survival of C corporations (see appendix.). The right panel in Figure 2 shows that the surge in business conversions was concentrated in larger firms, because the share of conversions when weighted by payroll is actually larger.

2.3 The effects of reorganization on firm dynamics

The surge in pass through conversions evident in figure 2 also affected firm behavior of the firms who elected to convert legal forms. One might have expected the shift in legal forms to tax-advantaged pass through organizations to only change the taxation of profits, but otherwise leave firm dynamics unchanged, except perhaps through increases in free cash flow from reducing owed tax. This turns out not to be the case: firms induced to shift legal forms by tax reforms actually shrink.

We provide indirect evidence on the shift in firm investment dynamics by examining the response of a firm's employment growth to the pass through conversion using the same firm-level administrative data.⁶ To this this, for every firm, we measure its employment growth, as well as its legal form. We construct a panel of firms that are C-corporations in 1984, and who over the next 10 years will either remain C corporations or convert to a for-profit pass through entity (either a partnership or S corporation). With this panel we estimate the following model:

$$\Delta \log E_{it} = \alpha_i + \sum_{\tau \neq 1985} \lambda_{\tau} D_{it}^{\tau} + \beta D_{it}^P + \sum_{\tau \geq 1986} \gamma_{\tau} D_{it}^P \times D_{it}^{\tau} + \varepsilon_{it} \quad (2.1)$$

where for business i , E_{it} is the employment in year t , α_i is a fixed effect, D_{it}^{τ} is a time dummy for year τ , D_{it}^P is a dummy variable indicating whether or not the firm is organized as a pass in current year t , and $E[\varepsilon_{it}|i, t, D_{it}^P] = 0$. The omitted year is 1985, which is just prior to the TRA 1986. γ_{1984} would be zero by construction because all firms are C corporations in 1984.

We can interpret the elasticity β as the elasticity of employment growth to a pass through conversion in 1985 and $\beta + \gamma_{\tau}$ as that elasticity in some year $\tau \geq 1986$ after the TRA 1986. The regression identifies these elasticities by comparing the change in growth rate at the time

⁶Ideally, we could observe the firms investment along with its employment, but there are unfortunately no investment data with the same comprehensive coverage of the LBD.

Table 2: Estimated change in employment growth at pass through conversion

	$\Delta \log E_{it}$ (1)	$\Delta \log E_{it}$ (2)	$\Delta \log E_{it}$ (3)	$\Delta \log E_{it}$ (4)
β	0.00699* (0.0040)	0.00915** (0.0041)	0.0345*** (0.0084)	0.0286*** (0.0086)
γ_{1986}	-0.0186*** (0.0050)	-0.0367*** (0.0052)	-0.0183* (0.0101)	-0.0312*** (0.0107)
γ_{1987}	-0.00206 (0.0041)	-0.0198*** (0.0048)	-0.0165* (0.0089)	-0.0315*** (0.0103)
γ_{1988}	-0.0170*** (0.0041)	-0.0230*** (0.0050)	-0.0378*** (0.0087)	-0.0288*** (0.0108)
γ_{1989}	-0.0159*** (0.0041)	-0.00669 (0.0074)	-0.0389*** (0.0086)	-0.00185 (0.0306)
Observations	3000000	500000	3000000	500000
R-squared	0.149	0.125	0.302	0.275
Business FE	Yes	Yes	Yes	Yes
Years	1984-1989	1984-1989	1984-1989	1984-1989
Weight	Equal	Equal	Employment	Employment
Sample	All	Converters	All	Converters

Note: Census Bureau Longitudinal Business Database. *, **, *** indicate significant at the 10, 5 and 1 percent level, respectively. Standard errors clustered by business. Number of observations rounded to nearest 100,000 to protect confidentiality. All includes all C corporations in 1984. Converters restricts the sample to those firms that convert to a pass through (LLC, LLP, general partnership or S corporation) from 1984 to 1993

of conversion to the change in growth rate for firms that have not converted. For example,

$$\begin{aligned} \beta + \gamma_{1986} = & E[\Delta \log E_{it}|i, D_{it}^P = 1, t = 1986] - E[\Delta \log E_{it}|i, D_{it}^P = 0, t = 1985] \\ & - (E[\Delta \log E_{it}|i', D_{it}^P = 0, t = 1986] - E[\Delta \log E_{it}|i', D_{it}^P = 0, t = 1985]) . \end{aligned}$$

Estimating the model from equation (2.1) by OLS and WLS weighting by business employment, we find that whereas firms that convert to pass throughs prior to 1986 grow faster, the growth rate declines for firms who elect a pass through conversion following TRA 1986. Table 2 reports the estimated elasticities. Columns (1) and (3) report the estimate elasticities for on the sample of all 1984 C corporations. When equally weighted (column 1) employment growth increases by 0.7 percentage points for a conversion in 1985 and decreases by 1.2 percentage points for a conversion in 1986. This compares conversions in those years against the change in growth rate for the firms that did not convert. The -1.86 percentage

point difference between these estimates is significant at the 1 percent level. When weighted by employment (column 3), the conversion also significantly reduces growth rates relative to converting in 1985, but the growth rates remain positive.

These estimates are attenuated by including C corporations that never convert in the control group. If we restrict the sample by excluding these C corporations that never convert as in columns (2) and (4), we find an even larger difference in growth rates. Businesses converting post TRA1986 on average experiencing declines in growth rates, regardless of weighting. For the most part, this pattern is also present for firms that convert in 1987-1989. This sensitivity to the choice of control group implies that employment growth is higher at firms that have yet to convert versus firms that will remain C corporations. It confirms, as will be the case in our model, that pass through conversions are only executed for a selected sample of C corporations. Although the table is not yet available, as a placebo test, we estimate the same model instead on the set of businesses that are C corporations in 1990 instead of 1984, which is a period of relatively steady level of conversions as can be seen from figure 2. When estimated on this set of firms, we find no statistically significant difference in growth rates between conversions in different years.

The difference in elasticities on its own should not be interpreted as the effect of a pass through conversion. For various idiosyncratic reasons, pass through conversions are executed even without a change in tax rates, and in all cases, the decision to convert is endogenous. We cannot observe a firm for which the re-organization is exogenously assigned. Instead we observe that the effects of executing a conversion reverse when the pass through is timed during a favorable tax reform. We interpret this difference as reflecting both a change in the threshold that makes a conversion profitable and thus expanding the set of marginal businesses, as well as capturing the effects on employment of those firms following the conversion. In our reduced form exercise we cannot disentangle those two forces. What is important for us, is that among this shifting marginal group, their employment dynamics change as a result of the conversion.

Overall, we interpret the evidence on employment dynamics as supporting the larger claim that the shift in legal forms is not an innocuous change in accounting. In the absence of severe adjustment costs, we expect firms to change inputs together, so that apparent effects on employment would also be evident were we able to observe firm investment. We later propose a mechanism tied to the difficulty of diversifying investment risk as a pass through entrepreneur consistent with these patterns in employment dynamics and increasing concentration of entrepreneurial income.

3 Legal forms and income distribution dynamics

It is well known that the top income shares grew substantially in the United States since 1980 (see for example [Atkinson et al. \(2011\)](#)). As illustrated in Figure A2 in the tax data the top 1 percent income share (excluding capital gains) grew from 8.2 percent in 1980 to 18.2 percent. The same pattern is observed for all other shares: top 10 percent, top 0.1 percent etc. However, it is less known that at the same time there has been a change in the composition of income at the top of the income distribution. Total income can be divided into three categories: (1) Labor income (2) Entrepreneurial income and (3) Other income. Labor income consists of wages, salaries, pensions, stock options exercised and annuities. Entrepreneurial income consists of income from sole proprietorships, partnerships and S corporations. The other income category consists of dividends, interest and rents. The increase in income inequality since 1980 has been accompanied by the rapid growth of the share of entrepreneurial income, mainly at the cost of dividend and interest income. In the top 10 percent group entrepreneurial income share grew from 8.3 percent in 1980 to 17.1 percent in 2012. The growth of entrepreneurial income for top 1 percent and top 0.1 percent was even more prominent, respectively 13.3 to 30.0 percent and 8.4 to 35.4 percent. The secular increase in the top income shares and associated shift in its composition coincide in time with the secular change in the distribution of legal forms of business organization documented in Section 2. The goal of this section is to establish an empirical link between the two phenomena.

How would changes in the legal form of organization of businesses documented in the previous section lead to changes in pre-tax income inequality over time? We distinguish two channels of impact: Mechanical and Economic. The mechanical channel is related to the differences in accounting rules associated with running a pass-through business and C corporation. Retained earnings from the C corporation are recognized as individual income of the owner only when distributed to shareholders either through dividends or capital gains. Income of the pass-through entities is immediately channeled to the owner according to the shared ownership, even when retained in the business. As a result, when C corporation converts to the pass-through entity the owner's income mechanically rises due to the income earned by the business. The economic channel is associated with the behavioral changes of the business owner who switches from one legal form to another such as changes in the amount of retained earnings, endogenous changes in the firm's investment or costs of operating a business. The ability to separate these two channel in the data is crucial in order to properly link dynamics of legal forms of organization and evolution of income inequality. In what

follows we propose the method to construct the counterfactual top income shares that extracts the impact of the economic effect.

Data and Definitions. We use data from the Survey of Consumer Finances (SCF) from waves 1988 to 2012. The starting point of the analysis is year 1988 since this is the first wave asking questions about the legal forms of business organization. The focus of our analysis are active business owners (ABO). The unit of observation in the SCF is the household. We classify active business owners as those households, a member of which owns or shares ownership in any privately-held businesses or any other business investments that are not publicly traded and has an active management role in any of these businesses. SCF provides us the information about the number of actively managed businesses by the household. For the first two businesses it also provides the information about their legal form of organization, classifying them into the partnerships, sole-proprietorships, S corporations, other corporations (including C), foreign business type and limited partnerships combined with limited liability companies. We classify other corporations as C corporations and all the other forms as pass-through entities. We proceed to attach the legal form of organization to each ABO household. To do so we need to take a stand about how to treat households running more than one business. For these households we attach the most senior legal form of organization from the all businesses actively manages by the household.⁷ In what follows we use the notions of total income and business income of the household to compute the counterfactual top income shares over time. We define in the SCF total income as the sum of: (i) wages and salaries, (ii) pensions less Social Security benefits and transfers (iii) income from a sole proprietorship or a farm (iv) income from interest (v) income from dividends (vi) income from other businesses or investments, net rent, trusts, or royalties. This definition captures pre-tax market income and does not include capital gains. Isolating the income ABOs households earn from their businesses is not straightforward in the SCF. We do so by using a question directly asking the respondents about how much of net earnings or other income, in addition to regular salary, they received from their business. We also include income received by the spouses from the businesses. We call this income a business part of total income of the ABO household. Defining business income this way rather than using the variable (vi), i.e. income from other businesses or investments, net rent, trusts, or royalties, allows us to disentangle in the SCF data the mechanical effect from the economic one. Variable (vi) in the SCF is a direct counterpart of line 17 in 1040 form, which includes income from partnerships and S

⁷For example, if a household manages both a C corp and an pass-through business we classify the household as a C corp business owner. In the Appendix we provide alternative approaches to this issue and make sure our results are not affected by this particular attachment rule.

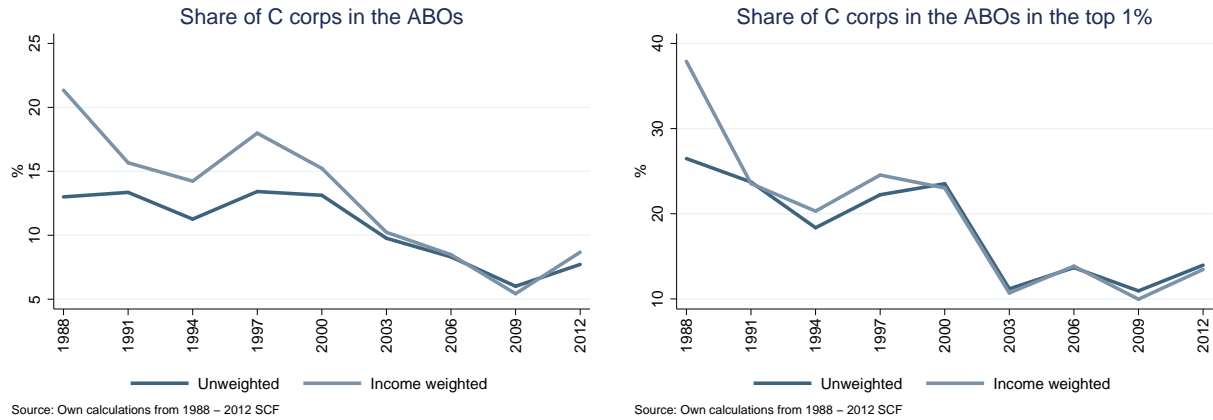
corporations (including losses carried over from previous years), rental real estate, royalties and trusts. Thus a mechanical shift of firm’s income after conversion from C corporation to pass-through entity would directly show up in line 17 of 1040 and hence in variable (vi) in SCF, however it would not affect our definition of business income unless there was a behavioral change of the ABO household affecting how much additional income it received after the switch.

Legal Forms among Active Business Owners. Active Business Owners constituted 11.5 percent of the total US population in 1988 and as illustrated in Figure A4 this number has been relatively stable over time with a slight decline to 10.8 percent in 2012. In terms of total income ABOs account for, there has been a slight increase from 25.8 percent in 1988 and to 29.7 percent in 2012. At the top of the income distribution the presence of the ABO is much more prominent. On average they constitute around 60 percent of the population as well as the total income of the top 1 percent income share. These numbers are in line with findings by [Quadrini \(2000\)](#), [Cagetti and Nardi \(2006\)](#) and many others - see the excellent survey by [De Nardi \(2016\)](#)- highlighting the role of entrepreneurs for wealth and income inequality.

The secular trend in the distribution of the legal forms of organization documented in Section 2 has also been present in the SCF data. To illustrate that we split the ABOs in the SCF into the owners of the pass-through entities and owners of the C corporations according to the rule described above. The share of owners of C corporations among ABOs in the overall population fell from 13.0 percent in 1988 to 7.7 percent in 2012 and weighting by income from 22.1 percent to 8.1 percent. In the top 1 percent income group a shift towards pass-through entities was even more salient. Share of C corporation owners among ABOs fell there from 26.5 percent in 1988 to 14.0 percent in 2012, and weighting by income from 37.9 percent to 13.5 percent.

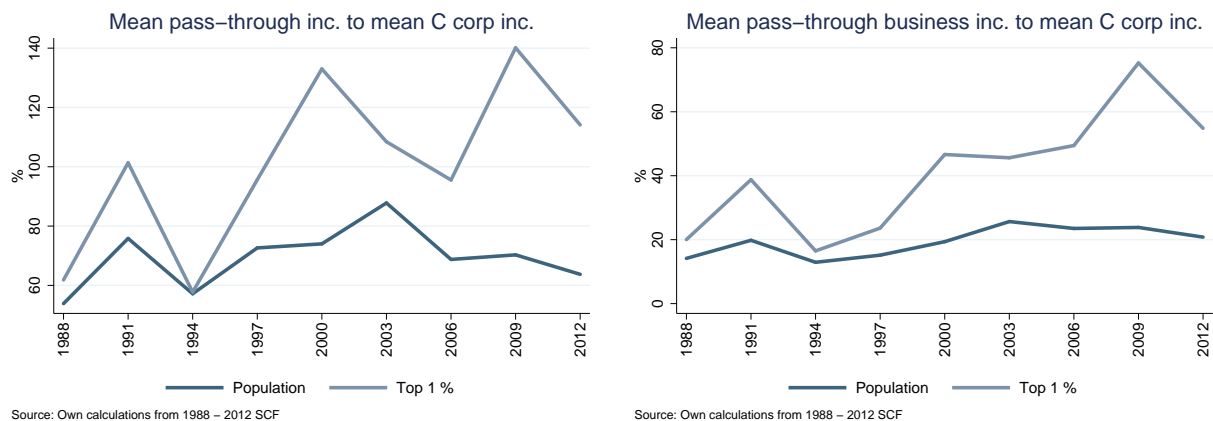
The shift in the composition of the legal form of organizations among ABOs has been associated with the striking shift of income between these two groups at the top of the income distribution as illustrated in Figure 4. In the top 1 percent the ratio of mean income (from all sources) of the pass-through owner to the mean income of the C corporation owner grew from 61.8 percent in 1988 to 114.1 percent in 2012 (growth of 84.6 percent), whereas in the overall population these numbers were respectively 53.9 percent and 63.7 percent (growth of 84.6 percent). To get more insight into this shift we decompose the overall income of the pass-through owners into the business components and non-business components in line

Figure 3: Share of C corps among the active business owners



with the definitions provided above. It turns out that the increase in the relative incomes is largely driven by the increase in the business component of pass-through owners income. In the top 1 percent the ratio of mean business income of the pass-through owner to the mean income of the C corporation from 20.0 percent to 54.8 percent. These secular changes in the composition of legal forms of organization and relative incomes across owners of firms with different legal forms suggest two forces at play. First, the business owners, who switched to pass-through entities were able to yield higher income from their businesses relative C corporation owners. Second, those who switched were owners of profitable (potentially large) businesses, which drove the dynamics of relative mean incomes.

Figure 4: Relative income of pass-through and C corp owners



Simple income decomposition. To quantify the impact of the shift in the distribution of legal forms of organization for income inequality dynamics we develop a simple income

decomposition, later used to compute the counterfactual time series of the top income shares. Let x_t be the share of the active business owners in the overall SCF population at date t . Moreover, let p_t be the share of the pass-through owners among active business owners. Then the mean income i_t in the entire population can be decomposed as follows

$$i_t = x_t [p_t(i_t^{PB} + i_t^{PNB}) + (1 - p_t) i_t^C] + (1 - x_t) i_t^W \quad (3.1)$$

where i_t^{PB} and i_t^{PNB} are respectively the mean business and non-business income of the pass-through owners, whereas i_t^C and i_t^W are respectively the mean income of C corporation owners and workers. Analogously, we decompose the mean income in the top j percent income share

$$i_t^j = x_t^j [p_t^j(i_t^{j,PB} + i_t^{j,PNB}) + (1 - p_t^j) i_t^{j,C}] + (1 - x_t^j) i_t^{j,W} \quad (3.2)$$

Given the decompositions (3.1) and (3.2) the top j - th percent income share is

$$s_t^j = \frac{N_t^j \times i_t^j}{N_t \times i_t} \quad (3.3)$$

where N^j is the number of households within the top j percent and N is the total number of households in the SCF population.

Counterfactual top shares. The simple income decomposition is useful to compute the counterfactual time series of the top income shares. We start with isolating the composition effect. To do so we fix the fraction of the pass-through owners at it's 1988 level, i.e. the first wave of the survey that reports the legal form of business organization of the ABOs. Hence, the counterfactual series of mean income in the population and mean income in the top j percent income share becomes

$$i_{c1,t} = x_t [p_{88}(i_t^{PB} + i_t^{PNB}) + (1 - p_{88}) i_t^C] + (1 - x_t) i_t^W \quad (3.4)$$

$$i_{c1,t}^j = x_t^j [p_{88}^j(i_t^{j,PB} + i_t^{j,PNB}) + (1 - p_{88}^j) i_t^{j,C}] + (1 - x_t^j) i_t^{j,W} \quad (3.5)$$

We proceed by isolating two selection effects to account for the change in the relative mean incomes of the pass-through owners and C corporation owners. First, we define the ratio of mean incomes as $\omega_A = \frac{i_{88}^{PB} + i_{88}^{PNB}}{i_{88}^C}$ and mean incomes in the top j percent income group $\omega_A^j = \frac{i_{88}^{j,PB} + i_{88}^{j,PNB}}{i_{88}^{j,C}}$ and construct the counterfactual series for mean income and mean income

in the top j percent group as follows

$$i_{c2A,t} = x_t [p_{88}\omega_A i_t^C + (1 - p_{88}) i_t^W] + (1 - x_t) i_t^W \quad (3.6)$$

$$i_{c2A,t}^j = x_t^j [p_{88}^j \omega_A^j i_t^{j,C} + (1 - p_{88}^j) i_t^{j,C}] + (1 - x_t^j) i_t^{j,W} \quad (3.7)$$

By keeping the ratio of total mean income of the pass-through entrepreneurs to the mean income of the C corporation owners we allow for the decomposition to capture potential trends in the evolution of the non-business income of pass-through entrepreneurs. To isolate the impact of business income from the other sources of income and capture the selection effect we further define the ratio of mean incomes as $\omega_B = \frac{i_{88}^{PB}}{i_{88}^C}$ and mean incomes in the top j percent income group $\omega_B^j = \frac{i_{88}^{j,PB}}{i_{88}^{j,C}}$. Then we construct the counterfactual series as follows:

$$i_{c2B,t} = x_t [p_{88}\omega_B i_t^C + (1 - p_{88}) i_t^C] + (1 - x_t) i_t^W \quad (3.8)$$

$$i_{c2B,t}^j = x_t^j [p_{88}^j \omega_B^j i_t^{j,C} + (1 - p_{88}^j) i_t^{j,C}] + (1 - x_t^j) i_t^{j,W} \quad (3.9)$$

Using the counterfactual definitions of mean incomes and mean incomes in the top j percent income group we construct the counterfactual top j income shares analogously to the definition in (3.3).

Figure 5: Actual and Counterfactual Top 1 Percent Income Shares

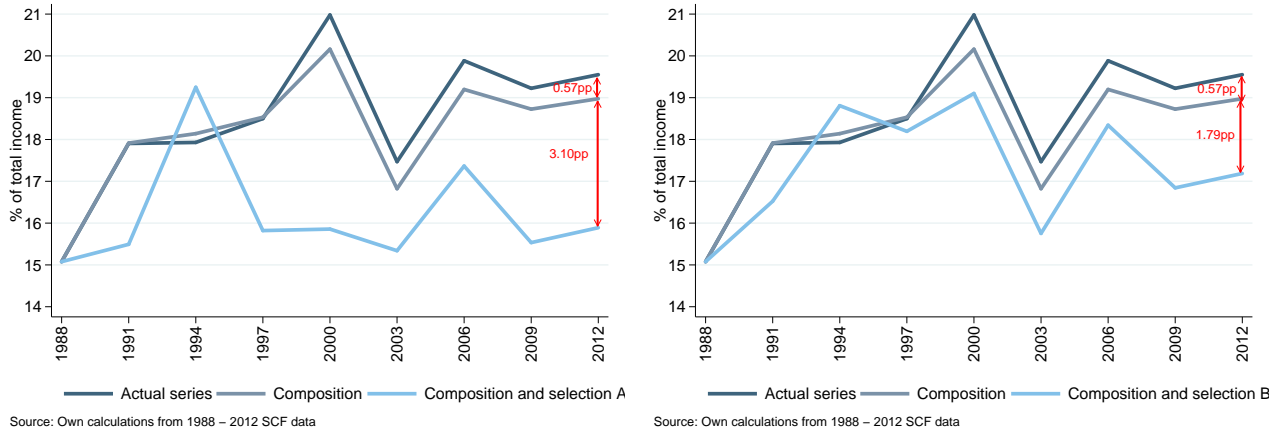


Figure 5 presents the comparison of the actual top 1 percent income share and the counterfactual series constructed using the formulas (3.1) – (3.9). The top 1 percent income share

grew between 1988 and 2012 in the SCF data by 4.6 percentage points. Counterfactual exercise indicates that the composition effect accounts for 0.57 percentage point of this growth which is 13.0 percent of the overall increase. The selection effect A, which keeps the mean total income of the pass-through owners to the mean income of C corporation owners constant at the initial level, accounts for the 3.10 percentage points of the increase. Hence, together with the composition effect it explains 81 percent increase of the top 1 percent income share in the SCF data since 1988. The selection effect B, which keeps the mean total business income of the pass-through owners to the mean income of C corporation owners constant at the initial level, accounts for the 1.79 percentage points of the increase. Hence, together with the composition effect it explains 52.8 percent increase of the top 1 percent income share in the SCF data since 1988. The magnitudes of the selection effects differ substantially indicating that the presence of non-business component of income for pass-through owners and its dynamics over time is potentially relevant for income inequality dynamics. Nonetheless, our analysis indicates that at least half of the increase in the top 1 percent income share since 1988 is driven by the changes in the income of the owners of pass-through businesses relative to the C corporation owners suggesting either larger pre-tax profitability of pass-through businesses or behavioral changes in the behavior of owners following changing the legal form of organization.

4 Model with endogenous choice of legal forms

The counterfactual exercise presented in Section 3 is suggestive and useful to understand the link between distribution of legal forms or organization and income distribution dynamics. However, it is silent on the sources of the shift in the distribution of legal forms as well as on the economic mechanisms translating them into the changes in income distribution. Hence, one needs a structural macroeconomic model to address these issues. In this section we develop a model with heterogeneous workers and entrepreneurs featuring endogenous choice of the legal form of organization for entrepreneurs. The model captures stylized trade-off between the legal forms. The income of the pass-through entities is taxed once according to the personal income tax code. Owners of the pass-through entities finance capital from their own equity and are subject to the undiversified investment risk. The income of the C corporation is subject double taxation, to the corporate income tax is levied on profits at the entity level and the dividend income tax is levied on the dividend payouts to the owners. Contrary to the pass-through entity, C corporations have access to the perfectly elastic supply of external equity and their owners can diversify completely an investment

risk. On the top of that running the C corporation is associated with some overhead, fixed costs. These features introduce trade-off between fully diversified risk but double taxation of profits and fixed costs of operation and undiversified investment risk but single taxation of profits. We exploit this trade-off and illustrate how it changes as a result of the tax reforms and secular shifts in productivity and further how endogenous choice of the legal form of organization translates into the income distribution. In what follows we present the details of the model.

Demographics. There is a measure one of individuals in the economy. Each individual is one of the two types: worker or entrepreneur. The lifespan of both types is infinite. We denote the fraction of entrepreneurs in the model by μ . The fundamental difference between these two types is that entrepreneurs have access to the production technology and use it to run a firm, while workers do not have access to it and supply their labor services in the market. Entrepreneurs can organize their businesses in two ways: as a pass-through entity or as C corporation. We denote the fraction of entrepreneurs organized as pass-through entities by p . Thus in every period we have $(1 - \mu)$ of workers, μp of pass-through entrepreneurs and $\mu(1 - p)$ of entrepreneurs with firms organized as C corporations in the model economy.

Preferences. Households in the economy have standard preferences over consumption c and leisure $1 - h$ ordered by

$$\mathbb{E}_0 \left[\sum_{t=0}^{\infty} \beta^t u(c_t, 1 - h_t) \right]$$

where $\beta \in (0, 1)$ is the discount factor, u satisfies standard conditions and expectation operator is with respect to the idiosyncratic shocks.

Technology. Every entrepreneur has an access to the decreasing returns to scale technology $f(z, k, n)$ transforming physical capital k and labor input n into the consumption good. Variable z represents the entrepreneur-specific productivity shock which follows the Markov process Γ_z . We impose the following functional form for the technology

$$f(z, k, n) = z^{1-\nu} (k^\alpha n^{1-\alpha})^\nu$$

where the presence of fixed factor z induces the decreasing returns to scale. Given the installed capital k and productivity z every firm generates the gross profits

$$\pi(k, z) = \max_n \left\{ z^{1-\nu} (k^\alpha n^{1-\alpha})^\nu - wn \right\}. \quad (4.1)$$

It will be convenient to express gross profits according the following lemma.

Lemma 1 *Given the homogeneity of the technology in z , k , and n and if labor markets are competitive where each unit of labor n is paid its marginal product, gross profits may be expressed as the sum of the return to capital and the return to the entrepreneur's productivity (Ricardian rent), i.e.,*

$$\pi(k, z) = f_k k + f_z z.$$

Proof. Given the technology is homogeneous of degree 1 in all factors, the result follows immediately from Euler's theorem noting with a competitive labor market, $f_n = w$. ■

Timing. The timing of the events within a period is as follows:

1. Productivity shock z, ε are realized
2. The entrepreneur makes a decision about the legal form of organization.
3. Production occurs. All agents receive their respective earnings.
4. The government levies taxes on personal, dividend and corporate income, then makes transfers and finances the exogenous government spending.
5. Consumption, saving and investment decisions are made.

Workers. The individual state of the worker is an asset position $a \in \mathcal{A}$ and idiosyncratic productivity shock $\varepsilon \in \mathcal{E}$, where ε follows the Markov process Γ_ε . Workers choose consumption c , labor supply h and next period asset position a' subject to the budget constraint and no borrowing constraint. Their income y consists of interest income ra and labor income $wh\varepsilon$. Thus the problem of the worker is

$$\begin{aligned} V^W(a, \varepsilon) &= \max_{c, h, a'} u(c, 1 - h) + \beta \mathbb{E}[V^W(a', \varepsilon')] \\ &\text{subject to} \\ c + a' &= a + y - T_i(y) + T \\ y &= ra + wh\varepsilon \\ a' &\geq \underline{a} \end{aligned} \tag{4.2}$$

where $T_i(\cdot)$ is the personal income tax schedule specified later and T is a lump sum transfer.

Entrepreneurs: pass-through entity. The individual state of the pass-through entrepreneur is $a \in \mathcal{A}$ personal asset position, $e \in \mathcal{E}$ capital invested in the business productivity shock $z \in \mathcal{Z}$, where z follows the Markov process Γ_z . Entrepreneur chooses consumption c , next period individual asset position a' and next period capital invested into the business e' . Her income y consists of the return on the individual asset ra and the profits from running a firm $\pi(e, z)$. Undepreciated value of the capital $(1 - \delta)e$ is added to her budget constraint. Income net of the value of depreciated capital is subject to the personal income tax levied according to the tax schedule $T_i(\cdot)$ specified later. An entrepreneur can finance the capital stock only through her own equity and is subject to no borrowing constraint. Hence, the dynamic programming program becomes

$$\begin{aligned}
V^P(a, e, z) &= \max_{a', e', c} u(c, 1 - \bar{h}) + \beta W^P(a', e', z) \\
&\text{subject to} \\
c + a' + e' &= y + a + (1 - \delta)e - T_i(y - \delta e) + T \\
y &= ra + \pi(e, z) \\
a' &\geq \underline{a}
\end{aligned} \tag{4.3}$$

where W^P is the continuation value that takes into account discrete decision about changing the legal form of organization.

Entrepreneurs: C corporation. The individual state of the entrepreneur that enters the period as C corporation consists of personal asset position $a \in \mathcal{A}$ and business productivity shocks $z \in \mathcal{Z}$. Entrepreneur chooses consumption c and next period individual asset position a' . Her income consists of the return on the individual assets ra and the Ricardian rents from running the C corporation $f_z(k^*(z))z$. Income is subject to the dividend income tax levied on Ricardian rents and the personal income tax levied on the returns on assets according to the tax schedules $T_d(\cdot)$ and $T_i(\cdot)$ respectively. Hence, the dynamic programming problem becomes

$$\begin{aligned}
V^C(a, z) &= \max_{a', c} u(c, 1 - \bar{h}) + \beta W^C(a', z) \\
&\text{subject to} \\
c + a' &= y + a - T_i(ra) - T_d(f_z(k^*(z))z) + T - c_f \\
y &= ra + f_z(k^*(z))z \\
a' &\geq \underline{a}
\end{aligned} \tag{4.4}$$

Continuation values: converting decision. At the beginning of every period entrepreneur chooses the legal form of organization. The pass-through entrepreneur may continue to operate with current legal form or convert to a C corporation by selling its equity to the mutual fund. The revenue from the transaction adds up to the personal assets. Thus, the continuation value for pass-through entrepreneur is

$$W^P(a', e', z) = \mathbb{E} [\max \{V^C(a' + e', z'), V^P(a', e', z')\} | z]$$

The owner of the C corporation can convert to the pass-through entity or continue to operate with the current legal form. To convert, the owner has to purchase all equity from the outside investors using personal assets. Therefore, the continuation value becomes

$$W^C(a', z) = \begin{cases} \mathbb{E}[V^C(a', z') | z] & \text{if } a' < k^*(z) \\ \mathbb{E}[\max \{V^C(a', z'), V^P(a' - k^*(z), k^*(z), z')\} | z] & \text{if } a' \geq k^*(z). \end{cases}$$

Denote the policy functions related to discrete decision about the legal form by $d_i \in \{0, 1\}$ for $i \in \{C, P\}$, where $d_i = 1$ denotes staying with the current legal form.

Mutual fund. The owners of the C corporations in the model have access to the infinitely elastic supply of outside equity, through the mutual fund, at the cost of $1 + r - T'_i(\cdot)$. The mutual fund is an institution that makes investment decisions for the C corporations and aggregates the idiosyncratic risks faced by their owners and hence by the law of large number it is able to fully diversify it, so that it does not face any uncertainty with respect to the aggregate profits. Thus, the optimal capital stock $k^*(z)$ is determined by equalizing the expected marginal return on the capital net of depreciation and corporate income tax with the marginal opportunity cost of investing one more unit of physical capital net of the personal income tax, i.e.

$$\mathbb{E}[(1 - T'_c(\pi(k^*; z'))) \pi_k(k^*; z') - \delta | z] + 1 = 1 + r - T'_i(\cdot) \quad (4.5)$$

where T_c is the corporate income tax schedule.

Aggregation and Market Clearings. In every period there is a fixed fraction $1 - \mu$ of workers and μ of entrepreneurs in the economy. Let $a \in A = [a_{\min}, \infty]$ and $\varepsilon \in \epsilon$, where ϵ is the domain of the productivity shock and further let $(A \times \epsilon, \mathcal{B}(A) \times \mathcal{B}(\epsilon))$ be a measurable space of individual assets and workers productivities, where $\mathcal{B}(A)$ and $\mathcal{B}(\epsilon)$ denote the Borel

sets. Let $\lambda_w : \mathcal{B}(A) \times \mathcal{B}(\epsilon) \rightarrow [0, 1]$ be the measure of over the space of individual assets and productivities for workers. It evolves according to

$$\lambda'_w(\mathcal{A}, \vartheta) = \int_{A \times \epsilon} \mathbb{I}\{a'(a, \epsilon) \in \mathcal{A}\} \Gamma(\epsilon'|\epsilon) d\lambda_w(a, \epsilon) \quad \forall \mathcal{A}, \vartheta \in \mathcal{B}(A) \times \mathcal{B}(\epsilon) \quad (4.6)$$

Let $e \in E = [0, \infty]$ and $z \in Z$ where Z is the domain of firm's productivity shocks. Let $(A \times Z, \mathcal{B}(A) \times \mathcal{B}(Z))$ be a measurable space of individual assets and firm's productivities of the C corporation owners and let $(A \times E \times Z, \mathcal{B}(A) \times \mathcal{B}(E) \times \mathcal{B}(Z))$ be a space of individual assets, capital invested in a firm and firm's productivities of the pass-through owners. Then define $\lambda_C : \mathcal{B}(A) \times \mathcal{B}(Z) \rightarrow [0, 1]$ as the measure of C corporation owners over the individual states and $\lambda_P : \mathcal{B}(A) \times \mathcal{B}(E) \times \mathcal{B}(Z) \rightarrow [0, 1]$ as the measure of pass-through owners over the individual states. They evolve according to the following law for all $\mathcal{A}, \mathcal{E}, \mathcal{Z} \in \mathcal{B}(A) \times \mathcal{B}(E) \times \mathcal{B}(Z)$:

$$\begin{aligned} \lambda'_P(\mathcal{A}, \mathcal{E}, \mathcal{Z}) &= \int_{A \times E \times Z} d_P(a, e, z) \mathbb{I}\{a'(a, e, z) \in \mathcal{A}\} \mathbb{I}\{e'(a, e, z) \in \mathcal{A}\} \Gamma(z'|z) d\lambda_P(a, e, z) \\ &+ \int_{A \times Z} (1 - d_C(a, z)) \mathbb{I}\{a'(a, \epsilon) - k^*(z) \in \mathcal{A}\} \mathbb{I}\{k^*(z) \in \mathcal{E}\} \Gamma(z'|z) d\lambda_C(a, z) \end{aligned} \quad (4.7)$$

and for all $\mathcal{A}, \mathcal{Z} \in \mathcal{B}(A) \times \mathcal{B}(Z)$

$$\begin{aligned} \lambda'_C(\mathcal{A}, \mathcal{Z}) &= \int_{A \times Z} d_C(a, z) \mathbb{I}\{a'(a, z) \in \mathcal{A}\} \Gamma(z'|z) d\lambda_C(a, z) \\ &+ \int_{A \times E \times Z} (1 - d_P(a, e, z)) \mathbb{I}\{(a'(a, e, z) + e'(a, e, z)) \in \mathcal{A}\} \Gamma(z'|z) d\lambda_P(a, e, z) \end{aligned} \quad (4.8)$$

The number of pass-through owners p is endogenous in the model and determined by

$$p = \mu \left(\int_{A \times E \times Z} d_P(a, e, z) d\lambda_P(a, e, z) + \int_{A \times Z} (1 - d_C(a, z)) d\lambda_C(a, z) \right) \quad (4.9)$$

and then by construction the fraction of the C corporation owners is $(1 - \mu)(1 - p)$. Market clearing for labor requires

$$\begin{aligned} \int_A \int_\epsilon h(a, \epsilon) d\lambda_w(a, \epsilon) &= \int_{A \times Z} n^*(z) d\lambda_C(a, z) \\ &+ \int_{A \times E \times Z} n(a, e, z) d\lambda_P(a, e, z) \end{aligned} \quad (4.10)$$

and market clearing for the capital stock requires

$$\begin{aligned} \int_{A \times Z} k^*(z) d\lambda_C(a, z) &= \int_{A \times \epsilon} a'(a, \epsilon) d\lambda_w(a, \epsilon) + \int_{A \times Z} a'(a, z) d\lambda_C(a, z) \\ &+ \int_{A \times E \times Z} a'(a, e, z) d\lambda_P(a, e, z) \end{aligned} \quad (4.11)$$

Government. Government in our model has to finance an exogenous stream of expenditure G using the corporate income tax schedule $T_c(\cdot)$, dividend income tax schedule $T_d(\cdot)$ and personal income tax schedule $T_i(\cdot)$, government debt. It also has access to the lump sum transfer instrument which balances the budget. The revenues from the personal income tax, R_i , the dividend income tax, R_d , the corporate income tax, R_c are

$$\begin{aligned} R_i &= \int_{A \times \epsilon} T_i(ra + wh\epsilon) d\lambda_w(a, \epsilon) + \int_{A \times E \times Z} T_i(ra + \pi(e, z) - \delta e) d\lambda_P(a, e, z) \\ &+ \int_{A \times Z} T_i(ra) d\lambda_C(a, z) \\ R_d &= \int_{A \times Z} T_d(f_z(k^*(z))z) d\lambda_C(a, z) \\ R_c &= \int_{A \times Z} T_c(\pi(k^*(z); z)) d\lambda_C(a, z) \end{aligned}$$

Hence the intertemporal government budget constraint becomes

$$G + (1 + r)B + T = B' + R_i + R_d + R_c \quad (4.12)$$

Equilibrium. The general equilibrium is defined as follows.

Definition 1 *Given government policy $\{G, T_i, T_d, T_c\}$, a **recursive competitive equilibrium** is a set of value functions $\{V^W, V^P, V^C\}$, allocations of workers $X_W = \{a', c, h\}$, allocations of pass-through entrepreneurs $X_P = \{a', e', c, d_P\}$, allocations of C corporation owners $X_C = \{a', c, d_C\}$, allocations of labor for pass-through firms and C corporations $\{n^*, n\}$, allocation of capital for C corporations $\{k^*\}$, prices $\{r, w\}$ and measures $\{\lambda_w, \lambda_P, \lambda_C\}$ such that*

1. *Given prices, allocations X_W, X_P, X_C and value functions $\{V^W, V^P, V^C\}$ solve respectively problems (4.2), (4.3), (4.4).*
2. *Given prices, allocations of labor $\{n^*, n\}$ and capital $\{k^*\}$, solve respectively (4.1) and (4.5).*

3. The probability measures $\{\lambda_w, \lambda_P, \lambda_C\}$ evolve according to (4.6), (4.7), (4.8).
4. Government budget constraint (4.12) is satisfied.
5. Market clearing conditions (4.10), (4.11) hold.

5 Calibration

TO BE COMPLETED

6 Results

6.1 The role of risk premium.

Undiversified investment risk associated with running a pass-through entity induces there exists a risk premium, i.e. pass-through entrepreneurs demand higher return from running the business relative to the owners of the C corporation. To see this, the following lemma is useful.

Lemma 2 *Suppose T_i, T_d, T_c are set to zero and the borrowing constraint is slack. Then the allocations of capital for pass-through entities and C corporations are:*

$$e'(a, e, z) = \left[\left(\frac{\Delta}{r + \delta} \right) \left(\frac{\mathbb{E} \left[u_c(c(a', e', z')) \left(z'^{\frac{1-\nu}{1-(1-\alpha)\nu}} \right) | z \right]}{\mathbb{E} [u_c(c(a', e', z')) | z]} \right) \right]^{\frac{1-(1-\alpha)v}{1-v}}$$

$$k^*(z) = \left[\left(\frac{\Delta}{r + \delta} \right) \mathbb{E} \left[\left(z'^{\frac{1-\nu}{1-(1-\alpha)\nu}} \right) \right] \right]^{\frac{1-(1-\alpha)v}{1-v}}$$

where Δ is a constant depending on production function parameters. Moreover, for a given z we have $e' < k^*$ as long as $\text{Cov} \left(u_c(c(a', e', z')), \left(z'^{\frac{1-\nu}{1-(1-\alpha)\nu}} \right) \right) < 0$.

It's clear from the Lemma 2, that as long as the marginal utility of consumption is negatively correlated with the productivity shock then conditional on the current productivity level the amount of capital invested into the pass-through company will be lower than the amount of capital invested into the C corporation. Thus, it follows from the decreasing marginal products property of the production function that the return has to be higher. The inability to insure against productivity risk is crucial for the correlation to be negative. In the complete markets world the idiosyncratic shocks would be perfectly insured and consumption would be unaffected by them. As a result the risk premium would vanish.

6.2 The role of taxes.

The presence of distortionary taxes on the individual income, dividend income and corporate profits affects the allocation of physical capital and through this channel the distribution of income in the model economy. To illustrate their role the following lemma is useful.

Lemma 3 *Suppose tax schedules are linear and suppose there is no idiosyncratic risk associated with productivity, i.e. z is fixed. Then the allocations of capital for pass-through entities and C corporations are:*

$$e'(a, e, z) = \left[\left(\frac{\Delta}{r + \delta} \right) \left(z^{\frac{1-\nu}{1-(1-\alpha)\nu}} \right) \right]^{\frac{1-(1-\alpha)v}{1-v}}$$

$$k^*(z) = \left[\left(\frac{\Delta}{\frac{(1-\tau_i)}{(1-\tau_c)(1-\tau_d)}r + \delta} \right) \left(z^{\frac{1-\nu}{1-(1-\alpha)\nu}} \right) \right]^{\frac{1-(1-\alpha)v}{1-v}}$$

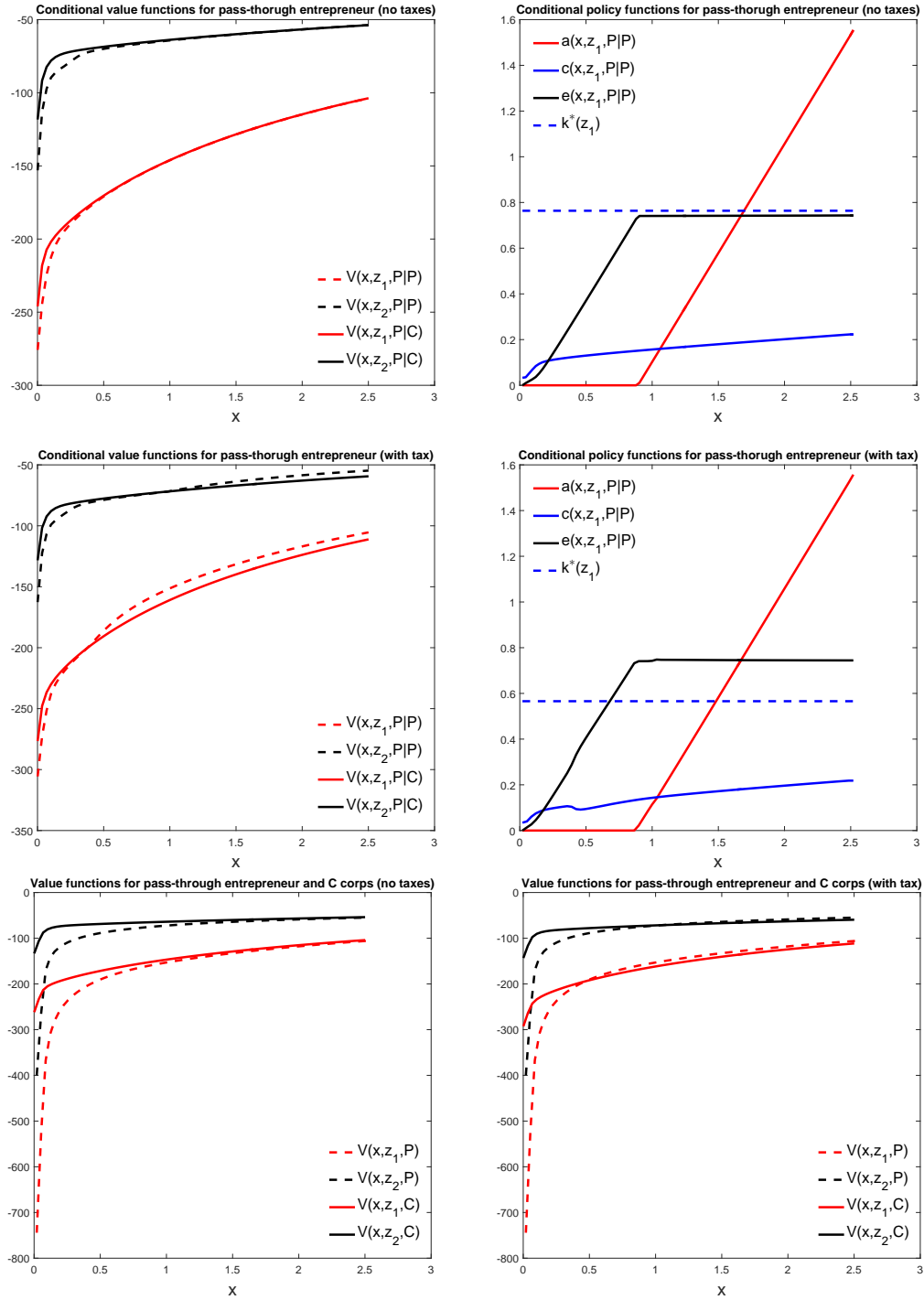
where Δ is a constant depending on production function parameters. Moreover, for a given z we have $e' < k^*$ as long as $(1 - \tau_c)(1 - \tau_d) > (1 - \tau_i)$.

Whenever the taxes are linear and there is no idiosyncratic uncertainty the allocation of the capital for the pass-through entrepreneur is unaffected and equal to the undistorted one. As for the capital allocation for the C corporations the interaction between the personal income tax and combination of the dividend income tax and corporate income tax distort the allocation. It is immediate to see that as long as the after tax profit from additional dollar invested in the C corporation is larger than one dollar invested in the pass-through entity (or into the safe asset) the capital allocated in the former is going to be higher.

Figure 6 illustrates the conditional value and policy functions of the pass-through entrepreneur from the general model introduced in the previous section. In the figure we use the notion of cash-in-hand state variable, which we introduce in the Appendix to economize on the endogenous, continuous state variables. The first row of figures illustrates the case when there is no taxes at all in the economy, as well as no fixed costs associated with running the C corporation. Thus, the only difference between the values of running pass-through entity and C corporation comes from the presence of the risk premium. The pass-through entrepreneur would invest all the savings into the business and nothing into the safe assets until the point almost reaches to the optimal scale. There is still undiversified investment risk, therefore the amount of resources invested in the business (solid black line in the top, right figure) is not equal to the unconstrained level of capital installed in the C corporation (dashed blue line). At this point the conditional value function on staying as a pass-through

lies on the top of the value function conditional on switching to the C corporation. As we introduce the positive corporate income tax (in a linear fashion) the optimal scale of the C corporation goes down, which is reflected by the shift of the blue, dashed line. The presence of the investment risk still induces that running the pass-through business is less profitable than the C corporation for the low levels of cash in hand x . However, at some level of wealth, due to the presence of the corporate income tax, it pays off for the pass-through business owner to stay in her current legal form of organization. Hence, in line with the logic presented in Lemma 3 whenever $\tau_c > \tau_i$, the unconstrained level of capital in the pass-through business is larger than the one installed in the C corporation and at some level of wealth (cash in hand) it becomes more profitable to maintain running the pass-through business.

Figure 6: The effects of the corporate income tax increase



Notes: x denotes cash in hand of the entrepreneur and value functions are conditional staying pass-through business or not - see Appendix for details. The last row presents the value functions with and without the tax in a model where entrepreneurs can not switch the legal form.

6.3 Preliminary quantitative results

In this section we present preliminary results from a quantitative model aimed at illustrating the main forces operating in the model economy rather than making definite predictions. Instead of formal calibration, at this stage, we have parametrized the model using standard (exact numbers are available upon request) values of parameters from the literature. Then we consider the tax reform, which lowers personal income tax, to illustrate the it's effect on endogenous choice of the legal forms and further for the changes in the *pre-tax* income distribution. For the illustrative purposes we assume all taxes in the model are linear. In the initial stationary equilibrium (Economy 1) we set the following tax rates: $\tau_i = 0.25$, $\tau_c = 0.25$ and $\tau_d = 0.15$, which is roughly equivalent to the marginal effective tax rates on accordingly wages and salaries, corporate profits and dividends estimated with the use of the TAXSIM model and NIPA. Next, we consider a reduction of the personal income tax of 10 percentage points and split the response of the economy into two stages. First, we look at the effects in a partial equilibrium framework (Economy 2), fixing the prices at their initial level. Then, we move to inspect the general equilibrium effects and we make sure labor and asset markets clear with the new, reduced personal income tax rate (Economy 3). Table 3 illustrates the effects of the tax reduction for the top income groups, Table 4 presents the composition of the population and income in general and in the top income groups. Finally, Table 5 presents prices and allocations across the three considered economies.

Table 3: Top income shares

	Economy 1 $\tau_i = 0.25$, GE	Economy 2 $\tau_i = 0.15$, PE	Economy 3 $\tau_i = 0.15$, GE
Top 1%	5.8	6.4	6.2
Top 5%	22.3	24.8	23.3
Top 10%	38.0	40.8	39.1
Top 15%	45.3	49.3	47.0

Notes: GE - general equilibrium (labor and asset markets clear), PE - partial equilibrium.

As the we reduce the personal income tax the top income shares grow substantially. For example Top 5% grows from 22.3 percent to 24.8 percent, an increase by 2.5 percentage points - see Table 3. This shift is a direct consequence of the switch in the distribution of the legal forms of businesses in the model. As Table 4 illustrates the fraction of the pass-through entrepreneurs increases from 6.6 to 7.3 percent as a fraction of population (from 54.5 to 60.3 percent as a fraction of entrepreneurs). Inspect now the presence of the pass-through business owners at the top income distribution illustrated in Table 4. As the personal tax

income is reduced the fraction of individuals, as well as the fraction of income from pass-through businesses, increases in all top income groups. Pass-through business owners demand higher return on their investment due to the presence of the risk premium. Importantly, also their propensity to save is higher relative to the C corporation owners, which drives up their income from the safe assets. These two channels contribute, through the mechanism of endogenous choice of the legal form of organization, to the increase in income inequality.

Table 4: Composition of agents across income distribution

	Economy 1			Economy 2			Economy 3		
	$\tau_i = 0.25$, GE			$\tau_i = 0.15$, PE			$\tau_i = 0.15$, GE		
	Work.	C ent.	P ent.	Work.	C ent.	P ent.	Work.	C ent.	P ent.
Total Population	87.9	5.4	6.6	87.9	4.8	7.3	87.9	5.1	7.0
Top 25%	51.3	22.1	26.6	50.3	19.7	30.0	46.7	23.6	29.6
Top 10%	6.1	27.6	66.4	2.8	24.0	73.1	5.7	26.9	67.5
Top 5%	0.0	3.1	96.9	0.0	1.1	98.9	0.0	4.3	95.7
Total Income	83.7	5.3	11.0	82.6	4.3	13.1	84.0	4.7	11.4
Top 25%	29.3	22.8	47.9	26.7	17.7	55.6	26.6	22.9	50.5
Top 10%	3.8	21.8	74.4	1.7	16.1	82.3	3.6	21.0	75.5
Top 5%	0.0	2.8	97.2	0.0	1.0	99.0	0.0	3.7	96.3
Rel. Mean Income	66.2	245.7	428.5	63.4	222.5	460.3	66.4	241.9	426.1

Notes: GE - general equilibrium (labor and asset markets clear), PE - partial equilibrium. Top percentages are with respect to the income distribution.

On the top of the changes in allocations, due to the tax reduction, there are important general equilibrium effects. The presence of larger number of pass-through business owners, who have high propensity to save, induces that the supply of assets in the economy increases dramatically following the tax reform as illustrated in Table 5 in statistics for Economy 2. Following the composition change, labor demand from C corporations falls and labor demand from pass-through businesses rises in Economy 2 relative to the Economy 1. The excess supply of assets puts a downward pressure on the interest rate, which has to fall by 1.4 percentage point to clear the asset market as we move to the Economy 3. General equilibrium forces to some extent undo the effects of the tax reform in terms of impact for income inequality. Lower rate of return of the safe asset induces larger optimal scale of the C corporation and more incentives to become the owner of this legal form.

Table 5: Labor and Capital Market Prices and Allocations

	Economy 1 $\tau_i = 0.25$, GE	Economy 2 $\tau_i = 0.15$, PE	Economy 3 $\tau_i = 0.15$, GE
Prices			
Wage	0.481	0.481	0.496
Interest rate	0.053	0.053	0.039
Allocations			
Labor demand C ent.	0.085	0.071	0.083
Labor demand P ent.	0.102	0.113	0.108
Capital demand C ent.	0.103	0.079	0.126
Asset supply	0.102	0.244	0.126
Labor supply	0.188	0.190	0.191

Notes: GE - general equilibrium (labor and asset markets clear), PE - partial equilibrium. Asset supply comes from the savings of workers, owners of the C corporations and owners of the pass-through firms.

7 Conclusions

TO BE COMPLETED

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A Additional figures and tables

Figure A1: Business exit by legal form

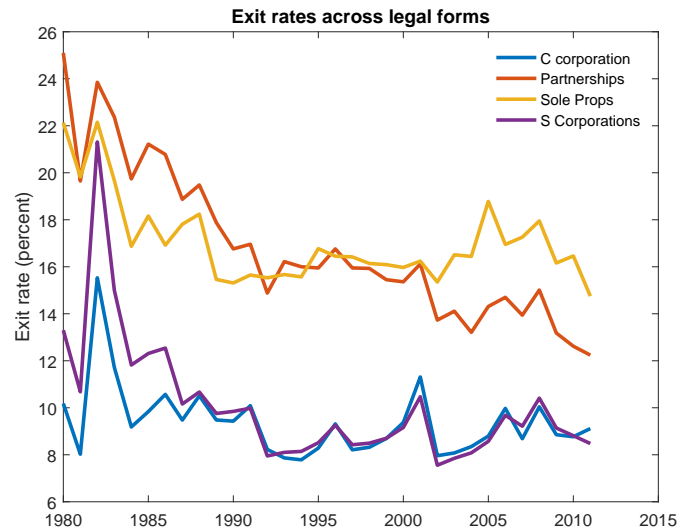


Figure A2: Pre-tax top income shares in 1980-2012



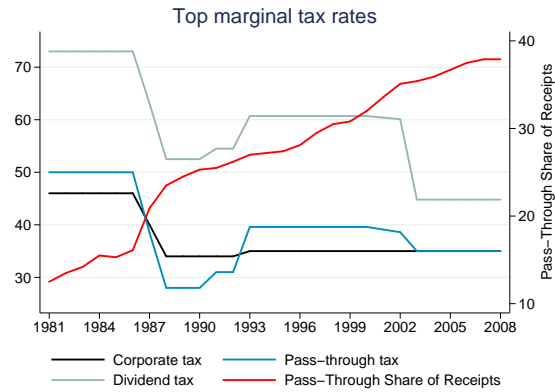
Source: Own calculations. NBER Tax Model Files. Series exclude capital gains.

Table 6: Shares of total income and income composition.

	Share	1980 Composition			Share	2012 Composition		
		Labor	Entr.	Other		Labor	Entr.	Other
Top 10%	32.9	78.1	8.3	13.6	47.8	74.3	17.1	8.6
Top 1%	8.2	60.5	13.3	26.2	18.9	54.9	30.0	15.2
Top 0.1%	2.2	49.1	8.4	40.5	8.4	41.6	35.4	23.0

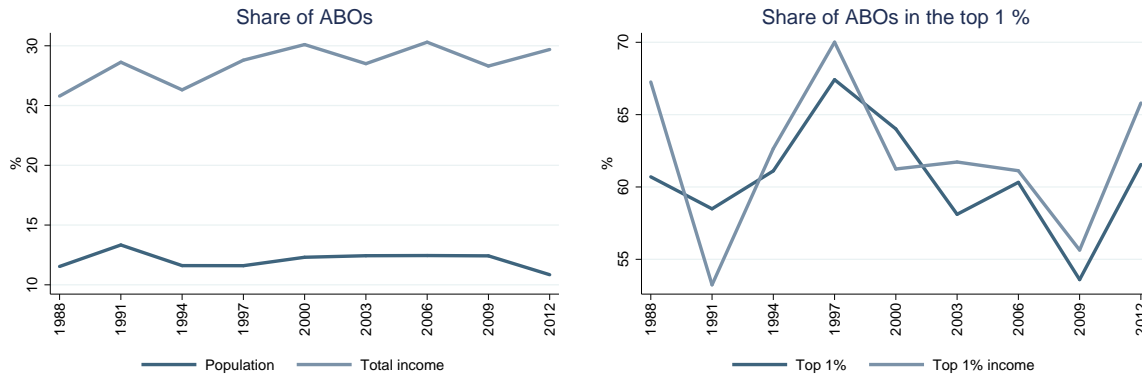
Source: Own calculations. NBER Tax Model Files. Notes: Labor income = wages + salaries + pensions + stock-option exercised + annuities; Entrepreneurial income = sole proprietorships + partnerships + S corporations; Other: dividends + interest + rents.

Figure A3: Top Marginal Tax Rates in the US



Source: Congressional Budget Office and IRS

Figure A4: Active Business Owners over time



Source: Own calculations from 1988 – 2012 SCF

Source: Own calculations from 1988 – 2012 SCF

B Numerical algorithm

To economize on the individual state variables we rewrite problems in terms of cash on hand. Let x to be cash on hand that entrepreneur has after the production took place and before consumption, savings and investment decisions have been made. Then, the continuation value depends on the legal form of organization and denote x'_C and x'_P to be respectively the continuation value in case entrepreneur chooses to run C corporation and continuation value in case entrepreneur chooses to run pass-through entity. Thus, we have for the C corporation

$$\begin{aligned} x'_C &= y'_C(z') + a' - T_i(ra') - T_d(f_z(k^*(z))z') + T - c_f & \forall z' \\ y'_C(z') &= ra' + f_z(k^*(z))z' & \forall z' \end{aligned}$$

and for the pass-through entrepreneurs we have

$$\begin{aligned} x'_P &= y'_P(z') + a' + (1 - \delta)e' - T_i(y'_P(z') - \delta e') + T & \forall z' \\ y'_P(z') &= ra' + \pi(e', z') & \forall z' \end{aligned}$$

With these continuation values at hand one can rewrite the problem of C corporation entrepreneur as

$$\begin{aligned} V(x, z, C) &= \max_{c, a', d_C} u(c) + \beta \mathbb{E} [d_C V(x'_C(z'), z', C) + (1 - d_C) \mathbf{1}_{\{a' \geq k^*(z)\}} V(x'_P(z'), z', P)] \\ &\text{subject to} & (B.1) \\ x'_C &= y'_C(z') + a' - T_i(ra') - T_d(f_z(k^*(z))z') + T - c_f & \forall z' \\ x'_P &= y'_P(z') + a' + (1 - \delta)k^*(z) - T_i(y'_P(z') - \delta k^*(z)) + T & \forall z' \\ y'_C(z') &= ra' + f_z(k^*(z))z' & \forall z' \\ y'_P(z') &= ra' + \pi(k^*(z), z') & \forall z' \\ x &= a' + c \\ a' &\geq \underline{a} \end{aligned}$$

and the problem of the pass-through entrepreneur as

$$\begin{aligned}
V(x, z, P) &= \max_{c, a', d_P} u(c) + \beta \mathbb{E}[d_P V(x'_P(z'), z', P) + (1 - d_P) V(x'_C(z'), z', C)] \\
&\text{subject to} \\
x'_C &= y'_C(z') + a' + e' - T_i(r(a' + e')) - T_d(f_z(k^*(z))z') + T - c_f \quad \forall z' \\
x'_P &= y'_P(z') + a' + (1 - \delta)e' - T_i(y'_P(z') - \delta e') + T \quad \forall z' \\
y'_C(z') &= r(a' + e') + f_z(k^*(z))z' \quad \forall z' \\
y'_P(z') &= ra' + \pi(e', z') \quad \forall z' \\
x &= a' + e' + c \\
a' &\geq \underline{a}
\end{aligned} \tag{B.2}$$

To present the numerical algorithm, it is useful to write the conditional value functions for the entrepreneurs. Problem of the entrepreneur running C corporation who does not change the legal form becomes

$$\begin{aligned}
V(x, z, C | C) &= \max_{c, a'} u(c) + \beta \mathbb{E}[V(x', z', C) | z] \\
&\text{subject to} \\
x'_C &= y'_C(z') + a' - T_i(ra') - T_d(f_z(k^*(z))z') + T - c_f \quad \forall z' \\
y'_C(z') &= ra' + f_z(k^*(z))z' \quad \forall z' \\
x &= a' + c \\
a' &\geq \underline{a}
\end{aligned} \tag{B.3}$$

The problem of the entrepreneur running the C corporation who switches to running the pass-through business becomes

$$\begin{aligned}
V(x, z, C | P) &= \max_{c, a', e'} u(c) + \beta \mathbb{E}[V(x', z', P) | z] \\
&\text{subject to} \\
x'_P &= y'_P(z') + a' + (1 - \delta)k^*(z) - T_i(y'_P(z') - \delta k^*(z)) + T \quad \forall z' \\
y'_P(z') &= ra' + \pi(k^*(z), z') \quad \forall z' \\
x &= a' + c \\
a' &\geq k^*(z)
\end{aligned} \tag{B.4}$$

where the constraint on a' incorporates the restriction that entrepreneur can convert only if she has enough assets. The problem of the pass-through entrepreneur conditional on keeping her legal form of organization is

$$\begin{aligned}
V(x, z, P | P) &= \max_{c, a', e'} u(c) + \beta \mathbb{E}[V(x', z', P) | z] & (B.5) \\
&\text{subject to} \\
x'_P &= y'_P(z') + a' + (1 - \delta)e' - T_i(y'_P(z') - \delta e') + T & \forall z' \\
y'_P(z') &= r a' + \pi(e', z') & \forall z' \\
x &= a' + e' + c \\
a' &\geq \underline{a}
\end{aligned}$$

and conditional on switching to the C corporation the problem becomes

$$\begin{aligned}
V(x, z, P | C) &= \max_{c, a', e'} u(c) + \beta \mathbb{E}[V(x', z', C) | z] & (B.6) \\
&\text{subject to} \\
x'_C &= y'_C(z') + (a' + e') - T_i(r(a' + e')) - T_d(f_z(k^*(z))z') + T - c_f & \forall z' \\
y'_C(z') &= r(a' + e') + f_z(k^*(z))z' & \forall z' \\
x &= a' + e' + c \\
a' &\geq \underline{a}
\end{aligned}$$

Then the numerical algorithm to solve problems (B.1) and (B.2) is as follows.

Algorithm 4 Create two grids, \mathcal{G}_v for the value function and \mathcal{G}_x for the policy functions and derivative of the value function. Let \mathcal{G}_z be the grid for the productivities. Pick the accuracy parameter ε . Proceed through the following steps.

1. Guess $\tilde{V}^0(x, z, P)$ and $\tilde{V}^0(x, z, C)$ on the grid $\mathcal{G}_v \times \mathcal{G}_z$ where

$$\tilde{V}^0(x, z, i) = \beta \mathbb{E}[V(x', z', i) | z]$$

for $i \in \{P, C\}$.

2. Use linear splines to interpolate the $\tilde{V}^0(x, z, i)$ on the $\mathcal{G}_x \times \mathcal{G}_z$ grid and compute it's derivative with respect to the x . The existence of the derivative is guaranteed by the arguments in [Clausen and Strub \(2016\)](#).

3. Given the guess, solve on the grid $\mathcal{G}_x \times \mathcal{G}_z$ for the conditional policy functions solving problems (B.3), (B.4), (B.6) and (B.5). We develop and use the application of the envelope condition method for this step (see [Maliar and Maliar \(2013\)](#) for the simple exposition of the method).
4. Obtain the conditional value functions $V(x, z, C | C)$, $V(x, z, C | P)$, $V(x, z, P | P)$, $V(x, z, P | C)$ using conditional policy functions found in Step 3 and interpolate them back linearly on the grid $\mathcal{G}_v \times \mathcal{G}_z$.
5. Obtain the unconditional value functions

$$\begin{aligned} V(x, z, C) &= \max_{i \in \{C, P\}} \{V(x, z, C | i)\} \\ V(x, z, P) &= \max_{i \in \{C, P\}} \{V(x, z, P | i)\} \end{aligned}$$

and policy functions, i.e. the legal form of organization decision from

$$\begin{aligned} d(x, z, C) &= \arg \max_{i \in \{C, P\}} \{V(x, z, C | i)\} \\ d(x, z, P) &= \arg \max_{i \in \{C, P\}} \{V(x, z, P | i)\} \end{aligned}$$

and the consumption, savings and investment decision rules from

$$\begin{aligned} c(x, z, i) &= c(x, z, i | d(x, z, i)) \\ a'(x, z, i) &= a'(x, z, i | d(x, z, i)) \\ e'(x, z, P) &= e'(x, z, P | d(x, z, P)) \end{aligned}$$

6. Update the guess of the value function

$$\tilde{V}^1(x, z, i) = \beta \mathbb{E}[V(x', z', i) | z]$$

Check the condition

$$\left\| \tilde{V}^0(x, z, i) - \tilde{V}^1(x, z, i) \right\|_{\infty} \leq \varepsilon$$

if it holds stop, otherwise set $\tilde{V}^0(x, z, i) = \tilde{V}^1(x, z, i)$ and go to Step 2.