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Taxation of top incomes and tax avoidance

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Non-technical summary

Research Question

The income share at the top of the income distribution in the US increases over time. When assessing the economic consequences of taxing top incomes, it is, therefore, crucial to account for the characteristics of rich households and their behavioral responses to marginal tax rates. The research questions of this paper are: How does tax avoidance by entrepreneurs shape macroeconomic outcomes? Does the top marginal income tax rate affect the trade-off between equity and efficiency in the presence of tax avoidance? Does tax avoidance affect the optimal top marginal income tax rate and how?

Contribution

We introduce entrepreneurial tax avoidance in a dynamic general equilibrium model with incomplete markets and occupational choice following. Households are heterogeneous in wealth, labor productivity, and entrepreneurial talent and decide every period whether to be a worker or entrepreneur. Entrepreneurs can avoid taxes in two ways. On the extensive margin, entrepreneurs can choose the legal form of their business organization to reduce their tax burden. On the intensive margin, they can shift their income between different tax bases.

Results

To understand how tax avoidance affects macroeconomic outcomes and welfare, we consider a counterfactual economy in which we eliminate all channels of tax avoidance such that all entrepreneurs are taxed as sole proprietors independent of their legal form of organization. A comparison between the counterfactual economy and the benchmark economy highlights that tax avoidance affects productive efficiency in two opposing ways. First, the intensive margin of tax avoidance increases productive efficiency by minimizing entrepreneurs' tax burdens, relaxing their credit constraints and facilitating higher investments. Second, the extensive margin of tax avoidance reduces productive efficiency because the possibility to avoid taxes induces entrepreneurs to switch their legal form of organization from C-corporation to S-corporation, despite facing a tighter borrowing limit with adverse effects on capital investment.

Nichttechnische Zusammenfassung

Fragestellung

Der Anteil des Einkommens an der Spitze der Einkommensverteilung in den USA nimmt im Laufe der Zeit zu. Bei der Bewertung der wirtschaftlichen Folgen einer Besteuerung von Spitzeneinkommen ist es daher von entscheidender Bedeutung, die Merkmale reicher Haushalte und ihre Verhaltensreaktionen auf Grenzsteuersätze zu berücksichtigen. Die Forschungsfragen dieses Papiers lauten: Wie wirkt sich die Steuervermeidung von Unternehmern auf die makroökonomischen Ergebnisse aus? Beeinflusst der Spitzengrenzsteuersatz den Kompromiss zwischen Gerechtigkeit und Effizienz, wenn Steuervermeidung vorliegt? Wirkt sich Steuervermeidung auf den optimalen Spitzengrenzsteuersatz aus und wie?

Beitrag

Wir führen unternehmerische Steuervermeidung in einem dynamischen allgemeinen Gleichgewichtsmodell mit unvollständigen Märkten und anschließender Berufswahl ein. Die Haushalte sind in Bezug auf Vermögen, Arbeitsproduktivität und unternehmerisches Talent heterogen und entscheiden in jeder Periode, ob sie Arbeitnehmer oder Unternehmer sein wollen. Unternehmer können Steuern auf zwei Arten vermeiden. Erstens können Unternehmer die Rechtsform ihrer Unternehmensorganisation wählen, um ihre Steuerlast zu verringern. Zweitens können sie ihr Einkommen zwischen verschiedenen Steuerbemessungsgrundlagen verschieben.

Ergebnisse

Um zu verstehen, wie sich Steuervermeidung auf die makroökonomischen Ergebnisse und die Wohlfahrt auswirkt, betrachten wir eine kontrafaktische Wirtschaft, in der wir alle Kanäle der Steuervermeidung ausschalten, so dass alle Unternehmer unabhängig von ihrer Rechtsform als Einzelunternehmer besteuert werden. Ein Vergleich zwischen der kontrafaktischen Wirtschaft und der Benchmark-Volkswirtschaft zeigt, dass Steuervermeidung die produktive Effizienz auf zwei gegensätzliche Arten beeinflusst. Erstens erhöht die Möglichkeit Einkommen zwischen verschiedenen Steuerbemessungsgrundlagen zu verschieben die produktive Effizienz, indem sie die Steuerlast der Unternehmer minimiert, ihre Kreditbeschränkungen lockert und höhere Investitionen ermöglicht. Zweitens verringert die Wahlmöglichkeit der Rechtsform der Unternehmensorganisation die produktive Effizienz, da die Möglichkeit der Steuervermeidung die Unternehmer dazu veranlasst, ihre Rechtsform von einer C-Körperschaft zu einer S-Körperschaft zu wechseln, obwohl sie mit einer strengeren Kreditaufnahmegrenze konfrontiert sind, die sich negativ auf die Kapitalinvestitionen auswirkt.

Deutsche Bundesbank Discussion Paper No 25/2024

Taxation of Top Incomes and Tax Avoidance*

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Abstract

This paper studies the aggregate and distributional effects of raising the top marginal income tax rate in the presence of tax avoidance. To this end, we develop a quantitative macroeconomic model with heterogeneous agents and occupational choice in which entrepreneurs can avoid taxes in two ways. On the extensive margin, entrepreneurs can choose the legal form of their business organization to reduce their tax burden. On the intensive margin, entrepreneurs can shift their income between different tax bases. In a quantitative application to the US economy, we find that tax avoidance weakens the distortionary effects of higher income taxes at the top but makes them ineffective at lowering inequality. Eliminating tax avoidance by implementing an equal tax treatment of entrepreneurs across all legal forms of business organization substantially increases tax revenue, aggregate output, and welfare.

Keywords: Tax Avoidance, Top Income Tax Rate, Occupational Choice, Legal Form of Organization, Wealth Inequality, Incomplete Markets, Heterogeneous Agents.

JEL classification: E21, E62, H25, H26, H32.

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1 Introduction

In the US, increasing top-income shares have stimulated an academic and political debate on how to tax the rich. It is well known that progressive income taxation may induce behavioral responses shaping the trade-off between equity and efficiency. When assessing the economic consequences of taxing top incomes, it is, therefore, crucial to account for the characteristics of rich households and their behavioral responses to marginal tax rates. In this respect, two empirical facts are of key importance. First, there is a high concentration of entrepreneurs with small and medium-sized businesses at the top of the US income distribution (Smith et al., 2019). Second, the estimated response of reported income to marginal tax rates is larger for the top 1% income earners compared to the rest of the population. This difference may be attributed to tax avoidance and suggests that entrepreneurs effectively reduce their tax burden (Mertens and Montiel Olea, 2018; Saez et al., 2012).

These empirical facts highlight the importance of understanding entrepreneurial decisions and tax avoidance when assessing the aggregate and distributional consequences of taxing top incomes. This paper focuses on two main research questions. First, how does tax avoidance by entrepreneurs affect macroeconomic outcomes and welfare? And, second, how does the top marginal income tax rate impact equity and efficiency in the presence of tax avoidance?

To answer these questions, we introduce entrepreneurial tax avoidance in a dynamic general equilibrium model with incomplete markets and occupational choice following Cagetti and De Nardi (2006), Quadrini (2000), and Kitao (2008). Households are heterogeneous in wealth, working ability, and entrepreneurial talent and decide every period whether to be a worker or entrepreneur. Entrepreneurs can avoid taxes in two ways. On the extensive margin, entrepreneurs can choose the legal form of their business organization to reduce their tax burden. On the intensive margin, they can shift their income between different tax bases. Entrepreneurs invest in capital, hire labor, and use a decreasing return to scale production technology to produce the consumption good. Entrepreneurs are credit-constrained in their investment decisions. That is, they face a borrowing limit proportional to their net wealth, and the limit depends on the legal form of business organization. The government collects personal income, corporate, and dividend taxes to finance government spending. Moreover, the government raises a social security tax to provide pension benefits to retirees. In addition to the entrepreneurial sector consisting of small and medium-sized businesses, a non-entrepreneurial sector operates under constant returns to scale using capital and labor competitively to produce the consumption good.

We focus on the tax treatment of three main forms of business organization: sole proprietorship, S-corporations, and C-corporations. Sole-proprietorships involve no taxation at the entity level. Instead, business income is passed through to the owners and taxed

at the personal income tax rate. The advantage of this organizational form is its simplicity, but there is little room for tax avoidance. Alternatively, entrepreneurs can decide to incorporate, which generates operating costs. Like sole proprietors, S-corporations are taxed at the individual level rather than the entity level, but their owners have the option to declare part of their income as business income to avoid the social security tax (Smith et al., 2022). C-corporations are complex and run at higher operating costs. However, they benefit from better access to credit because there are fewer legal restrictions that limit their ability to raise external capital (Dyrda and Pugsley, 2022b; Chen et al., 2018; Chen and Qi, 2016). C-corporations are taxed at the entity level and face double taxation: business income is subject to the corporate tax and then taxed again when it is paid to the owners as dividends. Like S-corporations, C-corporations can shift their income between different tax bases.

Our model replicates important quantitative features of the US economy in terms of income and wealth, the entrepreneurial sector, the distribution of legal forms of business organization, and the composition of tax revenue. Our quantitative analysis highlights that poor entrepreneurs choose to be sole proprietors. Despite operating costs, richer entrepreneurs run their businesses as S-corporations to avoid the social security tax by declaring business income rather than wage income. In addition, they circumvent the double taxation of C-corporations. In line with the empirical evidence, our model predicts that S-corporations are more common than C-corporations among small and medium-sized businesses (Smith et al., 2022). Entrepreneurs with high entrepreneurial talent organize as C-corporations to benefit from the relaxed credit constraint, which allows them to invest more.

To understand how the intensive and extensive margins of tax avoidance affect macroeconomic outcomes and welfare, we perform two counterfactual experiments within the US tax system. The first experiment removes income shifting but allows entrepreneurs to use the extensive margin of tax avoidance by changing the legal form of their businesses. We find that removing the intensive margin of tax avoidance imposes a larger tax burden on entrepreneurs and tightens their budget constraints. Because entrepreneurs cannot shift income to circumvent the double taxation of the corporate and dividend tax, owners of C-corporations switch their legal form despite a deteriorating access to credit. Tighter budget and credit constraints reduce investment and output. The second experiment additionally removes the extensive margin of tax avoidance within the US tax system. Specifically, we rule out tax-motivated reorganizations of businesses by fixing the legal form. Because owners of C-corporations cannot respond to the larger tax burden by changing their legal form, their access to credit remains unchanged such that entrepreneurial investment and output are less negatively affected compared to the first experiment. Since taxes cannot be avoided by entrepreneurs, a lower social security tax is required to finance pension benefits. Therefore, eliminating tax avoidance generates welfare gains in the aggregate but

welfare effects differ across occupations. Whereas workers and sole proprietors experience welfare gains, corporate entrepreneurs suffer from welfare losses because of the removed tax avoidance opportunities.

Next, we consider a tax reform in which all entrepreneurs are taxed as sole proprietors independent of their legal form of business organization. The equal tax treatment of all entrepreneurs eliminates the benefits from income shifting and tax-motivated choices of legal forms. Consequently, a large share of entrepreneurs run their businesses as C-corporations to improve their access to credit. As a result, entrepreneurial investment and output strongly increase. Since the tax reform removes all channels of tax avoidance and raises aggregate output, the government collects a higher tax revenue that can be redistributed to all households via tax cuts. The tax reform is beneficial for workers and entrepreneurs and generates substantial welfare gains in the aggregate.

In a policy analysis, we study the aggregate and distributional impact of the top marginal income tax rate and explore how tax avoidance affects the trade-off between equity and efficiency. Using our benchmark economy, we find that raising the top marginal tax rate induces entrepreneurs at the top of the income distribution to run their businesses as C-corporations rather than S-corporations because the higher top marginal tax rate reduces the tax advantage of S-corporations relative to C-corporations. Moreover, they engage in income shifting to minimize their tax burden. Due to the improved access to credit experienced by C-corporations, the negative impact of income taxation on aggregate outcomes is dampened. However, the income share held by the top 1% increases. Our findings highlight that tax avoidance weakens the distortionary effects of top income taxation but makes them ineffective at lowering inequality. In contrast, in the tax reform economy in which all channels of tax avoidance are eliminated, increasing the top marginal tax rate reduces inequality at the expense of efficiency. The predictions of our model are in line with Cooper et al. (2016), Smith et al. (2022), and Dyrda and Pugsley (2022b), who report that cutting top marginal income tax rates in the 1980s induced income shifting and a switch from C-corporations to pass-through businesses. Our findings suggest that accounting for entrepreneurial tax avoidance is important when assessing the welfare effects of income tax reforms.

Related literature. Our paper builds on different strands of the literature. First, our study contributes to the analysis of optimal top marginal tax rates, e.g., Kindermann and Krueger (2022), and Badel et al. (2020). Heathcote and Tsujiyama (2021), Heathcote et al. (2020), Heathcote et al. (2017), Guner et al. (2016), Bakış et al. (2015), Diamond and Saez (2011), and Erosa and Koreshkova (2007) discuss the optimal progressivity of the income tax schedule. All these studies abstract from entrepreneurs, who are concentrated at the top of the income distribution. Quadrini (2000) and Cagetti and De Nardi (2006) show that models incorporating entrepreneurship and financial frictions can better explain macroeconomic patterns such as wealth inequality. Building on this literature,

Brüggemann (2021) and Ge (2023) analyze dynamic general equilibrium models with incomplete markets and occupational choice to derive the optimal taxation of top income earners. Brüggemann (2021) reports a welfare-maximizing top marginal tax rate of 60%. In a model with entrepreneurial activity, Imrohoroglu et al. (2023) argue that raising the progressivity of the income tax schedule is more effective than increasing the top marginal tax rate. In a model with occupational choice, Bohacek and Zubricky (2012) report a flat tax reform to be welfare improving for workers as well as entrepreneurs.

All these papers abstract from tax avoidance, which is the focus of our paper.[1] The important role of tax avoidance has been addressed by Piketty et al. (2014), who provide empirical evidence on the decomposition of the total behavioral response of top incomes to marginal tax rates. Landier and Plantin (2017), Uribe-Teran (2021), and Gorea (2014) address tax avoidance in dynamic models by assuming that agents have access to a costly tax avoidance technology. We contribute to this literature by modeling the micro-foundations of tax avoidance as we allow entrepreneurs to optimally reduce their tax burden.

Our micro-foundation of tax avoidance builds on the earlier literature that studies the entrepreneurial choice of incorporation and the role of taxation and tax distortions in this context, see, among others, Gordon and Slemrod (1998), Mackie-Mason and Gordon (1997), Gordon and MacKie-Mason (1994). Bilicka and Raei (2023) apply an industry equilibrium model in which the legal form of business organization is an endogenous choice to study how differential tax treatments distort aggregate output. Chen et al. (2018) analyze the impact of the corporate tax on the entrepreneurial choice of business organization and unemployment within a dynamic stochastic occupational choice model.[2] Our paper is most closely related to Dyrda and Pugsley (2022a), who develop a quantitative dynamic general equilibrium model with a fixed share of entrepreneurs choosing whether to run a pass-through business or a C-corporation. They study the optimal design of the labor and business tax and find that the progressivity of the labor tax scheme should rise and that the uniform business income tax should be set to 31%. Dyrda and Pugsley (2022b) explore the effects of tax reforms using a dynamic general equilibrium model with an endogenous choice of legal form. We contribute to this literature by focusing on the different channels of tax avoidance. While Chen et al. (2018) and Dyrda and Pugsley (2022a,b) differentiate between pass-through businesses and C-corporations, we explicitly account for the different tax treatments of sole proprietors, S-corporations, and C-corporations. In addition, we allow for entrepreneurial income shifting between different tax bases as an intensive margin of tax avoidance. Importantly, we focus on how the top marginal tax rate affects

[1] A related literature focuses on tax evasion as an illegal way to reduce tax payments, see Slemrod (2007), Maffezzoli (2011), Kotsogiannis and Mateos-Planas (2019), Di Nola et al. (2021), Bhandari et al. (2024), and the references therein. In this paper, we focus on legal strategies to reduce tax liabilities.

[2] In a related paper, Zeida (2022) evaluates the macroeconomic and distributional impact of the Tax Cuts and Jobs Act and allows for an endogenous entrepreneurial choice of legal form in a robustness analysis presented in an online appendix.

the entrepreneurial choice of how to run the business in the presence of tax avoidance.

The rest of the paper is organized as follows. In Section 2, we provide details on legal forms of business organization in the US and discuss evidence on entrepreneurial tax avoidance. Section 3 describes the model. Section 4 explains the calibration procedure. In Section 5, we present the results and discuss how tax avoidance affects aggregate outcomes and welfare. Moreover, we discuss the macroeconomic and distributional impact of higher top marginal income tax rates and the equity-efficiency trade-off in the presence of tax avoidance. The last section concludes.

2 Tax Avoidance and Legal Forms of Organization

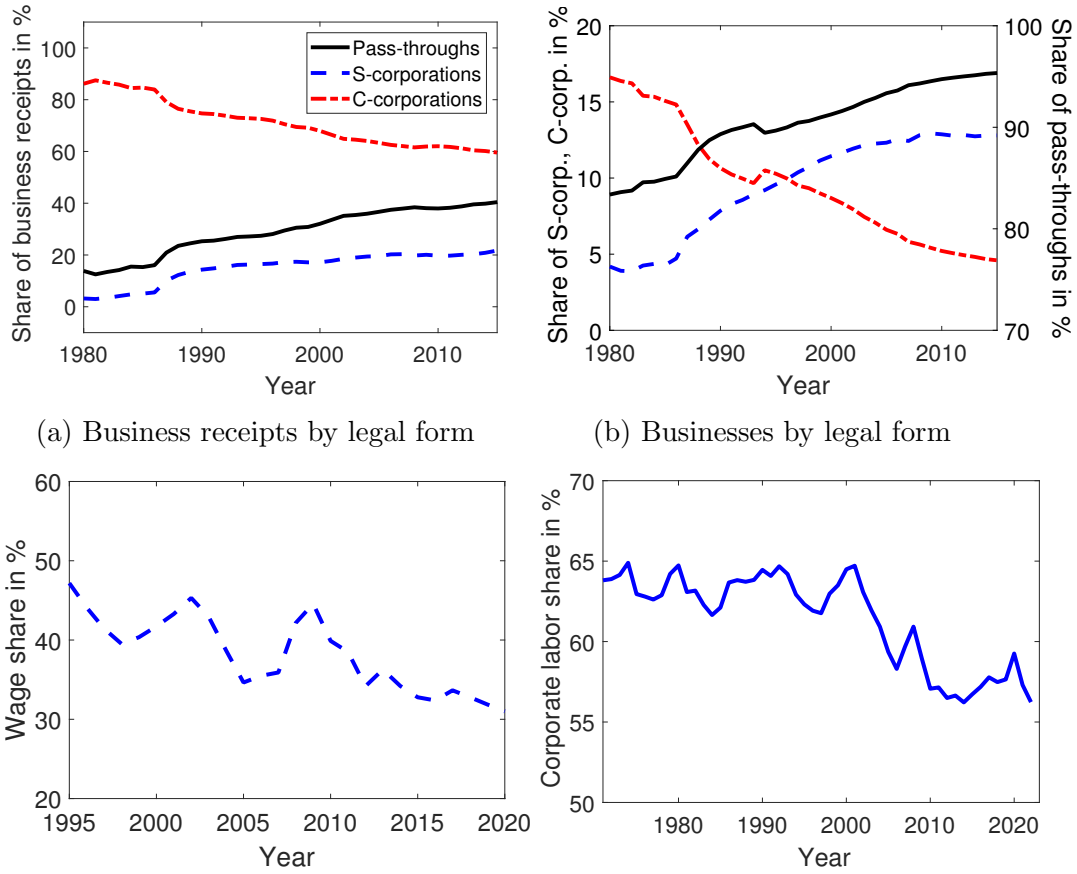
In the following, we focus on the taxation of three main types of business organizations in the US: sole proprietorships and partnerships, C-corporations, and S-corporations. Sole proprietorships and partnerships are unincorporated businesses and involve no taxation at the entity level.[3] Instead, business income is subject to the individual income tax and the social security tax. C-corporations and S-corporations are incorporated businesses. C-corporations are taxed at the entity level and face double taxation: business income is subject to the corporate tax and then taxed again when it is paid to the owners as dividends. In contrast, for S-corporations, business income is passed through to the owners and taxed at the individual level. Therefore, like sole proprietorships, S-corporations belong to the class of pass-through businesses. In contrast to sole proprietorships, owners of S- and C-corporations can shift their income between the two tax bases: wage income and business income.

Sole proprietors and partnerships are the most common form of organization for business owners. Using the Integrated Business Data (IBD) of the Internal Revenue Service (IRS), in the year 2013, around 82% of all businesses are sole proprietorships and partnerships whereas S-corporations and C-corporations amount to 13% and 5% of all businesses, respectively. However, the aggregate statistics provided by the IRS include publicly held C-corporations. As we are interested in the entrepreneurial choices of privately held businesses, we consider the sample of active business owners in the 2013 Survey of Consumer Finance (SCF) and restrict our sample to households headed by males aged 25 to 64. We find that 67% of the entrepreneurs are sole proprietors, 24% run their business as S-corporations, and 9% choose the C-corporation as their legal form of business organization.

We focus on two distinct channels of tax avoidance. First, entrepreneurs can reduce their tax burden through the choice of the legal form of business organization. We label this channel the *extensive margin* of tax avoidance. Second, conditional on incorporating their businesses, entrepreneurs can reduce their tax liabilities by shifting income between

[3] While a sole proprietorship has one owner, a partnership is owned by two or more persons.

Figure 1: Facts on US Businesses by Legal Form of Business Organization



(a) Business receipts by legal form

(b) Businesses by legal form

(c) Owner wage share, S-corporations

(d) Labor share in corporate sector

Notes: Panels (a) and (b) are based on the Integrated Business Data (IBD) of the IRS Statistics of Income and show the percentage share of business receipts and the share of businesses by legal form. Panel (c) uses data from the Corporation Income Tax Returns Complete Report of the IRS Statistics of Income and shows the owner wage share defined as officer compensation/(net income (less deficit) plus officer compensation) for S-corporations. The corporate labor share shown in panel (d) is defined as the compensation of employees in the corporate sector over gross value added in the corporate sector using Table 1.14 of the National Income and Product Accounts (NIPA) of the Bureau of Economic Analyses.

different tax bases; we label this as the *intensive margin* of tax avoidance.[4]

The extensive margin of tax avoidance. As of 2013, the top marginal income tax in the US was 39.6%. The social security tax amounted to 12.4% for the first $113,700 plus an additional uncapped 2.9% medicare tax and the 0.9% of Affordable Care Act surcharge. On the other hand, the corporate income tax was 35%, and the top dividend tax rate was 23.8%. Cooper et al. (2016) point out that not only the statutory but also the average effective tax rate on corporate income is larger than the average effective tax rate on pass-through business income. Therefore, entrepreneurs can reduce their tax burden by running their businesses as S-corporations rather than C-corporations.

The predominance of pass-through businesses started after the Tax Reform Act of 1986 (TRA86). The reform reduced the top personal tax rate from 50% to 28%, creating tax incentives for business owners to reorganize from C-corporation to S-corporation. Figure 1a shows that in the early 1980s about 86% of business receipts were generated by C-corporations, including the large publicly held corporations, whereas in 2020 it amounted to about 60%. The share of business receipts of S-corporations increased from 3.2% to 21%. Figure 1b illustrates the significant increase in the share of S-corporations, which is reflected in the overall rise of pass-through businesses.[5] Cooper et al. (2016) argue that if the share of pass-through businesses would have remained at its 1980s level, the average tax rate on total business income would have been 28% rather than 24% and tax revenue would have been substantially higher. Dyrda and Pugsley (2022b) use firm-level administrative data and show that tax reforms are associated with a significant reorganization between the legal forms. In a recent empirical contribution, Dyrda and Pugsley (2024) highlight that the TRA86 explains not only the sharp increase in pass-throughs but also their continued rise in the 2000s.

The intensive margin of tax avoidance. Incorporated business owners can reduce their tax liabilities by shifting income between wage income and business income. Owners of S-corporations are inclined to declare their income as business income to avoid the social security tax. In contrast, under the fiscal regime in 2013, owners of C-corporations have incentives to pay themselves wage income to avoid the double taxation of business income implied by the corporate and dividend taxes. However, the IRS requires S-corporations

[4]C-corporations can also retain earnings to invest in their businesses to relax their credit constraints and to postpone the payment of the dividend tax. Clarke and Kopczuk (2017) show that the ratio of the stock of retained earnings to net income has substantially declined since the 1970s. Moreover, for S-corporations retained earnings are substantially lower than for C-corporations, because S-corporations are privately held while most C-corporations are publicly held. Since we focus on entrepreneurs of privately held businesses, we abstract from retained earnings as a channel of tax avoidance. In our model described in Section 3, the owner of a privately held C-corporation can save distributed profits and use them as collateral for investment.

[5]Similar numbers are reported by DeBacker and Prisinzano (2015), Nelson (2016), Cooper et al. (2016), Clarke and Kopczuk (2017), Kopczuk and Zwick (2020), and Dyrda and Pugsley (2022b).

and C-corporations to pay a *reasonable compensation* to owner-employees who provide services to the corporations (Internal Revenue Service, 2022).

Gordon and Slemrod (1998) and Slemrod (1996) document empirical evidence of substantial income shifting since 1965. Because labor earnings of corporate owners are not available, we follow Nelson (2016) and use data on officer compensation as a measure of business owner wages. Nelson (2016) argues that for S-corporations this is a good proxy because these businesses are actively managed by their owners who can shift their income between business income and wage income. Figure 1c uses data of the IRS Statistics of Income and shows wage income as percentage share of total net income for S-corporations between 1995 and 2020. As also highlighted by Nelson (2016), the share of owner's wage income has decreased over time. Smith et al. (2022) deliver empirical evidence of tax-motivated forces behind this pattern. They identify 183,000 firms switching from C- to S-corporation between 2000 and 2012 and find that the estimated reported labor payments decreased in the switching year by 2.29% of sales. Importantly, the estimated reported profits increased by the same amount. These findings suggest a tax-motivated response: By switching from C-corporation to S-corporation, owners shift their income towards the tax-preferred tax base and pay themselves profits rather than wage income to avoid the social security tax. Overall, Smith et al. (2022) provide evidence that 17.7% of the fall in the corporate labor share shown in Figure 1d can be explained by the growth of S-corporations and the associated reporting response of business owners who shifted their income toward business income.

Top incomes and tax avoidance. The extensive and intensive margins of entrepreneurial tax avoidance have important implications for the income distribution. Cooper et al. (2016) argue that pass-through business income is substantially more concentrated at the top. As of 2014, 69% of the top 1% and more than 84% of the top 0.01% of the income distribution earn some pass-through business income (Smith et al., 2019). A substantial part of the rise in the income share held by the top 1% is driven by the organizational shift to pass-through businesses (Kopczuk and Zwick, 2020). Dyrda and Pugsley (2022b) document that the rise of pass-through businesses explains up to 40% of the increase in the share of pre-tax income of the top 1%. Motivated by these facts, we incorporate the choice of the legal form of business organization and income shifting in an incomplete market model with entrepreneurs building on Cagetti and De Nardi (2006), Quadrini (2000), and Kitao (2008) and use it to study how the top marginal income tax rate interacts with tax avoidance.

3 The Model

3.1 Model Environment

Demographics, preferences, and occupations. Households go through two life stages, young and old. They age stochastically with probability ρ_R. Retired old households receive a pension, die with probability ρ_D and are immediately replaced by newborn young households so that the fraction of young households is held constant at $\frac{\rho_D}{\rho_R+\rho_D}$.

Households are heterogeneous in wealth a, working ability ε, and entrepreneurial talent θ. ε and θ follow an exogenous stochastic process described by the Markov chain $\Gamma(\varepsilon', \theta'|\varepsilon, \theta)$. Young households decide every period whether to be a worker or to be an entrepreneur.

Preferences are given by $u(c, \ell)$ where c denotes consumption and ℓ refers to working hours. We normalize the total time endowment to one so that $\ell \in [0, 1]$. Workers W derive utility from consumption and disutility from their working hours. We assume that entrepreneurs do not receive disutility from managing their businesses and set their working hours to zero in their utility function.[6]

Entrepreneurs choose from three legal forms of business organization: EP (sole proprietorship), ES (S-corporation), or EC (C-corporation). We refer to the former two legal forms (EP and ES) as pass-through businesses. The occupation and legal form is denoted by $o \in \{W, EP, ES, EC\}$. Switching the occupation or the legal form incurs a utility cost $\xi_{z_-,o}$ where $z_- \in \{W, EP, ES, EC, R\}$ denotes the status in the previous period.[7]

Technology, costs, and financial constraints. The economy consists of two production sectors: an entrepreneurial sector consisting of businesses (EP, ES, and EC) run by entrepreneurial households and a non-entrepreneurial sector.

Entrepreneurs with talent θ produce outputs according to a decreasing returns to scale technology,

$$f(\theta, k, n) = \theta(k^\gamma n^{1-\gamma})^v, \tag{1}$$

where $\gamma \in (0, 1)$ is the share of capital in the production function and $v \in (0, 1)$ is the span-of-control parameter. Entrepreneurs invest in capital k and hire labor n (in efficiency units of labor supplied by workers). The operating profit is given by

$$f(\theta, k, n) - (r + \delta)\, k - wn,$$

where δ is the capital depreciation rate, r is the rental rate of capital, w is the wage paid for an efficiency unit of hired labor, and the price of output is normalized to one.

[6] This assumption is in line with Hurst and Pugsley (2017) who provide evidence that for a majority of small business owners "being their own boss" was the primary reason for becoming an entrepreneur.

[7] $z_- = R$ indicates a newborn household. We assume that $\xi_{z_-,o}=0$ for $z_-=o$ or $z_- = R$, and $\xi_{z_-,o} > 0$ otherwise.

In contrast to being a sole proprietor, running an S-corporation or C-corporation involves operating costs κ^{ES} and κ^{EC}, respectively. Owners of S-corporations (C-corporations) can shift their income between different tax bases and declare a share ϕ^{ES} (ϕ^{EC}) as wage income and the remaining part as business income. For S-corporations, only wage income is subject to social security taxation such that the owner can avoid taxes by declaring income as business income. However, tax avoidance generates a convex cost $C^{ES}\left(1-\phi^{ES}\right)$ reflecting the IRS requirement for reasonable compensation of owners-employees (Internal Revenue Service, 2022). For C-corporations, business income is subject to the corporate tax and the dividend tax. Owners of C-corporations can avoid this double taxation by declaring their income as wage income. However, similar to S-corporations, there is an increasing and convex cost of tax avoidance $C^{EC}\left(\phi^{EC}\right)$. We assume that the costs κ^{ES}, κ^{EC}, C^{ES} and C^{EC} are tax-deductible as business expenses.

In the non-entrepreneurial (NE) sector, firms operate competitively with constant returns to scale technology:[8]

$$F(K^{NE}, N^{NE}) = \left(K^{NE}\right)^{\alpha}\left(N^{NE}\right)^{1-\alpha}, \tag{2}$$

where $0 < \alpha < 1$ is the capital share, and K^{NE} and L^{NE} are capital and labor inputs, respectively.

Given the value of their assets a, households choose their future asset level a' facing a borrowing constraint, $a' \geq 0$. Entrepreneurial households can borrow from a single financial intermediary that behaves competitively and earns zero profit and repay their debt at the end of the period. Due to the partial enforceability of credit contracts, entrepreneurs pledge their private assets as collateral and can borrow up to a fraction λ of their current wealth a to invest in capital: $k \leq \lambda a$, where $\lambda \in \{\lambda^{EP}, \lambda^{ES}, \lambda^{EC}\}$ depends on the legal form of business organization. It is well documented that C-corporations have better chances of attracting external capital than pass-through businesses (Chen and Qi, 2016; Dyrda and Pugsley, 2022b). We capture this stylized fact in a parsimonious way by assuming that the collateral requirement is lower for entrepreneurs who run their businesses as C-corporations, $\lambda^{EP} = \lambda^{ES} \leq \lambda^{EC}$.

Government. The government raises personal income, corporate, and dividend taxes to finance public spending G. Pension benefits B are financed via social security taxation. The personal income tax liability after paying social security is given by $T^i(y)$ where y is declared personal income after deductibles. Following Heathcote et al. (2017) and Imrohoroglu et al. (2023), we consider the following tax schedule:

$$T^i(y) = \begin{cases} y - \lambda_i y^{1-\tau_i} & \text{if } y < y_h, \\ \tau_h\left(y - y_h\right) + y_h - \lambda_i y_h^{1-\tau_i} & \text{if } y \geq y_h. \end{cases} \tag{3}$$

[8]The non-entrepreneurial firms correspond to large public C-corporations. In the model, we assume that this sector does not face financial constraints.

The parameter τ_i specifies the progressivity of the income tax schedule whereas the parameter λ_i determines the average income tax level. τ_h is the marginal tax rate for incomes exceeding y_h.

We consider a flat social security tax that is proportional to labor income denoted by y_l up to an income cap $\bar{y}_s$:

$$T^s(y_l) = \tau_s \min\{y_l, \bar{y}_s\}. \tag{4}$$

The marginal social security tax rate is zero for gross labor incomes above this cap. The corporate tax on declared business income y_c is given by $T^c(y_c) = \tau_c y_c$. Corporate profits paid out as dividends d are subject to the dividend tax $T^d(d) = \tau_d d$, which is assumed to be linear following Dyrda and Pugsley (2022a).

3.2 Decisions

At the beginning of each period, given assets a, their previous status z_-, and after observing their idiosyncratic working ability ε and entrepreneurial talent θ, young households choose their occupation and legal form of business organization according to:

$$\mathcal{V}(a, \varepsilon, \theta, z_-) = \max_{o \in \{W, EP, ES, EC\}} \left\{ V^o(a, \varepsilon, \theta) - \xi_{z_-, o} \right\}, \tag{5}$$

where V^o is the value of the occupation/legal form o.[9] $\xi_{z_-,o}$ is the utility cost associated with switching from z_- to o.

Worker. A worker chooses consumption c, labor supply ℓ, and savings a'. The worker's value function is defined as:

$$V^W(a, \varepsilon, \theta) = \max_{c, a', \ell} \left\{ u(c, \ell) + \beta(1 - \rho_R) \mathbb{E}_{\varepsilon', \theta' | \varepsilon, \theta} \left[\mathcal{V}(a', \varepsilon', \theta', W) \right] + \beta \rho_R V^R(a') \right\} \tag{6}$$

subject to

$$y^W = w\varepsilon\ell - T^s(w\varepsilon\ell) + ra, \tag{7}$$

$$c + a' = y^W + a - T^i\left(y^W\right), \tag{8}$$

$$a' \geq 0, \tag{9}$$

$$\ell \in [0, 1].$$

$V^R(a')$ denotes the value of retirement and is defined later in the text. Eq. (7) defines the worker's personal income y^W consisting of wage income $w\varepsilon\ell$ net of social security taxes and income from renting out assets ra. Personal income y^W is subject to the personal

[9] For numerical stability, we introduce a small i.i.d. preference shock to the occupational choice when solving the model, see Appendix A.1.

income tax, which is reflected in the budget constraint Eq. (8). Eq. (9) states the worker's borrowing constraint.

Sole proprietor. Entrepreneurs choose consumption, savings, and the capital and labor inputs in production, k and n. The value function of a sole proprietor is given as:

$$V^{EP}(a,\varepsilon,\theta) = \max_{c,a',k,n} \left\{ u(c,0) + \beta(1-\rho_R)\,\mathbb{E}_{\varepsilon',\theta'|\varepsilon,\theta}\left[\mathcal{V}(a',\varepsilon',\theta',EP)\right] + \beta\rho_R V^R(a') \right\} \quad (10)$$

subject to

$$\pi^{EP} = f(\theta,k,n) - (r+\delta)\,k - wn, \quad (11)$$
$$y^{EP} = \pi^{EP} - T^s(\pi^{EP}) + ra, \quad (12)$$
$$c + a' = y^{EP} - T^i\left(y^{EP}\right) + a, \quad (13)$$
$$k \leq \lambda^{EP} a,\ a' \geq 0, \quad (14)$$

Eq. (11) defines business profits as the difference between revenue and input costs. Business profits are passed through to the business owner and are taxed at the social security tax, Eq. (12). Personal income y^{EP} is subject to the income tax as reflected in Eq. (13). Eq. (14) states the credit and borrowing constraints.

S-corporation. Owners of S-corporations face operating costs κ^{ES} but have the option to shift income between different tax bases. Their value function is given as:

$$V^{ES}(a,\varepsilon,\theta) = \max_{c,a',k,n,\phi^{ES}} \left\{ u(c,0) + \beta(1-\rho_R)\,\mathbb{E}_{\varepsilon',\theta'|\varepsilon,\theta}\left[\mathcal{V}(a',\varepsilon',\theta',ES)\right] + \beta\rho_R V^R(a') \right\}$$

subject to

$$w^{ES} = \phi^{ES}\left[f(\theta,k,n) - (r+\delta)\,k - wn\right], \quad (15)$$
$$\pi^{ES} = \left(1-\phi^{ES}\right)\left[f(\theta,k,n) - (r+\delta)\,k - wn\right], \quad (16)$$
$$y^{ES} = \pi^{ES} + w^{ES} - T^s(w^{ES}) + ra, \quad (17)$$
$$c + a' = y^{ES} - C^{ES}\left(1-\phi^{ES}\right) - \kappa^{ES} - T^i\left(y^{ES} - C^{ES}\left(1-\phi^{ES}\right) - \kappa^{ES}\right) + a, \quad (18)$$
$$k \leq \lambda^{ES} a,\ a' \geq 0, \quad (19)$$
$$0 \leq \phi^{ES} \leq 1.$$

The owner of an S-corporation reports the fraction ϕ^{ES} of $f(\theta,k,n)-(r+\delta)\,k-wn$ as wage income w^{ES} and $\left(1-\phi^{ES}\right)$ as business income π^{ES}. Eq. (17) derives the entrepreneur's taxable income consisting of business income, wage income, and income from renting out assets. Because only wage income is subject to social security taxation, the entrepreneur has incentives to shift her income towards business income to avoid the social security tax. However, tax avoidance generates a convex cost $C^{ES}\left(1-\phi^{ES}\right)$. The entrepreneur's

income y^{ES} is subject to the personal income tax. We assume that the operating costs and the costs of tax avoidance are tax-deductible as business expenses (Eq. 18).

C-corporation. Owners of C-corporations face operating costs κ^{EC} and double taxation as their business is taxed at the entity level. Their maximization problem is given as:

$$V^{EC}(a,\varepsilon,\theta) = \max_{c,a',k,n,\phi^{EC}} \left\{ u(c,0) + \beta(1-\rho_R)\,\mathbb{E}_{\varepsilon',\theta'|\varepsilon,\theta}\left[\mathcal{V}(a',\varepsilon',\theta',EC)\right] + \beta\rho_R V^R(a') \right\}$$

subject to

$$w^{EC} = \phi^{EC}\left[f(\theta,k,n) - (r+\delta)k - wn\right], \tag{20}$$

$$\pi^{EC} = \left(1-\phi^{EC}\right)\left[f(\theta,k,n) - (r+\delta)k - wn\right], \tag{21}$$

$$y^{EC} = (1-\tau_c)\,\pi^{EC} + w^{EC} - T^s(w^{EC}) + ra, \tag{22}$$

$$\begin{aligned} c + a' = {} & y^{EC} - \tau_d(1-\tau_c)\,\pi^{EC} - C^{EC}\left(\phi^{EC}\right) - \kappa^{EC}, \\ & - T^i\left(w^{EC} - T^s(w^{EC}) + ra - C^{EC}\left(\phi^{EC}\right) - \kappa^{EC}\right) + a, \end{aligned} \tag{23}$$

$$k \le \lambda^{EC} a,\ a' \ge 0, \tag{24}$$

$$0 \le \phi^{EC} \le 1.$$

The owner of a C-corporation reports a fraction ϕ^{EC} of $f(\theta,k,n)-(r+\delta)k-wn$ as wage income w^{EC}. The remaining fraction $1-\phi^{EC}$ is declared as business income π^{EC}. Eq. (22) highlights that wage income is subject to social security taxation while business income is taxed at the corporate tax rate τ_c. Double taxation occurs because net business income is distributed as dividends to the business owner and then taxed again at the dividend tax rate τ_d, Eq. (23). To avoid double taxation, owners of C-corporations may shift their income towards wage income. However, similarly to S-corporations, there is an increasing and convex cost of tax avoidance $C^{EC}\left(\phi^{EC}\right)$. As for S-corporations, operating costs and tax avoidance costs are tax-deductible. Eq. (24) highlights the collateral constraint of C-corporations.

Retiree. The problem of a retiree amounts to choosing consumption c and savings a' according to the following maximization problem:

$$V^R(a) = \max_{c,a'} \left\{ u(c,0) + \beta(1-\rho_D)\,V^R(a') + \beta\rho_D \mathbb{E}_{\varepsilon',\theta'}\left[\mathcal{V}(a',\varepsilon',\theta',R)\right] \right\} \tag{25}$$

subject to

$$c + a' = b\bar{y}_l + (1+r)\,a - T^i\left(b\bar{y}_l + ra\right), \tag{26}$$

$$a' \ge 0. \tag{27}$$

The pension income of the retiree is a fraction b of the average wage income of young households $\bar{y}_l$. Incomes from pension and renting out assets are subject to the personal income tax (Eq. (26)). The expectation operator $\mathbb{E}_{\varepsilon',\theta'}$ signifies the expectation over the value function $\mathcal{V}(a',\varepsilon',\theta',R)$ in terms of productivity shocks ε' and θ' drawn from the stationary distribution of the process $\Gamma(\varepsilon',\theta'|\varepsilon,\theta)$ when the retiree is reborn as young.

3.3 Equilibrium

Let $s \equiv (a, \varepsilon, \theta, z, z_-)$ with $z, z_- \in \{W, EP, ES, EC, R\}$. A stationary equilibrium is a list of prices $\{r, w\}$, policy functions $\{c(s), a'(s), \ell(s), k(s), n(s), \phi(s)\}$ and an invariant distribution over the states, $\mu(s)$, such that

1. The policy functions $\{c(s), a'(s), \ell(s), k(s), n(s), \phi(s)\}$ solve the household maximization problem described in Section (3.2) with $z = o(a, \varepsilon, \theta, z_-)$ for young households and $z = R$ for old households.

2. Capital and labor markets clear:

$$K^{NE} + \int \mathcal{I}_E(s) k(s) d\mu(s) = \int a d\mu(s),$$

$$N^{NE} + \int \mathcal{I}_E(s) n(s) d\mu(s) = \int \mathcal{I}_W(s) \ell(s) \varepsilon d\mu(s).$$

   where $\mathcal{I}_E(s) = 1$ if $z \in \{EP, ES, EC\}$, and $\mathcal{I}_W(s) = 1$ if $z = W$.

3. Competitive factor pricing holds:

$$r = \alpha \left(\frac{K^{NE}}{N^{NE}}\right)^{\alpha-1} - \delta, \qquad w = (1-\alpha) \left(\frac{K^{NE}}{N^{NE}}\right)^{\alpha}.$$

4. The government budget constraints are satisfied:

$$\int \left[T^i(s) + T^c(s) + T^d(s)\right] d\mu(s) = G,$$

$$\int T^s(s) d\mu(s) = B,$$

   where G is government spending and B is total pension expenditure defined as

$$B = b\bar{Y} \int \mathcal{I}_R(s) d\mu(s),$$

   where b is the replacement rate, $\mathcal{I}_R(s) = 1$ if $z = R$ and $\bar{Y}$ is the average wage income of young households.

5. The invariant distribution satisfies the fixed point equation $\mu = \mathcal{H}(\mu)$, where $\mathcal{H}$ is a one-period-ahead transition operator such that $\mu' = \mathcal{H}(\mu)$.

4 Calibration and Model Fit

We calibrate our model to replicate important empirical features of the US economy, including *(i)* the share of entrepreneurs and the distribution of legal form of business organization, *(ii)* the share of entrepreneurial income declared as wage income, *(iii)* inequality

Table 1: Externally Calibrated Parameters

Parameter	Description	Value	Source
Demographics			
ρ_R	Prob. of retiring	0.022	Brüggemann (2021)
ρ_D	Prob. of dying	0.089	Brüggemann (2021)
Working ability			
ρ_ε	Persistence	0.94	Kitao (2008)
σ^2_ε	Variance	0.02	Kitao (2008)
Preferences			
σ_1	Risk aversion	1.50	Standard value
σ_2	Inverse of Frisch elasticity	1.70	Frisch elasticity 0.59
Production			
α	Capital share in non-corporate sector	0.33	Standard value
δ	Capital depreciation	0.06	Standard value
Taxation			
b	Replacement rate, pensions	0.400	OECD (2013)
τ_c	Corporate tax rate	0.350	US Tax code (2013)
τ_d	Dividend tax rate	0.181	SCF (2013) and TAXSIM
τ_h	Top marginal tax rate	0.396	US Tax code (2013)
$\bar{y}_s/\bar{y}_l$	Social security cap (in terms of average labor income)	2.283	SSA and QCEW

measures such as the share of wealth held by entrepreneurs, and *(iv)* the entrepreneurial employment shares by firm size.

Our main data source is the Survey of Consumer Finance in 2013 (SCF). We restrict our sample to households headed by males aged 25 to 64 and define entrepreneurs as active business owners (ABO). In line with our theoretical model, we consider three categories of business organizations: (1) Sole proprietors EP, which include both sole-proprietors and partnerships, (2) S-corporations ES, and (3) C-corporations EC, which include C-corporations and other corporations. We use the Business Dynamics Statistics (BDS) data for information on the exit rate from entrepreneurship. To construct data targets related to the employment distribution across firm-size bins, we use the Statistics of US Businesses (SUSB).

4.1 Calibration Strategy

We calibrate a subset of parameters externally based on the literature or the US tax code, including those governing demographics, working ability, preferences, corporate production, and taxation. The remaining parameters are jointly calibrated by minimizing the distance between a set of data- and model-generated moments. Tables 1 and 2 summarize the externally and internally calibrated parameters, respectively.

Demographics, endowments, and preferences. We set the probability of retiring at $\rho_R = 0.022$ and the probability of dying in retirement at $\rho_D = 0.089$ following Brüggemann

Table 2: Internally Calibrated Parameters

Parameter	Description	Value	Calibration Target
Preferences			
β	Discount factor	0.924	Interest rate
χ	Disutility from working	30.0	Average hours worked
Production			
ν	Span of control	0.89	Employment share by firm size bins
γ	Capital share, entre. sector	0.475	K/Y ratio
Entrepreneurial ability			
μ_θ	Unconditional mean	-0.0305	Share of entrepreneurs in population
ρ_θ	Persistence	0.89	Exit rate from entrepreneurship
σ_θ	Dispersion	0.175	Gini income among entrepreneurs
Switching cost			
ξ	Disutility of occupational/LFO switching	0.195	Transition from C-corp. to pass-through business
Financial Frictions			
$\lambda^{EP}, \lambda^{ES}$	Collateral constraint (Pass-through)	1.50	Share of payroll in S-corp.
λ^{EC}	Collateral constraint (C-corp.)	2.02	Wealth share of all entrepreneurs
Tax avoidance and corp. costs			
κ^{ES}	Operating cost, S-corp.	0.008	Share of S-corp.
κ^{EC}	Operating cost, C-corp.	0.061	Share of C-corp.
ψ^{ES}	Intercept of $C(\cdot)$, S-corp.	0.131	Share of income declared as wage, S-corp.
ψ^{EC}	Intercept of $C(\cdot)$, C-corp.	4.50	Share of income declared as wage, C-corp.
Superstar shock			
ϵ^*	Value of the shock	12.20	Gini income in population
p_{ϵ^*}	Probability of becoming a superstar	0.85%	Share of entrepreneurs at top 10% income distribution
$\bar{p}_{\epsilon^*}$	Probability of dropping back	12.0%	Share of entrepreneurs at top 10% wealth distribution
Taxation			
λ_i	Income tax, level	0.796	Tax revenue to GDP
τ_i	Income tax, progressivity	0.127	Share in the top income tax bracket
τ_s	Social security tax	0.133	Social security budget constraint

(2021). Working ability ε is defined by an AR(1)-process:

$$\log(\varepsilon_{t+1}) = \rho_\varepsilon \log(\varepsilon_t) + \eta_{\varepsilon,t+1},$$

where $\eta_{\varepsilon,t+1} \sim N(0, \sigma_\varepsilon^2)$ is an i.i.d. innovation term. We take the values for the persistence parameter $\rho_\varepsilon = 0.94$ and the variance of the innovation $\sigma_\varepsilon^2 = 0.02$ from Kitao (2008).

The entrepreneurial talent θ is modeled as an AR(1)-process:

$$\log(\theta_{t+1}) = \mu_\theta + \rho_\theta \log(\theta_t) + \nu_{\theta,t+1},$$

where $\nu_{\theta,t+1} \sim N(0, \sigma_\theta^2)$ is the innovation term. The long-run unconditional mean μ_θ is pinned down by matching the share of entrepreneurs in the data. The persistence ρ_θ and the dispersion σ_θ are calibrated to replicate the exit rate of entrepreneurs and the Gini coefficient of entrepreneurial income. The calibrated values $\rho_\theta = 0.89$ and $\sigma_\theta = 0.175$ are in line with other estimates in the literature. For example, Chen et al. (2018) calibrate the parameters of the AR(1)-process to the fraction of entry firms and the employment fraction of entry firms. Their estimated persistence of 0.821 and standard deviation of 0.245 are similar to what we find. Dyrda and Pugsley (2022b) set the persistence of entrepreneurial productivity to 0.9. and the dispersion to 0.315.[10]

Since we study the aggregate and distributional consequences of taxing high income earners, it is important to match the occupational distribution at the top of the income distribution. Although we focus on entrepreneurial responses to tax changes, we also need to match the empirical observation that many top earners are workers. To generate high-income workers in our model, we assume a superstar shock on worker ability following Brüggemann (2021) and Kindermann and Krueger (2022). Specifically, with probability p_{ϵ^*} an ordinary worker becomes a superstar and her ability becomes ϵ^*, which is significantly higher than the mean ability among ordinary workers. With probability $\bar{p}_{\epsilon^*}$ a superstar worker drops back to a random ordinary state. We calibrate the parameters ϵ^*, p_{ϵ^*}, and $\bar{p}_{\epsilon^*}$ to match the Gini coefficient of income and the share of entrepreneurs at the top 1% of the income and wealth distributions.

The utility function is assumed as:

$$u(c, \ell) = \frac{c^{1-\sigma_1}}{1-\sigma_1} - \chi \frac{\ell^{1+\sigma_2}}{1+\sigma_2}$$

The coefficient of relative risk aversion σ_1 is assumed to be 1.5 which is standard in the macroeconomic literature. The parameter σ_2 is set to 1.7 to match a Frisch elasticity of 0.59. The weight of the disutility of labor χ is calibrated internally to match average hours worked. The discount factor β pins down the interest rate in the economy.

[10] Buera and Shin (2013) assume that entrepreneurs draw a new productivity realization from a Pareto distribution and retain the previous one with probability 0.894.

We make the parsimonious assumption that $\xi_{z_-,o} = \xi$ for $z_- \neq o$ and $z_- \neq R$. The parameter ξ is calibrated to match the transition rate from C-corporations to pass-through businesses taken from Bhandari and McGrattan (2020).

Technology, costs, and financial constraints. The non-entrepreneurial sector operates with a Cobb-Douglas production function given in Eq. (2). The parameter α represents the capital share and is set to 0.33, and the capital depreciation δ is 6%, which is standard in the macroeconomic literature (Stokey and Rebelo, 1995).

The entrepreneurial sector uses a decreasing return to scale technology specified in Eq. (1). The capital share γ is calibrated to match the capital-to-output (K/Y) ratio. We compute the K/Y ratio as fixed capital and consumer durables relative to GDP based on 2013 data provided by the Federal Reserve St. Louis. The span of control parameter ν influences the size of entrepreneurial businesses. We discipline ν by targeting the employment shares by business size. Specifically, we group firms into four bins and compute the employment share in each bin. Using data from the SUSB, we focus on firms with fewer than 500 employees to capture the characteristics of entrepreneurial businesses. The four bins are, respectively, firms with 0-4 employees, 5-9 employees, 10-19 employees, and 20-499 employees. 62.11% of firms belong to the first bin, 17.24% to the second bin, 10.43% the third bin, and 10.22% belong to the fourth bin. In the model, we group firms into bins based on the firm size distribution found in the SUSB and use the corresponding employment shares as calibration targets.

S- and C-corporations face operating costs κ^{ES} and κ^{EC} affecting the share of sole-proprietors, S-corporations, and C-corporations among entrepreneurs, which we use as internal calibration targets. We assume quadratic costs of tax-motivated income shifting: $C^{ES}(1-\phi) = \psi^{ES}(1-\phi)^2$ and $C^{EC}(\phi) = \psi^{EC}\phi^2$. The parameters ψ^{ES} and ψ^{EC} are calibrated internally to match the share of income reported as wage income within S- and C-corporations. We rely on tax return tables in 2013 provided by the IRS Statistics of Income and use the data on officer compensation as a proxy for wage income following Nelson (2016). We compute the wage share as the ratio of officers' compensation to net income less deficit.

The collateral constraint faced by entrepreneurs captures the financial frictions in raising external credit. We calibrate $\lambda^{EP} = \lambda^{ES}$ and λ^{EC} internally to match the entrepreneurial share of total wealth and the share of payroll of pass-through businesses. The intuition behind these targets is that a tighter collateral constraint increases the accumulation of wealth by entrepreneurs. Moreover, λ^{ES} and λ^{EC} affect the relative size of C-corporations vs. pass-through businesses; a lower λ^{ES} implies that pass-through businesses are, on average, smaller and, thus, have a smaller share of payroll than C-corporations.[11] The recovered value for pass-through businesses is 1.5, which is in line with, e.g., Kitao

[11] Our approach similar to the one of Chen et al. (2018), who use the employment share of C-corporations to identify the collateral constraint.

(2008) and Brüggemann (2021). The value for C-corporations is 2.02 implying better access to credit as documented in the literature.[12]

Tax schedule. The income tax function given in Eq. (3) is non-linear up to the income threshold y_h and linear with slope τ_h for incomes greater than y_h. We calibrate the parameter τ_h to the statutory marginal tax rate for the top income bracket, which equals 0.396 in 2013. The level of the income tax λ_i is internally calibrated to match total tax revenue (excluding social security) as share of GDP based on the Congressional Budget Office (CBO) 2013 fiscal report. The progressivity parameter τ_i is internally calibrated to replicate the fraction of tax returns reaching the top income bracket taken from IRS data.[13]

To determine y_h, we use the following condition that guarantees continuity in the marginal income tax rate (see Ge, 2023):

$$\tau_h = 1 - \lambda_i \left(1 - \tau_i\right) y_h^{-\tau_i}.$$

The corporate tax rate τ_c is set to the statutory level in 2013 of 35%. We set the linear dividend tax rate τ_d to the average marginal dividend income tax computed using TAXSIM based on SCF data. Following Barro and Redlick (2011) and Bhandari and McGrattan (2020), we compute the average marginal dividend tax as follows. Let τ_{di} be the marginal dividend tax of household i, and let $d_i / \sum_i d_i$ be the dividend earnings of household i as a fraction of total dividend earnings. The average marginal dividend tax is $\tau_d = \sum_i \tau_{di} d_i / \sum_i d_i$. Since only owners of C-corporations earn dividends in our model, we restrict the sample accordingly in computing the average marginal dividend tax and find τ_d to be 0.181.[14]

The social security income cap $\bar{y}_s$ is set based on average labor income. According to the Social Security Agency (SSA), the income cap in 2013 is \$113,700. The average annual pay of US workers in 2013 is \$49,808 based on data from the Quarterly Census of Employment and Wages (QCEW). The ratio between the two numbers is 2.283. The social security tax rate τ_s is an equilibrium object that balances the government's pension budget. We get a value of 13.3%, which corresponds well with the US social security tax of 12.4% plus the 2.9% medicare tax.

[12] There are only few papers considering collateral constraints across different legal forms of business organization. Chen et al. (2018) assume that, with an exogenous probability, the firm receives an external finance offer and can raise as much capital as needed. Their calibration implies that C-corporations have a 1.5 higher probability of obtaining external finance than pass-through businesses. For comparison, our calibrated λ^{EC} is 1.35 higher than λ^{ES}.

[13] Our calibrated progressivity of 0.127 falls within the broad range in the literature. For example, Bakış et al. (2015) find τ_i to be 0.17, and Guner et al. (2014) estimate it at 0.053.

[14] We use the same method as Bhandari and McGrattan (2020), who consider data from 2007 and report $\tau_d = 0.133$. Our value is slightly higher because the statutory dividend tax rate was larger in 2013 than in 2007.

The pension benefit replacement rate b is set to 40%, which is the average replacement rate in the US in 2013 (OECD, 2013).

4.2 Model Fit

Table 3 shows the values of the targeted moments, revealing that our model successfully replicates important empirical dimensions of the US economy in 2013. The share of entrepreneurs in the working population and at the top of the income and wealth distribution, the share of entrepreneurs by legal form, and the transition rate from C-corporation to pass-through businesses are matched very well. Importantly, our model generates shares of income declared as wage income for S- and C-corporations that closely replicate their data counterparts. Moreover, the model provides a good fit of the distribution of employment shares by firm size and matches the size of pass-through businesses relative to C-corporations in terms of payroll. The model also replicates the empirical distributional characteristics within and across occupations. Specifically, it matches the share of taxpayers in the top income tax bracket and inequality moments including the Gini coefficient of income in the entire population and among entrepreneurs, the share of wealth owned by entrepreneurs, and the occupations at the top of the income and wealth distribution.

As a validation, Figure 2 and Table 4 show that the model replicates moments of the US economy that are not targeted in our calibration procedure. Figures 2a and 2b display the equilibrium distribution of occupations by quintiles of income and wealth. The model predicts that the share of entrepreneurs is increasing in income and wealth, which is in line with the data. Overall, the model provides a good match of the occupations across income quintiles, in spite of overestimating the share of entrepreneurs in the fifth quintile. A similar pattern appears across quintiles of wealth. Here, the model underestimates the share of entrepreneurs in the lower quintiles. Figures 2c and 2d focus on the top quintile of income and wealth and report sole proprietors, S-corporations, and C-corporations as shares of entrepreneurs. The empirical pattern of the legal form of business organization is very well matched.

Table 4 reveals that our model provides a decent fit of the share of employment in the entrepreneurial sector and replicates pass-through output as share of aggregate output and the average business income of pass-through businesses relative to C-corporations. Importantly, our model delivers a good match of the (untargeted) transition rates from sole proprietorships to C-corporations and from S-corporations to C-corporations as documented in Bhandari and McGrattan (2020) and Dyrda and Pugsley (2024).

With respect to inequality, the model provides a good fit of the ratio of entrepreneurial to worker income. It matches the observed Gini coefficient of wealth and the income and wealth shares over the entire distribution in spite of underestimating the share of wealth held by the top 1%. The model does a good job in replicating tax revenue coming

from different tax sources, however, it overstates the share of income tax revenue and understates the share of dividend tax revenue. We calculate average income tax rates using SCF (2013) and TAXSIM and find that the model matches the average income tax rates of the highest income groups but underestimates the average income tax rates of the income groups at the lower end of the distribution.[15]

Table 3: Targeted Moments

	Data	**Model**	**Data Source**
Aggregates			
Interest rate (%)	1.90	2.12	FRED (1990-2020)
Average hours worked	0.33	0.33	SCF (2013)
K/Y ratio	3.33	3.06	FRED (2013)
Tax revenue (excl. social security) to GDP (%)	16.70	16.60	CBO report (2013)
Entrepreneurial sector			
Share of entrepreneurs (%)	15.16	15.47	SCF (2013)
Sole-prop. as share of entre. (%)	67.36	67.48	SCF (2013)
S-corp. as share of entre. (%)	23.63	24.18	SCF (2013)
C-corp. as share of entre. (%)	9.01	8.34	SCF (2013)
Exit rate from entrepreneurship (%)	9.18	9.51	BDS (2013)
Transition rate from C-corp. to pass-through (%)	2.40	2.64	Bhandari and McGrattan (2020)
Share of payroll in pass-throughs (%)	38.00	35.31	SUSB (2013)
Share of entrepreneurial income declared as wage			
S-corp. (%)	36.27	34.07	IRS (2013)
C-corp. (%)	19.88	20.55	IRS (2013)
Employment share by firm size bins (%)			
Bin 1 (smallest)	10.43	17.85	SUSB (2013)
Bin 2	11.48	13.99	SUSB (2013)
Bin 3	14.18	15.51	SUSB (2013)
Bin 4 (largest)	63.91	52.64	SUSB (2013)
Inequality			
Gini income	0.54	0.57	SCF (2013)
Gini income, entrepreneurs	0.62	0.64	SCF (2013)
Share of entre. in top 10% income (%)	37.71	38.10	SCF (2013)
Share of entre. in top 10% wealth (%)	46.88	52.68	SCF (2013)
Wealth share entre. (%)	53.55	55.81	SCF (2013)
Share of taxpayers in the top income bracket (%)	2.87	2.84	IRS (2013)

Notes: Model outcomes are based on the benchmark calibration.

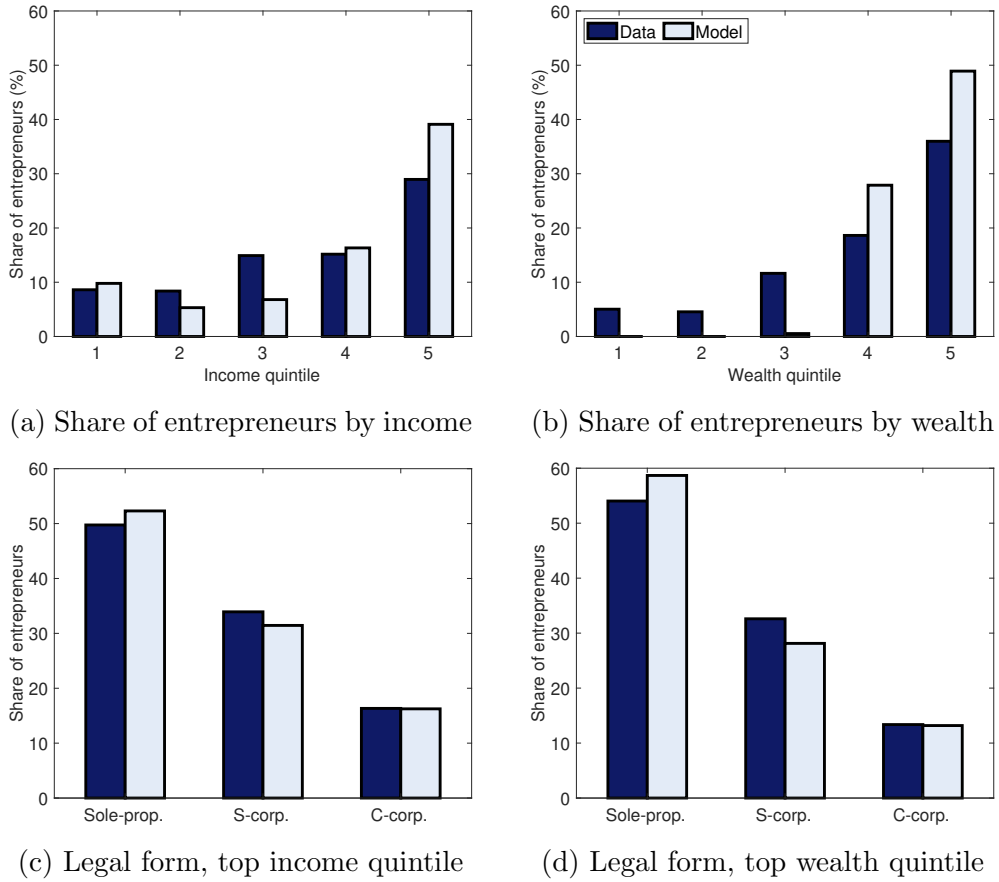
[15]The empirical average income tax rates are comparable to those reported by Guner et al. (2014), who consider the IRS public use tax file from 2000.

Table 4: Untargeted Moments

	Data	**Model**
Entrepreneurial sector		
Share of employment in entrepreneurial sector (%)	71.4	62.98
Pass-through output as share of aggregate output (%)	39.55	39.76
Average business income, pass-through to C-corp.	0.20	0.18
Transition rate from sole prop. to C-corp. (%)	0.9	2.1
Transition rate from S-corp. to C-corp. (%)	2.7	2.7
Inequality		
Gini wealth	0.84	0.82
Average income ratio: entre. to worker	2.60	2.50
Median income rate: entre. to worker	1.56	1.74
Income shares (%)		
Top 1%	19.05	14.27
Top 10%	44.89	55.30
Top 20%	58.71	65.69
Bottom 40%	11.08	12.52
Wealth shares (%)		
Top 1%	33.45	19.76
Top 10%	73.60	64.92
Top 20%	86.20	87.52
Bottom 40%	0.10	0.00
Tax revenue		
Total tax revenue (incl. social security) to GDP (%)	24.07	22.47
Income tax share of revenue (%)	47.44	56.44
Social security tax share of revenue (%)	34.17	26.13
Corporate tax share of revenue (%)	9.88	13.05
Dividend tax share of revenue (%)	8.51	4.38
Average income tax rate by taxable income (%)		
Top 1%	29.27	33.60
P90-P99	25.30	27.91
P50-P90	16.03	8.19
Bottom 50%	6.39	1.12

Notes: Model outcomes are based on the benchmark calibration. For the empirical moments we use the following data: Average business income of pass-through businesses relative to C-corporations and the share of employment in the entrepreneurial sector are taken from Dyrda and Pugsley (2022b) and Davis et al. (2007), respectively. Transition rates are taken from Bhandari and McGrattan (2020). Business receipts of pass-through businesses as share of aggregate business receipts in 2013 are taken from the IBD. Total tax revenue as a share of GDP is based on OECD data in 2012. Empirical tax revenue shares by tax type are taken from Congressional Budget Office (2013). Average income tax rates are computed using SCF (2013) and TAXSIM. All other data moments are based on SCF (2013).

Figure 2: Occupation and Legal Form by Income and Wealth



(a) Share of entrepreneurs by income

(b) Share of entrepreneurs by wealth

(c) Legal form, top income quintile

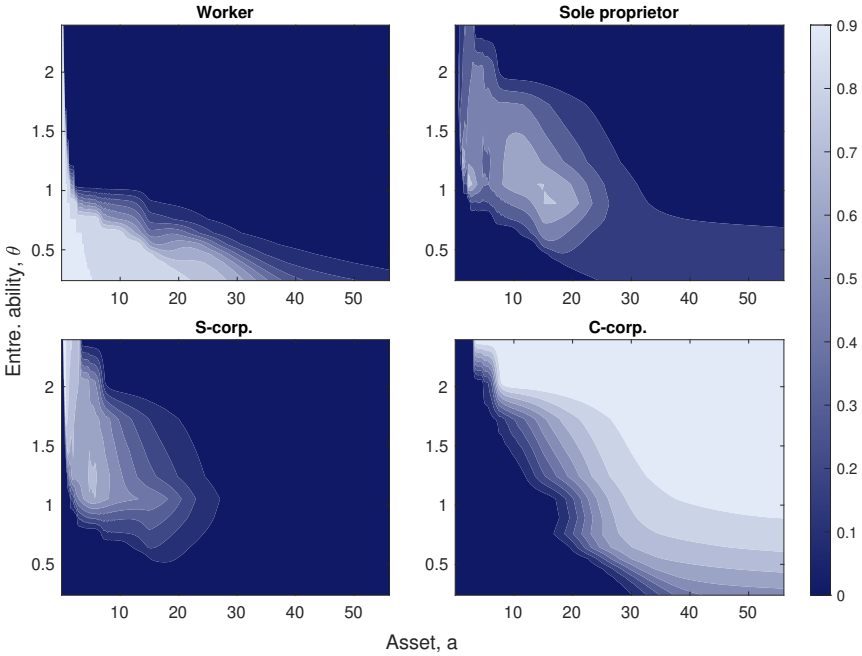
(d) Legal form, top wealth quintile

Notes: Shares of entrepreneurs by income and wealth, and sole proprietors, S-corporations, and C-corporations as shares of entrepreneurs are based on SCF (2013). Model outcomes are based on the benchmark calibration.

5 Results

5.1 Entrepreneurial Decisions and Tax Avoidance

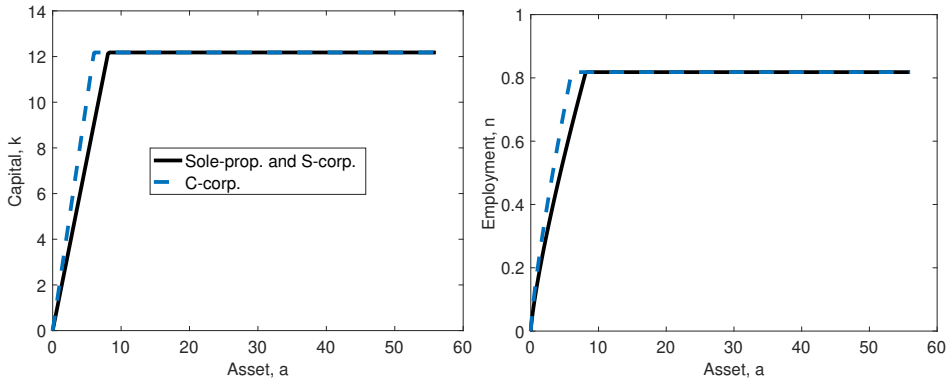
Figure 3: Occupation and Legal Form of Business Organization



Notes: The figure shows the probability distribution of the occupation and legal form of business organization for each level of asset a and entrepreneurial ability θ. We fix the working ability ε at the mean and integrate $o(a, \varepsilon, \theta, z_{-})$ over the previous state z_{-}.

In this section, we analyze the economic mechanisms of tax avoidance and start with a discussion of the policy functions. Figure 3 shows the probability that a household with entrepreneurial talent θ and wealth a (given the average working ability ε) chooses to be a worker or to be an entrepreneur of a sole proprietorship, S-corporation, or C-corporation. For a given level of entrepreneurial talent, households become entrepreneurs only if they hold sufficient wealth. Talented but wealth-poor agents choose to be workers because they are credit-constrained and cannot generate sufficient income from running a business. Among entrepreneurs, only the very talented and wealthy households run their businesses as C-corporations despite higher operating costs and double taxation to take advantage of the relaxed credit constraint, which allows them to invest more (Figure 4a) and to employ more workers (Figure 4b). Compared to owners of C-corporations, entrepreneurs of S-corporations have less wealth; they operate their businesses as S-corporations because they can circumvent double taxation and report a fraction of their income as business income to avoid the social security tax. The least talented entrepreneurs are sole proprietors as they cannot afford to pay the operating costs associated with S-corporations.

Figure 4: Policy Functions - Capital and Employment

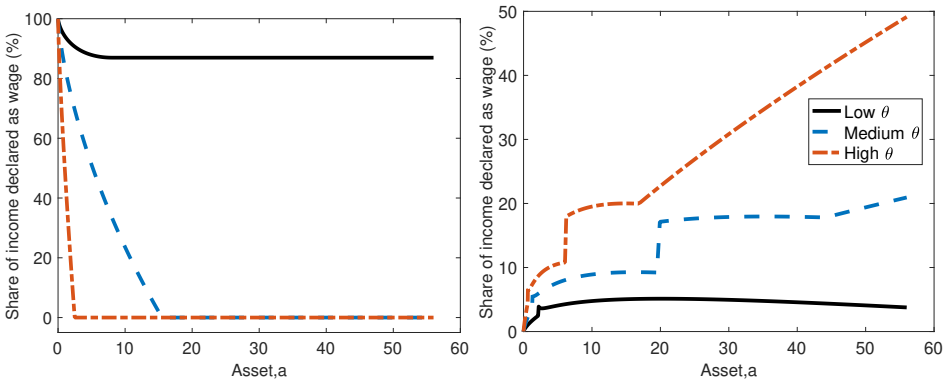


(a) Capital (b) Employment

Notes: Entrepreneurial talent θ is fixed at the mean.

Figure 5 shows how S-corporations (left panel) and C-corporations (right panel) use the intensive margin of tax avoidance. We plot the share of total income declared as wage income as a function of wealth for three different realizations of entrepreneurial ability θ. Owners of S-corporations have an incentive to report their income as business income to avoid the social security tax. However, shifting income between tax bases is costly. Consequently, less talented and less wealthy owners of S-corporations report a larger share of their income as wage income. In contrast, wealthy and talented owners of S-corporations declare all of their income as business income. The right panel of Figure 5 shows how owners of C-corporations shift their income. C-corporations have incentives to declare their income as wage income to avoid double taxation. However, because income shifting is costly, the talented and wealthy owners of C-corporations declare large shares as wage income. Since wealth-poor C-corporations cannot afford the tax avoidance cost, they report a negligible share of their income as wage income. The capped social security tax and the top marginal tax rate become visible in the income shifting of C-corporations. With increasing assets, income rises and once it is beyond the cap $\overline{y}_s$ (see Eq. (4)) the declared share of wage income exhibits a jump increase. It is flat afterward because the owner of the C-corporation avoids the highest top marginal tax rate. Once the top marginal tax rate applies, the wage share monotonically increases with assets.

Figure 5: Policy Functions - Income Shifting



(a) S-corporation (b) C-corporation

Notes: The figures display the policy functions for the share of income declared as wage income by asset level. Low-, medium-, and high-θ correspond to entrepreneurial talent values $\{\bar{\theta} - 0.5\sigma_\theta, \bar{\theta}, \bar{\theta} + 0.5\sigma_\theta\}$ where $\bar{\theta}$ is the mean θ conditional on the legal form (S- or C-corp.).

5.2 The Impact of Tax Avoidance on Macroeconomic Outcomes and Welfare

Counterfactual analysis. To highlight the macroeconomic effects of tax avoidance, we consider the benchmark economy and study two counterfactual experiments. In experiment 1, we remove income shifting as the intensive margin of tax avoidance. Specifically, we impose $\phi^{ES}(a, \varepsilon, \theta) \equiv 1$ such that owners of S-corporations declare all their income as wage income and cannot avoid the social security tax. Moreover, we impose $\phi^{EC}(a, \varepsilon, \theta) \equiv 0$ implying that C-corporations report all their income as business income and cannot avoid the corporate and dividend tax by shifting towards wage income. Importantly, experiment 1 keeps the extensive margin of tax avoidance, i.e., entrepreneurs can engage in tax-motivated switching of their legal form. In experiment 2, we additionally fix the occupation and legal form of business organization at the benchmark economy: $o(a, \varepsilon, \theta, z_-) \equiv o^b(a, \varepsilon, \theta, z_-)$ where $o^b(a, \varepsilon, \theta, z_-)$ denotes the optimal choice in the benchmark economy. Thus, in experiment 2, we eliminate the intensive and extensive margins of tax avoidance. Note, however, that $o(a, \varepsilon, \theta, z_-)$ still depends on assets a such that a change in the distribution of wealth affects occupations and legal forms in equilibrium. In both counterfactual experiments, all parameters are kept at their values of the benchmark economy. Since the social security tax τ_s is an equilibrium outcome, it adjusts such that social security contributions equal total pension expenses.

Table 5 summarizes the long-run effects of experiments 1 and 2. Because the intensive margin of tax avoidance is eliminated, in experiment 1, S-corporation is not chosen as legal form of business organization as it involves operating costs but the opportunity to avoid the social security tax is removed. Eliminating income shifting increases the tax burden of C-

Table 5: The Impact of Tax Avoidance - Counterfactual Experiments

	Counterfactual Experiments			
	Benchmark Tax System		Tax Reform	
	Exp. 1	Exp. 2	Exp. 3	Exp. 4
Impact on prices				
Interest rate (p.p.)	0.04	0.03	-0.54	-0.19
Wage (%)	-0.21	-0.21	3.47	1.20
Impact on aggregates				
Aggregate output (%)	-0.72	-0.35	7.26	1.80
Aggregate capital (%)	-0.78	-0.72	10.07	4.33
Average entrepreneurial capital (%)	-3.58	-1.49	39.77	9.72
Entrepreneurial share of output (p.p)	-0.84	-0.23	11.34	1.22
Impact on taxes				
Total revenue (excl. soc. sec. %)	-0.45	1.57	6.23	-1.51
Social security contributions (%)	-0.21	-0.21	3.47	1.20
Social security tax rate (p.p.)	-0.36	-0.25	-0.85	-0.61
Impact on entrepreneurial sector				
Share of entrepreneurs (p.p.)	0.20	0.05	-0.51	-0.37
Sole prop. as share of entre. (p.p.)	26.36	0.44	-35.24	-0.72
S-corp. as share of entre. (p.p.)	-24.18	-0.31	-24.18	-0.34
C-corp. as share of entre. (p.p.)	-2.18	-0.13	59.41	1.05

Notes: The table shows the outcomes of the counterfactual experiments relative to the benchmark economy either in % or in p.p. Exp. 1 imposes $\phi^{ES}(a,\varepsilon,\theta) \equiv 1$ and $\phi^{EC}(a,\varepsilon,\theta) \equiv 0$ in the benchmark tax system. Exp. 2 additionally fixes the occupation and legal form of business organization at the benchmark economy: $o(a,\varepsilon,\theta,z_-) \equiv o^b(a,\varepsilon,\theta,z_-)$ where $o^b(a,\varepsilon,\theta,z_-)$ denotes the optimal choice in the benchmark economy. Exp. 3 and Exp. 4 refer to a tax reform that taxes all entrepreneurs as sole proprietors. Exp. 4 fixes the occupation and legal form of business organization at the benchmark economy: $o(a,\varepsilon,\theta,z_-) \equiv o^b(a,\varepsilon,\theta,z_-)$. All model and tax parameters are at their benchmark values. The social security tax adjusts such that social security contributions equal total pension expenses. To highlight the effects of eliminating tax avoidance on tax revenue, we do not adjust the income tax parameter λ_i to balance the government budget constraint. Assuming fiscal neutrality does not change the qualitative results except for total tax revenue.

corporations and tightens their budget constraints with adverse effects on entrepreneurial investment. Because entrepreneurs cannot shift income to circumvent the double taxation of the corporate and dividend tax, owners of C-corporations make use of the extensive margin of tax avoidance and switch their legal form: they run their businesses as sole proprietors despite deteriorating access to credit. Tighter budget and credit constraints reduce entrepreneurial investment and output. Since social security contributions cannot be avoided in this counterfactual experiment, a lower social security tax is required to finance pension benefits. However, because of the adverse effects on aggregate outcomes, total tax revenue decreases.

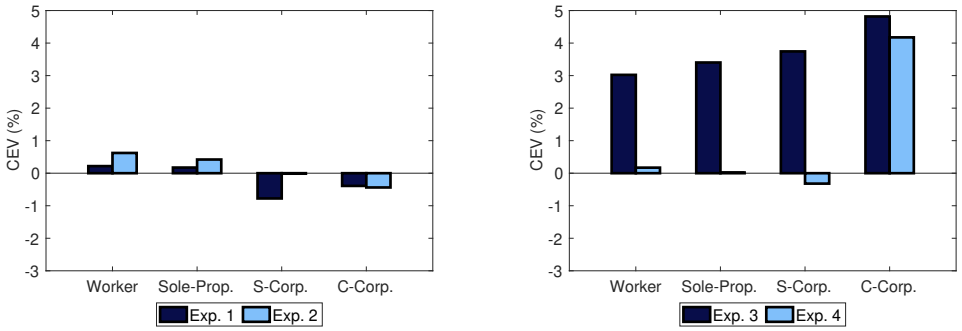
Experiment 2 in Table 5 refers to the counterfactual in which not only the intensive margin but also the extensive margin of tax avoidance is eliminated. The legal form of business organization is fixed at the benchmark economy, still there is a small decrease in the share of S- and C-corporations because of a negative wealth effect; the missing opportunity to minimize the tax burden tightens the entrepreneurial budget reducing wealth such that in equilibrium fewer entrepreneurs can afford to pay the corporate operating costs. Compared to experiment 1, the negative effect on entrepreneurial capital and output is less pronounced because C-corporations cannot engage in tax-motivated switches of their legal form and, therefore, still benefit from better access to credit. In this experiment, total tax revenue increases because due to the elimination of tax avoidance more taxes are paid and the overall tax base is less negatively affected compared to experiment 1.

We use consumption equivalent variations (CEV) to measure the welfare effects of eliminating tax avoidance compared to the benchmark economy.[16] Our analysis includes the long-run and short-run welfare effects along the transition to the new steady state. We impose fiscal neutrality by assuming that the change in tax revenue is compensated by an adjustment in the income tax parameter λ_i. In the aggregate, experiments 1 and 2 generate welfare gains of 0.15% and 0.56%, respectively. Experiment 2 generates a larger aggregate welfare gain as it prohibits the switch from C-corporation to sole proprietors. However, Figure 6a reveals that welfare effects differ across workers and entrepreneurs. Despite lower aggregate output, workers and sole proprietors experience welfare gains because they benefit from the reduced social security tax. In contrast, entrepreneurs running their businesses as S- or C-corporations in the benchmark economy suffer welfare losses in the counterfactual economy as they cannot minimize their tax liabilities by income shifting.

Tax reform. Whereas experiments 1 and 2 keep the tax system as in the benchmark economy, in the following, we consider a tax reform that imposes equal tax treatment of workers and entrepreneurs such that all channels of tax avoidance are eliminated. Specifically, we assume that all entrepreneurs are taxed as sole proprietors. In this experiment, all entrepreneurs solve the maximization problem (10) subject to Eq. (11) to (14) except

[16] Further details of the welfare calculations are given in Appendix A.2.

Figure 6: The Impact of Tax Avoidance on Welfare - Counterfactual Experiments



(a) Benchmark Tax System

(b) Tax Reform

Notes: The figure shows the welfare effects of the counterfactual experiments. Exp. 1 imposes $\phi^{ES}(a,\varepsilon,\theta) \equiv 1$ and $\phi^{EC}(a,\varepsilon,\theta) \equiv 0$ in the benchmark tax system. Exp. 2 additionally fixes the occupation and legal form of business organization at the benchmark economy: $o(a,\varepsilon,\theta) \equiv o^b(a,\varepsilon,\theta)$ where $o^b(a,\varepsilon,\theta)$ denotes the optimal choice in the benchmark economy. Exp. 3 and Exp. 4 refer to a tax reform that taxes all entrepreneurs as sole proprietors. Exp. 4 fixes the occupational and legal form at the benchmark economy: $o(a,\varepsilon,\theta) \equiv o^b(a,\varepsilon,\theta)$. All model and tax parameters except λ_i are at their benchmark values. Fiscal neutrality is imposed by adjusting the tax parameter λ_i in the counterfactual economies. The social security tax adjusts such that social security contributions equal total pension expenses. Occupations are defined as occupations in the benchmark economy.

that S- and C-corporations face operating costs and C-corporations differ in their excess to credit pinned downed by λ^{EC}. The resulting counterfactual economy corresponds to an extended version of the one studied by Brüggemann (2021), who considers sole proprietors only. However, in our model, despite higher operating costs, entrepreneurs can still choose to run their businesses as C-corporations to benefit from a relaxed credit constraint. Note that there are no incentives to run a business as an S-corporation because it involves operating costs but faces the same collateral constraint as a sole proprietor.

Experiment 3 in Table 5 summarizes the effects of the tax reform. The equal tax treatment of all entrepreneurs eliminates the tax-motivated legal form choice and, consequently, a large share of entrepreneurs choose to pay the operating costs and run their businesses as C-corporations to improve their access to credit. As a result, entrepreneurial capital and output strongly increase. Since the tax reform removes all channels of tax avoidance and raises aggregate output, the government collects more tax revenue and social security contributions. Consequently, the social security tax drops as an equilibrium outcome.

In experiment 4, we rule out that entrepreneurs switch their legal form to C-corporation. In this way, we isolate the effects coming from equal tax treatment and removal of tax avoidance rather than the change in credit market access. Similarly to experiment 2, we fix the occupation and legal form of business organization at the benchmark economy: $o(a,\varepsilon,\theta,z_-) \equiv o^b(a,\varepsilon,\theta,z_-)$ where $o^b(a,\varepsilon,\theta,z_-)$ denotes the optimal choice in the benchmark. Table 5 reveals a small increase in the share of C-corporations driven by a positive

wealth effect; the tax reform reduces the tax burden on entrepreneurs such that they become wealthier and can afford the operating cost of a C-corporation. Overall, given that most entrepreneurs remain in their legal form and keep the same collateral constraint, the positive impact of the tax reform on entrepreneurial and aggregate output is less pronounced but still sizable. However, as equal tax treatment reduces corporate taxation, total tax revenue falls.

Figure 6b highlights the welfare effects of the tax reform imposing fiscal neutrality and allowing for transitional dynamics.[17] The aggregate welfare gains of experiments 3 and 4 amount to 3.01% and 1.41%, respectively. Experiment 3 generates large welfare gains driven by the substantial increase in aggregate output and tax revenue, which can be redistributed to the households. Workers benefit from higher wages and the reduction of the social security tax. Entrepreneurs gain from the equal tax treatment that induces them to run their businesses as C-corporations, which are less financially constrained. Experiment 4 isolates the welfare effects coming from equal tax treatment rather than the change in credit market access. In this scenario, C-corporations benefit from the removal of double taxation but the lower tax revenue implies higher income taxes; S-corporations experience small welfare losses as they are forced to remain in their legal form and pay operating costs.

TRA86. Next, we employ our benchmark model to explore how a reduction of the top marginal tax rate affects the structure of the entrepreneurial sector. This exercise is motivated by the Tax Reform Act of 1986 (TRA86), which reduced the top income tax rate from 50% to 28%. Table 6 compares the steady state of the theoretical economy for $\tau_h = 0.5$ and $\tau_h = 0.28$.[18]

The substantial reduction of the top marginal tax rate induces entrepreneurs of C-corporations to reorganize and to run their businesses as S-corporations. Our model predicts that the share of entrepreneurial C-corporations drops from 10.15% to 0.46% while the share of S-corporations increases from 23.5% to 38%. Moreover, the owners of S-corporations declare a larger share of their income as wage income such that the S-corporate labor share decreases by 5.7 p.p. Note, however, that our analysis is limited by the fact that TRA86 included a variety of tax changes that we do not cover. Instead, we focus on the impact of the top marginal tax rate only. Still, the model predictions

[17] The transition from the benchmark economy to the tax reform economy (experiment 3) is shown in Figure 11 in Appendix A.3.

[18] We assume that government spending is the same as in the benchmark economy with $\tau_h = 0.396$. For $\tau_h \geq \tau_h^{bench}$, we hold the threshold for the top bracket constant at $y_h = y_h^{bench}$. For $\tau_h < \tau_h^{bench}$ we shift the threshold y_h below y_h^{bench} to ensure that the marginal income tax rate is monotonically increasing:

$$y_h = \left(\frac{\lambda_i (1 - \tau_i)}{1 - \tau_h} \right)^{1/\tau_i}.$$

Table 6: TRA86 - The Impact of the Top Marginal Tax Rate

	$\tau_h = 0.5$	$\tau_h = 0.28$
C-corp. as share of entre. (%)	10.15	0.46
S-corp. as share of entre. (%)	23.50	38.0
Sole-prop. as share of entre. (%)	66.34	61.52
S-corp. output as share of aggregate output (%)	36.30	61.73
Share of S-corp. income declared as wage (%)	12.49	30.56
Labor share of S-corp. (%)	58.28	52.55

Notes: Statistics are based on the steady-state equilibrium in which all parameters are kept at their benchmark calibration. Fiscal neutrality is imposed by adjusting the tax parameter λ_i. The social security tax adjusts such that social security contributions equal total pension expenses.

are qualitatively in line with the empirical trends described in Section 2 and illustrated in Figure 1.

5.3 Top Income Taxation and the Equity-Efficiency Trade-off

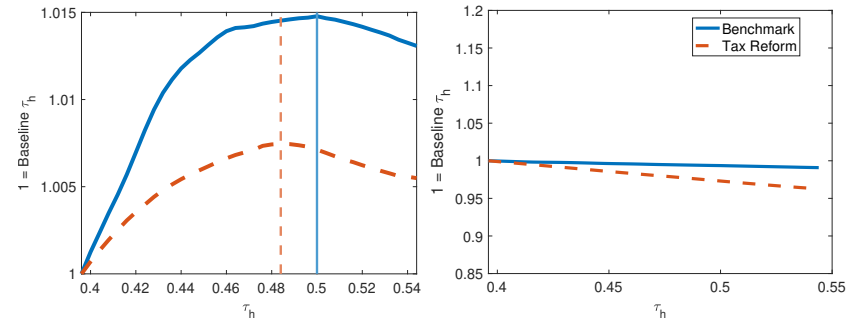
In this section, we explore the aggregate and distributional effects of raising the top marginal tax rate and explore how tax avoidance affects the equity-efficiency trade-off.

Laffer curve. To assess how tax avoidance affects the revenue-maximizing top marginal tax rate, we compare the benchmark economy with the counterfactual economy in which all entrepreneurs are taxed as sole proprietors such that all channels of tax avoidance are eliminated. We refer to the counterfactual as the 'tax reform' (experiment 3). To make the two economies comparable, we re-calibrate selected parameters of the tax reform economy to reflect similar economic conditions as the benchmark economy (see Appendix A.3). In both economies, we vary τ_h and display the steady states in Figures 7 to 9. The solid (dashed) vertical line refers to the top tax rate that maximizes tax revenues in the benchmark economy (tax reform economy).

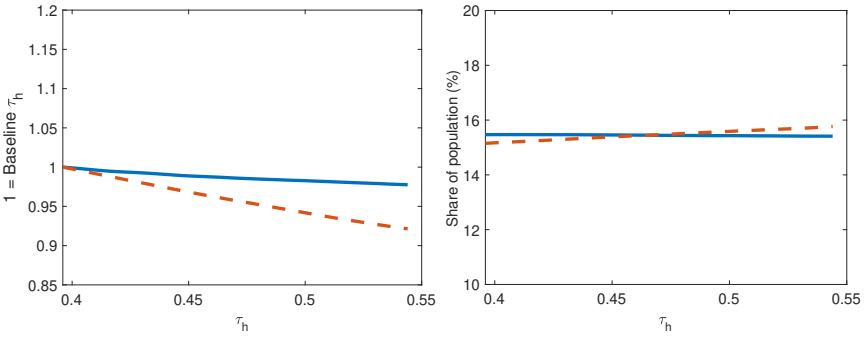
Let us first analyze the impact of increasing the marginal top tax rate in the tax reform economy in which all channels of tax avoidance are eliminated. Figure 7 highlights the well-known finding that a larger top marginal tax rate may erode the tax base with adverse effects on total tax revenue. A higher top marginal tax rate reduces capital and output in the aggregate such that the interest rate increases while the wage falls. The lower wage makes it less attractive for households to become workers such that the share of entrepreneurs in the population slightly increases.[19] Total tax revenue follows a Laffer

[19]Quantitatively, the change in the share of entrepreneurs is minor, in line with Bohacek and Zubricky (2012), who also report quantitatively small responses of the share of entrepreneurs to a flat tax reform.

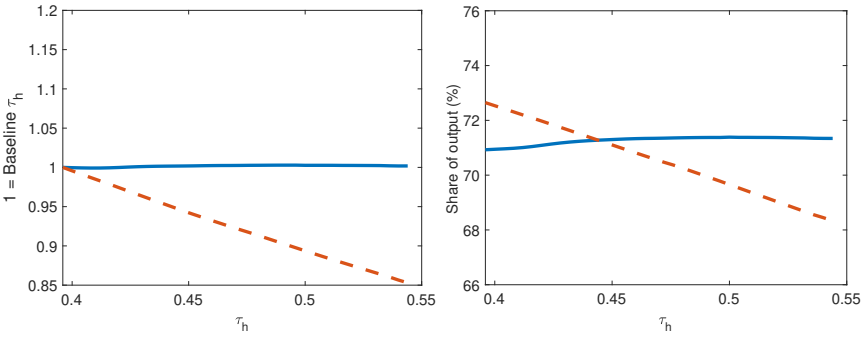
Figure 7: The Aggregate Long-Run Effects of the Top Marginal Tax Rate



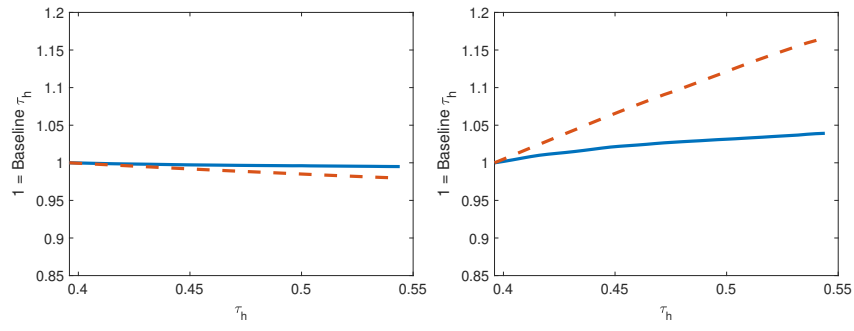
(a) Total tax revenue (b) Aggregate output



(c) Aggregate capital (d) Share of entrepreneurs



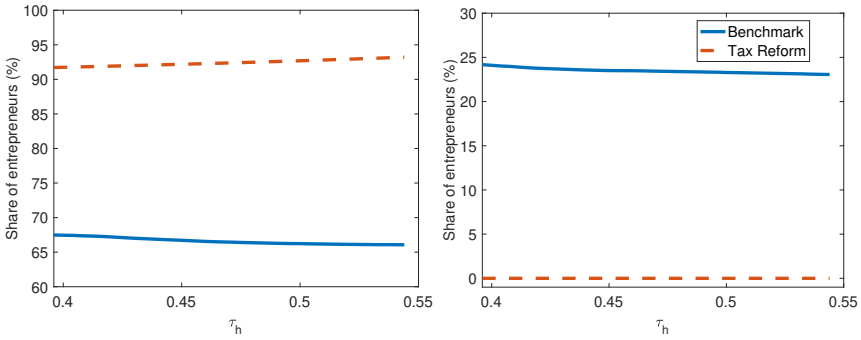
(e) Entrepreneurial capital (f) Entrepreneurial output



(g) Wage (h) Interest rate

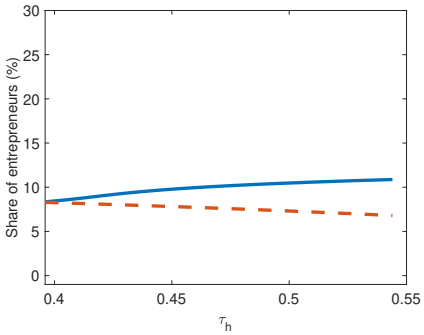
Notes: The figure shows selected outcomes for different values of the top marginal tax rate τ_h. The counterfactual tax reform economy is re-calibrated to reflect similar economic conditions as the benchmark economy. Total tax revenue, aggregate output, aggregate capital, and entrepreneurial capital are normalized to 1 at $\tau_h = 0.396$.

Figure 8: The Long-Run Effects of the Top Marginal Tax Rate on Tax Avoidance

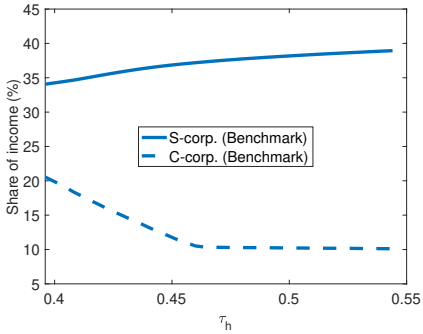


(a) Share of sole proprietors

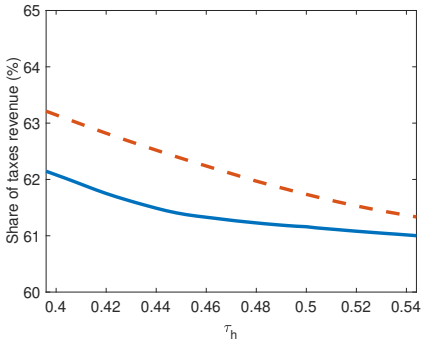
(b) Share of S-corporations



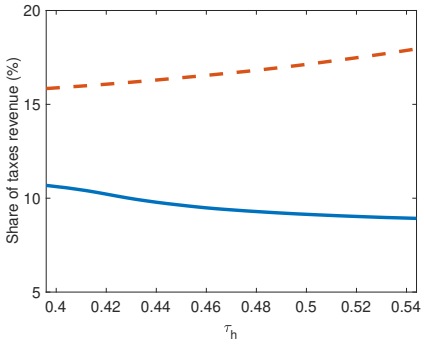
(c) Share of C-corporations



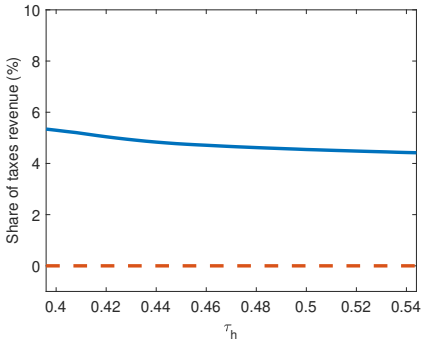
(d) Wage income, benchmark



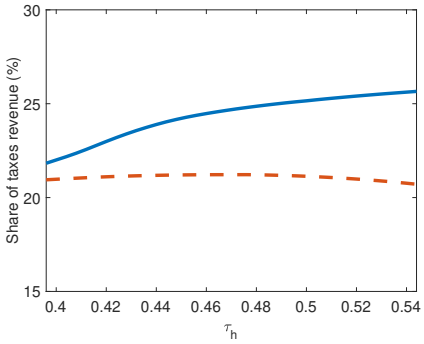
(e) Taxes paid by workers



(f) Taxes paid by sole-prop.



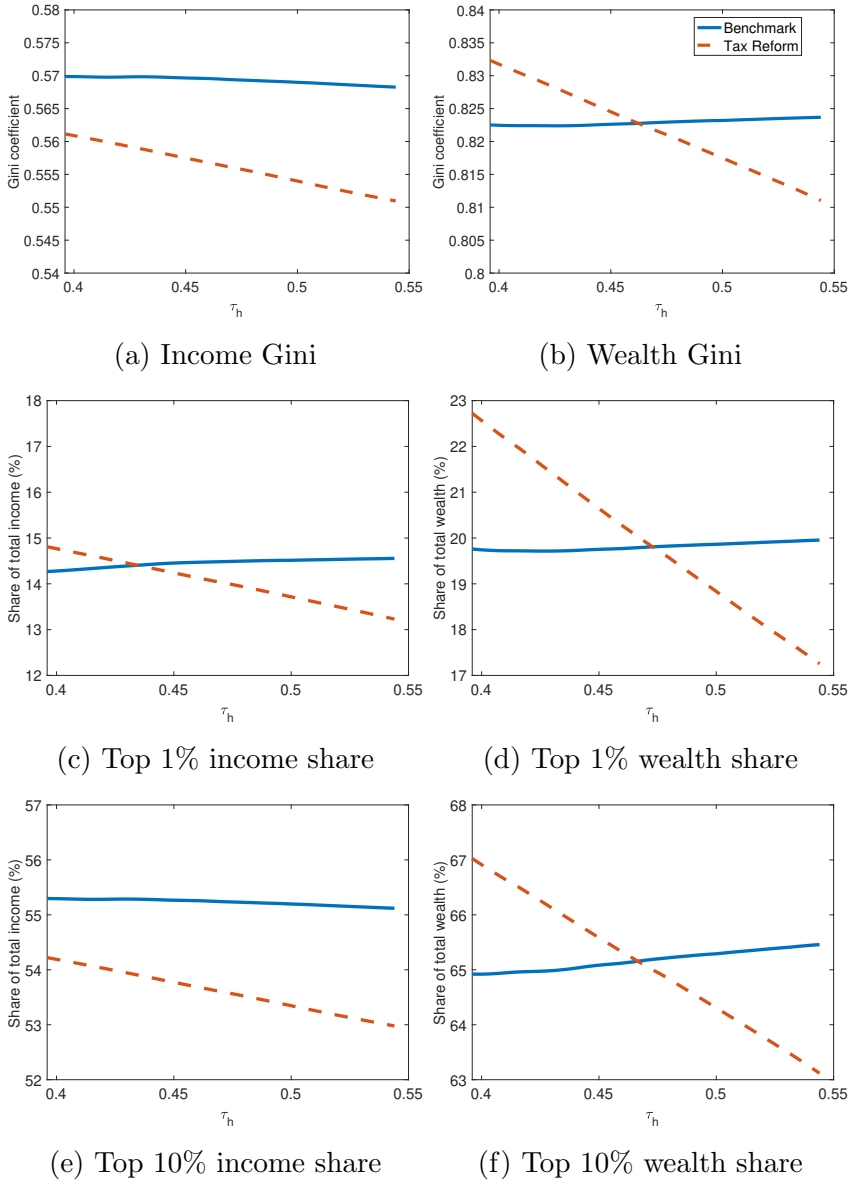
(g) Taxes paid by S-corp.



(h) Taxes paid by C-corp.

Notes: The figure shows selected outcomes for different values of the top marginal tax rate τ_h. The counterfactual tax reform economy is re-calibrated to reflect similar economic conditions as the benchmark economy.

Figure 9: The Distributional Long-Run Effects of the Top Marginal Tax Rate



(a) Income Gini (b) Wealth Gini

(c) Top 1% income share (d) Top 1% wealth share

(e) Top 10% income share (f) Top 10% wealth share

Notes: The figure shows inequality measures for different values of the top marginal tax rate τ_h. The counterfactual tax reform economy is re-calibrated to reflect similar economic conditions as the benchmark economy.

curve, and the revenue-maximizing top marginal tax rate amounts to 48.4%.

In the benchmark economy, entrepreneurs can minimize their tax burden by choosing the legal form of their businesses and by shifting income between different tax bases. Figure 8 reveals that high-income entrepreneurs switch from S-corporation to C-corporation because the higher top marginal tax rate reduces the relative tax advantage of S-corporations. Consequently, these entrepreneurs declare a smaller share of income as wage income. Since entrepreneurs avoid taxes, the distortionary effects on aggregate capital and output are less pronounced. Moreover, C-corporations benefit from improved access to credit such that aggregate output is less adversely affected by the higher top marginal tax rate. Given the weaker aggregate effects, the wage and the interest rate react less strongly (Figure 7). In sum, the interaction of tax avoidance and credit constraints weakens the tax distortions and affects the peak of the Laffer curve: the revenue-maximizing top marginal tax rate amounts to 50%, which is 1.6 p.p. higher compared to the tax reform economy.

Figure 9 displays the long-run impact of increasing the top marginal tax rate on income and wealth inequality in the benchmark economy and in the tax reform economy. In the tax reform economy, a higher top marginal tax rate strongly reduces the Gini coefficient of income and wealth and substantially decreases the income and wealth shares held by the top 1%. These findings highlight the well-known trade-off between equity and efficiency. In the benchmark economy, the impact of the top marginal tax rate on the Gini coefficients of income and wealth is quantitatively much smaller. Notably, the top 1% income and wealth shares increase rather than decrease in response to a tax hike. These findings suggest that tax avoidance reduces the effectiveness of the top marginal tax rate at lowering inequality.

Welfare-maximizing top marginal tax rate. In the following, we derive the optimal top marginal tax rate τ_h that maximizes welfare in the benchmark economy and in the tax reform economy in which all channels of tax avoidance are eliminated.

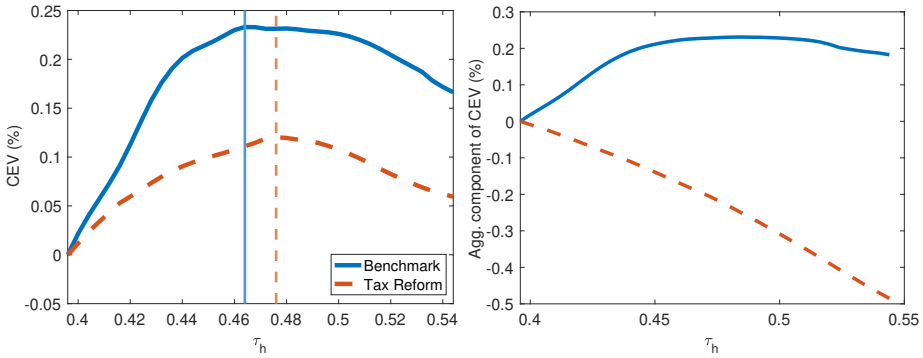
Figure 10 considers the benchmark and the tax reform economy and displays the welfare gains and their components. Figure 10a shows that the optimal top marginal tax rate equals 46.4% in the benchmark economy, which is 6.8 p.p. higher than the one implemented in the US tax code. Moreover, the tax reform economy is characterized by an optimal top marginal tax rate of 47.6%, which is 1.2 p.p. higher compared to the benchmark economy.

Following Domeij and Heathcote (2004), we decompose the welfare gain into an aggregate component and a distributional component. For each state s, we have

$$1 + \omega(s;\tau) = [1 + \hat{\omega}(s;\tau)]\,[1 + \tilde{\omega}(s;\tau)]\,, \tag{28}$$

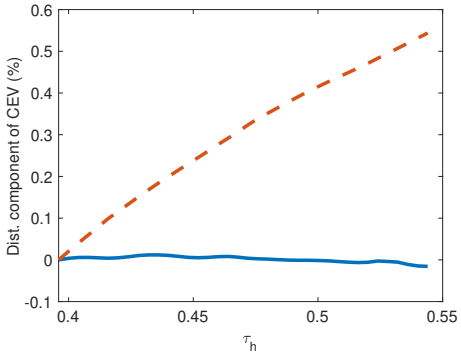
where $\hat{\omega}(s;\tau)$ is the increase in consumption such that an agent with state s is indifferent between the benchmark economy (with policy τ_b) and the tax reform economy (with policy τ) provided that the agent's share of consumption and labor supply in the tax reform economy are the same as those in the benchmark economy. In other words, $\hat{\omega}(s;\tau)$ is the aggregate component and $\tilde{\omega}(s;\tau)$ the distributional component of the welfare gain (see

Figure 10: Welfare-Maximizing Top Marginal Tax Rate

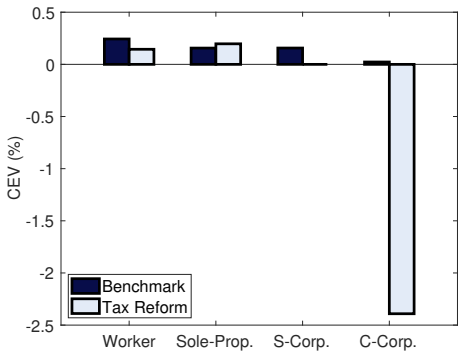


(a) Aggregate CEV

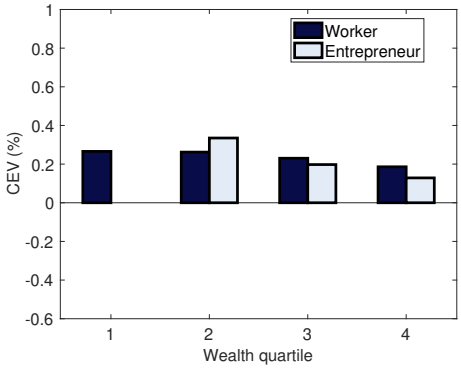
(b) Aggregate component of CEV



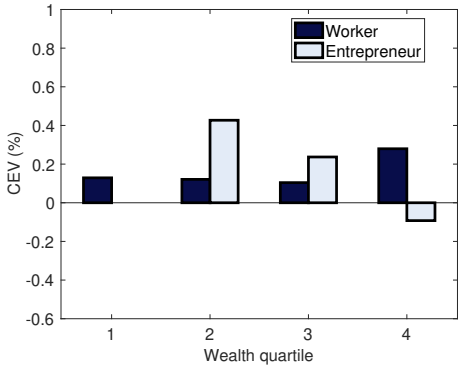
(c) Distrib. component of CEV



(d) CEV by occupation & legal form



(e) CEV, benchmark economy



(f) CEV, tax reform economy

Notes: Panels (a), (b), and (c) show the welfare effects of varying the optimal top marginal tax rate τ_h compared to the benchmark value. The aggregate and distributional components are calculated according to Eq. (28). Panels (d), (e), and (f) show the welfare effects of implementing the welfare-maximizing $\tau_h = 0.464$ and $\tau_h = 0.476$ in the benchmark economy and the tax reform economy, respectively. All figures implement fiscal neutrality by adjusting the tax parameter λ_i. The social security tax adjusts such that social security contributions equal total pension expenses. Occupations are defined as occupations in the benchmark economy.

Appendix A.2 for further details).

Figure 10b and 10c highlight the equity-efficiency trade-off in the tax reform economy without tax avoidance: while the aggregate component of the welfare gain is decreasing in τ_h, the distributional component is increasing. In contrast, in the benchmark economy, the aggregate component is hump-shaped because entrepreneurs engage in tax-motivated switches of legal forms, thereby benefiting from better access to credit and dampening the loss in efficiency. At the same time, equity is hardly affected.

Figure 10d compares the welfare gains of the benchmark economy and the tax reform economy across occupations. Clearly, without tax avoidance, owners of C-corporations suffer from substantial welfare losses if the current top marginal tax rate is replaced with the optimal one. In contrast, these entrepreneurs exhibit only small welfare effects in the benchmark economy. Workers enjoy welfare gains as the government collects additional tax revenue, which is redistributed to the households via an income tax cut. Figures 10e and 10f display the welfare gains of implementing the optimal tax rate across the wealth distribution in the benchmark and the tax reform economies, respectively. In the benchmark economy, implementing the optimal marginal tax rate at the top is beneficial for workers and entrepreneurs across the wealth distribution. In contrast, in the tax reform economy in which entrepreneurs cannot minimize their tax burden, the wealthy entrepreneurs lose. Overall, our findings highlight the importance of taking into account tax avoidance when studying the aggregate and distributional effects of increasing the top marginal income tax.

6 Conclusions

This paper has aimed to improve our understanding of the macroeconomic and distributional impact of entrepreneurial tax avoidance and to explore how tax avoidance affects the equity-efficiency trade-off of taxing high incomes.

To this end, we have developed a dynamic general equilibrium model with incomplete markets and occupational choice in which entrepreneurs can avoid taxes in two ways. On the extensive margin, entrepreneurs can choose the legal form of business organization. On the intensive margin, entrepreneurs can shift their income between different tax bases.

We have argued that eliminating tax avoidance by implementing an equal tax treatment of all entrepreneurs across legal forms of business organization substantially increases tax revenue, aggregate output, and welfare. Our findings suggest that tax avoidance weakens the distortionary effects of higher taxes at the top but makes them ineffective at lowering inequality. Our analysis has indicated that tax avoidance affects the optimal top marginal income tax rate with direct implications for applied policy. A particularly promising avenue for future research is to derive the optimal combination of income, corporate, and dividend taxation accounting for entrepreneurial tax avoidance.

References

Badel, A., Huggett, M., and Luo, W. (2020). Taxing Top Earners: A Human Capital Perspective. *The Economic Journal*, 130(629):1200–1225.

Bakış, O., Kaymak, B., and Poschke, M. (2015). Transitional Dynamics and the Optimal Progressivity of Income Redistribution. *Review of Economic Dynamics*, 18(3):679–693.

Barro, R. and Redlick, C. J. (2011). Macroeconomic Effects From Government Purchases and Taxes. *The Quarterly Journal of Economics*, 126(1):51–102.

Bhandari, A., Evans, D., and McGrattan, E. R. (2024). Business Income Underreporting and Public Finance. *working paper, University of Minnesota*.

Bhandari, A. and McGrattan, E. R. (2020). Sweat Equity in U.S. Private Business. *The Quarterly Journal of Economics*, 136(2):727–781.

Bilicka, K. and Raei, S. (2023). Output Distortions and the Choice of Legal Form of Organization. *Economic Modelling*, 119:106159.

Bohacek, R. and Zubricky, J. (2012). A Flat Tax Reform in an Economy with Occupational Choice and Financial Frictions. *The Economic Journal*, 122(565):1313–1345.

Brüggemann, B. (2021). Higher Taxes at the Top: The Role of Entrepreneurs. *American Economic Journal: Macroeconomics*, 13(3):1–36.

Buera, F. J. and Shin, Y. (2013). Financial Frictions and the Persistence of History: A Quantitative Exploration. *Journal of Political Economy*, 121(2):221–272.

Cagetti, M. and De Nardi, M. (2006). Entrepreneurship, Frictions, and Wealth. *Journal of Political Economy*, 114(5):835–870.

Chen, D. and Qi, S. (2016). The Importance of Legal Form of Organization on Small Corporation External Financing. *Economic Inquiry*, 54(3):1607–1620.

Chen, D., Qi, S., and Schlagenhauf, D. (2018). Corporate Income Tax, Legal Form of Organization, and Employment. *American Economic Journal: Macroeconomics*, 10(4):270–304.

Clarke, C. and Kopczuk, W. (2017). Business Income and Business Taxation in the United States since the 1950s. *Tax Policy and the Economy*, 31(1):121–159.

Congressional Budget Office (2013). Monthly Budget Review Summary for Fiscal Year 2013. Technical report.

Cooper, M., McClelland, J., Pearce, J., Prisinzano, R., Sullivan, J., Yagan, D., Zidar, O., and Zwick, E. (2016). Business in the United States: Who Owns It, and How Much Tax Do They Pay? In *Tax Policy and the Economy, Volume 30*, NBER Chapters, pages 91–128. National Bureau of Economic Research, Inc.

Davis, S., Haltiwanger, J., Jarmin, R., and Miranda, J. (2007). Volatility and Dispersion in Business Growth Rates: Publicly Traded versus Privately Held Firms. In *NBER Macroeconomics Annual 2006, Volume 21*, pages 107–180. National Bureau of Economic Research, Inc.

DeBacker, J. M. and Prisinzano, R. (2015). The Rise of Partnerships. *Tax Notes*, 147(13):1563–1575.

Di Nola, A., Kocharkov, G., Scholl, A., and Tkhir, A.-M. (2021). The Aggregate Consequences of Tax Evasion. *Review of Economic Dynamics*, 40:198–227.

Diamond, P. and Saez, E. (2011). The Case for a Progressive Tax: From Basic Research to Policy Recommendations. *Journal of Economic Perspectives*, 25(4):165–90.

Domeij, D. and Heathcote, J. (2004). On the Distributional Effects of Reducing Capital Taxes. *International Economic Review*, 45(2):523–554.

Dyrda, S. and Pugsley, B. (2022a). How to Tax Capitalists in the Twenty-First Century? *working paper, University of Toronto.*

Dyrda, S. and Pugsley, B. (2022b). The Rise of Pass-thoughs: A Quantitative Exploration. *working paper, University of Toronto.*

Dyrda, S. and Pugsley, B. (2024). The Rise of Pass-thoughs: An Empirical Investigation. *working paper, University of Toronto.*

Erosa, A. and Koreshkova, T. (2007). Progressive Taxation in a Dynastic Model of Human Capital. *Journal of Monetary Economics*, 54(3):667–685.

Ge, Z. (2023). Entrepreneurship, Frictions, and Top Marginal Tax Rates. *Available at SSRN 3636212.*

Gordon, R. H. and MacKie-Mason, J. K. (1994). Tax Distortions to the Choice of Organizational Form. *Journal of Public Economics*, 55(2):279–306.

Gordon, R. H. and Slemrod, J. (1998). Are Real Responses to Taxes Simply Income Shifting Between Corporate and Personal Tax Bases? NBER Working Papers 6576, National Bureau of Economic Research, Inc.

Gorea, D. (2014). Tax Avoidance: Aggregate and Distributional Consequences. *working paper, European University Institute*.

Guner, N., Kaygusuz, R., and Ventura, G. (2014). Income Taxation of U.S. Households: Facts and Parametric Estimates. *Review of Economic Dynamics*, 17(4):559–581.

Guner, N., Lopez-Daneri, M., and Ventura, G. (2016). Heterogeneity and Government Revenues: Higher Taxes at the Top? *Journal of Monetary Economics*, 80(C):69–85.

Heathcote, J., Storesletten, K., and Violante, G. L. (2017). Optimal Tax Progressivity: An Analytical Framework. *The Quarterly Journal of Economics*, 132(4):1693–1754.

Heathcote, J., Storesletten, K., and Violante, G. L. (2020). Optimal Progressivity with Age-dependent Taxation. *Journal of Public Economics*, 189:104074.

Heathcote, J. and Tsujiyama, H. (2021). Optimal Income Taxation: Mirrlees meets Ramsey. *Journal of Political Economy*, 129(11):3141–3184.

Hurst, E. and Pugsley, B. W. (2017). Wealth, Tastes, and Entrepreneurial Choice. In *Measuring Entrepreneurial Businesses: Current Knowledge and Challenges*. University of Chicago Press.

Imrohoroglu, A., Kumru, C. S., and Nakornthab, A. (2023). Revisiting Taxes on High Incomes. *Review of Economic Dynamics*, 51:1159–1184.

Internal Revenue Service (2022). S Corporation Employees, Shareholders and Corporate Officers. IRS Website, https://www.irs.gov/businesses/small-businesses-self-employed/s-corporation-employees-shareholders-and-corporate-officers.

Kindermann, F. and Krueger, D. (2022). High Marginal Tax Rates on the Top 1%? Lessons from a Life Cycle Model with Idiosyncratic Income Risk. *American Economic Journal: Macroeconomics*, 14(2):319–366.

Kitao, S. (2008). Entrepreneurship, Taxation and Capital Investment. *Review of Economic Dynamics*, 11(1):44–69.

Kopczuk, W. and Zwick, E. (2020). Business Incomes at the Top. *Journal of Economic Perspectives*, 34(4):27–51.

Kotsogiannis, C. and Mateos-Planas, X. (2019). Tax Evasion as Contingent Debt. Discussion Papers 1903, Centre for Macroeconomics (CFM).

Landier, A. and Plantin, G. (2017). Taxing the Rich. *Review of Economic Studies*, 84:1186–1209.

Mackie-Mason, J. K. and Gordon, R. H. (1997). How Much Do Taxes Discourage Incorporation? *The Journal of Finance*, 52(2):477–505.

Maffezzoli, M. (2011). Tax Evasion under Market Incompleteness. Working Paper 378, Innocenzo Gasparini Institute for Economic Research, Bocconi University.

Mertens, K. and Montiel Olea, J. L. (2018). Marginal Tax Rates and Income: New Time Series Evidence. *The Quarterly Journal of Economics*, 133(4):1803–1884.

Nelson, S. C. (2016). Paying Themselves: S Corporation Owners and Trends in C Corporation Income, 1980 - 2013. *Office of Tax Analysis Working Paper*, 107.

Piketty, T., Saez, E., and Stantcheva, S. (2014). Optimal Taxation of Top Labor Incomes: A Tale of Three Elasticities. *American Economic Journal: Economic Policy*, 6(1):230–271.

Quadrini, V. (2000). Entrepreneurship, Saving and Social Mobility. *Review of Economic Dynamics*, 3(1):1–40.

Saez, E., Slemrod, J., and Giertz, S. H. (2012). The Elasticity of Taxable Income with Respect to Marginal Tax Rates: A Critical Review. *Journal of Economic Literature*, 50(1):3–50.

Slemrod, J. (1996). High-Income Families and the Tax Changes of the 1980s: The Anatomy of Behavioral Response. In Feldstein, M. and Poterba, J., editors, *Empirical Foundations of Household Taxation*, pages 169–192. University of Chicago Press.

Slemrod, J. (2007). Cheating Ourselves: The Economics of Tax Evasion. *Journal of Economic Perspectives*, 21(1):25–48.

Smith, M., Yagan, D., Zidar, O., and Zwick, E. (2019). Capitalists in the Twenty-First Century. *The Quarterly Journal of Economics*, 134(4):1675–1745.

Smith, M., Yagan, D., Zidar, O., and Zwick, E. (2022). The Rise of Pass-Throughs and the Decline of the Labor Share. *American Economic Review: Insights*, 88(11):2283–2299.

Stokey, N. L. and Rebelo, S. (1995). Growth Effects of Flat-Rate Taxes. *Journal of Political Economy*, 103(3):519–550.

Uribe-Teran, C. (2021). Higher Taxes at the Top? The Role of Tax Avoidance. *Journal of Economic Dynamics and Control*, 129:104187.

Zeida, T. (2022). The Tax Cuts and Jobs Act (TCJA): A Quantitative Evaluation of Key Provisions. *Review of Economic Dynamics*, 46:74–97.

A Appendix

A.1 Preference Shock

To smooth out the kinks in the value function caused by the discrete occupational choice, we introduce an i.i.d. preference shock. We extend the model described in Section 3 by assuming that in each period young agents draw $\epsilon = \{\epsilon_W, \epsilon_{EP}, \epsilon_{ES}, \epsilon_{EC}\}$, where ϵ follows a type-I extreme value distribution with scale parameter σ_ϵ. The occupational choice problem in Eq. 5 becomes

$$\mathcal{V}(a, \varepsilon, \theta, z_-, \epsilon) = \max_{o \in \{W, EP, ES, EC\}} \left\{ V^o(a, \varepsilon, \theta) - \xi_{z_-, o} + \sigma_\epsilon \epsilon_o \right\}.$$

The probability of choosing occupation o is given by

$$P^o(a, \varepsilon, \theta, z_-) = \frac{\exp\{[V^o(a, \varepsilon, \theta) - \xi_{z_-, o}]/\sigma_\epsilon\}}{\sum_{j \in \{W, EP, ES, EC\}} \exp\{[V^j(a, \varepsilon, \theta) - \xi_{z_-, j}]/\sigma_\epsilon\}},$$

where the occupational value functions $V^o(a, \varepsilon, \theta)$ described in Section 3 need to be modified such that the expectation $\mathbb{E}$ also operates on the next period's ϵ. For example, in the case of a sole proprietor, the value function becomes

$$V^{EP}(a, \varepsilon, \theta) = \max_{c, a', k, n} \left\{ u(c, 0) + \beta (1 - \rho_R) \mathbb{E}_{\varepsilon', \theta' | \varepsilon, \theta} \left[\mathbb{E}_{\epsilon'} \mathcal{V}(a', \varepsilon', \theta', EP, \epsilon') \right] + \beta \rho_R V^R(a') \right\}$$

subject to constraints in Eq. (11) to (14), where

$$\mathbb{E}_\epsilon \mathcal{V}(a, \varepsilon, \theta, z_-, \epsilon) = \sigma_\epsilon \log \left(\sum_{o \in \{W, EP, ES, EC\}} \exp \left\{ \frac{V^o(a, \varepsilon, \theta) - \xi_{z_-, o}}{\sigma_\epsilon} \right\} \right)$$

The scale parameter σ_ϵ should be small enough that it does not affect the results of the model.

A.2 Welfare

Consumption equivalent variations. We use the conditional consumption equivalent variation (CEV) $\omega(s; \tau)$ to measure the welfare effect of implementing policy τ on an agent in state s. We consider the effects both on the transition path and in the new steady state.

Suppose the economy is originally in a steady state with benchmark policy τ_b. In period $t = 0$, policy τ is implemented. The agent's value conditional on s in period $t = 0$ is given by

$$V_0(s; \tau) = \mathbb{E}_0 \left[\sum_{t=0}^{\infty} \beta^t u\left(c_t(s_t; \tau), \ell_t(s_t; \tau)\right) | s_0 = s; \tau \right],$$

which can be re-written as

$$V_0(s; \tau) = V_0^c(s; \tau) - V_0^\ell(s; \tau), \tag{29}$$

where

$$\begin{aligned} V_0^c(s;\tau) &= \mathbb{E}_0\left[\sum_{t=0}^{\infty}\beta^t \tfrac{c_t(s_t;\tau)^{1-\sigma_1}}{1-\sigma_1}|s_0=s;\tau\right], \\ V_0^\ell(s;\tau) &= \mathbb{E}_0\left[\sum_{t=0}^{\infty}\beta^t \chi \tfrac{\ell_t(s_t;\tau)^{1+\sigma_2}}{1+\sigma_2}|s_0=s;\tau\right]. \end{aligned}$$

The conditional CEV $\omega(s;\tau)$ is defined such that

$$\mathbb{E}_0\left[\sum_{t=0}^{\infty}\beta^t u\left((1+\omega(s;\tau))c_t(s_t;\tau_b),\ell_t(s_t;\tau_b)\right)|s_0=s;\tau_b\right] = V_0(s;\tau),$$

Using Eq. (29), we can solve the above equation for $\omega(s;\tau)$ as follows:

$$\omega(s;\tau) = \left[\frac{V_0(s;\tau)-V_0(s;\tau_b)}{V_0^c(s;\tau_b)}+1\right]^{\frac{1}{1-\sigma_1}} - 1.$$

Welfare decomposition. Following Domeij and Heathcote (2004), the welfare gain can be decomposed into an aggregate component and a distributional component:

$$1+\omega(s;\tau) = \left[1+\hat{\omega}(s;\tau)\right]\left[1+\tilde{\omega}(s;\tau)\right],$$

where $\hat{\omega}(s;\tau)$ is the change in consumption such that an agent in state s is indifferent between the benchmark economy (with policy τ_b) and the tax reform economy (with policy τ) provided that the agent's share of consumption and labor supply in the tax reform economy are the same as those in the benchmark economy. In other words, $\hat{\omega}(s;\tau)$ is the aggregate component and $\tilde{\omega}(s;\tau)$ the distributional component of the CEV.

Let $C(\tau_b)$ and $L(\tau_b)$ be aggregate consumption and labor supply in the benchmark economy, and let $C_t(\tau)$ and $L_t(\tau)$ be the counterparts in the tax reform economy. For each agent in state s, we construct a sequence of hypothetical consumption and working hours such that

$$\begin{aligned} \hat{c}_t(s;\tau) &= \frac{c_t(s;\tau_b)}{C(\tau_b)}C_t(\tau) \\ \hat{\ell}_t(s;\tau) &= \frac{\ell_t(s;\tau_b)}{L(\tau_b)}L_t(\tau). \end{aligned}$$

The value at $t=0$ from this hypothetical sequence is

$$\hat{V}_0(s;\tau) = \mathbb{E}_0\left[\sum_{t=0}^{\infty}\beta^t u\left(\hat{c}_t(s_t;\tau),\hat{\ell}_t(s_t;\tau)\right)|s_0=s;\tau\right].$$

The aggregate component of the CEV is defined as

$$\hat{\omega}(s;\tau) = \left[\frac{\hat{V}_0(s;\tau)-V_0(s;\tau_b)}{V_0^c(s;\tau_b)}+1\right]^{\frac{1}{1-\sigma_1}} - 1,$$

and distributional component $\tilde{\omega}(s;\tau)$ is the residual

$$\tilde{\omega}(s;\tau) = \frac{\omega(s;\tau)-\hat{\omega}(s;\tau)}{1+\hat{\omega}(s;\tau)}.$$

A.3 The Tax Reform Economy

Table 7 shows the re-calibrated parameters in the tax reform economy in which all channels of tax avoidance are eliminated. The rest of the parameters take the same values as in the benchmark model. We re-calibrate five parameters such that the share of entrepreneurs, the share of C-corporations among entrepreneurs, the Gini coefficient of income, the share of households in the top income bracket, and the ratio between total tax revenue (excl. social security taxes) and GDP are similar to those in the benchmark economy. Table 8 compares the moments of the steady states of the two economies.

The re-calibrated parameter values are similar to those in the benchmark model except for the value of κ^{EC}, which is much higher than the benchmark model. This is because C-corporations no longer face corporate and dividend taxes in the counterfactual environment, making it a very attractive legal form for entrepreneurs. Thus, to keep the share of C-corporations among the entrepreneurs the same as in the benchmark model, we need to impose a significantly higher operating cost.

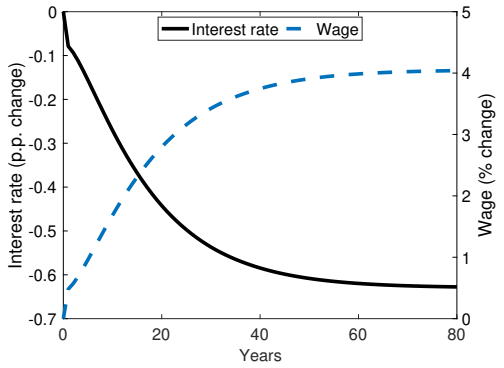
Table 7: Re-Calibrated Parameters

Parameter	Description	Value
μ_θ	Unconditional mean	-0.03
κ^{EC}	Operating cost for C-corp.	0.55
ϵ^*	Value of the superstar shock	11.20
λ_i	Income tax, level	0.79
τ_i	Income tax, progressivity	0.12

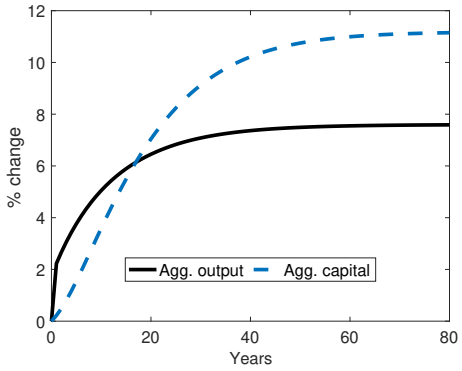
Table 8: Moments - Tax Reform Economy vs. Benchmark Model

	Benchmark	Tax Reform
Aggregates		
Interest rate (%)	2.12	2.06
Average hours worked	0.33	0.33
K/Y ratio	3.06	3.05
Tax revenue (excl. soc. security) to GDP (%)	16.60	16.60
Entrepreneurial sector		
Share of entrepreneurs (%)	15.47	15.16
Share of sole-prop. (%)	67.48	91.71
Share of S-corp. (%)	24.18	-
Share of C-corp. (%)	8.34	8.29
Exit rate from entrepreneurship (%)	9.51	9.38
Transition rate from C-corp. to pass-through (%)	2.64	7.15
Share of payroll in pass-throughs (%)	35.31	33.50
Share of entrepreneurial income declared as wage		
S-corp. (%)	34.07	-
C-corp. (%)	20.55	-
Employment share by firm size bins (%)		
Bin 1 (smallest)	17.85	16.85
Bin 2	13.99	13.40
Bin 3	15.51	15.07
Bin 4 (largest)	52.64	54.68
Inequality		
Gini income	0.57	0.56
Gini income, entrepreneurs	0.64	0.64
Share of entre. in top 10% income (%)	38.10	38.14
Share of entre. in top 10% wealth (%)	52.68	55.31
Wealth share entre. (%)	55.81	58.46
Share of taxpayers in the top income bracket (%)	2.84	2.79

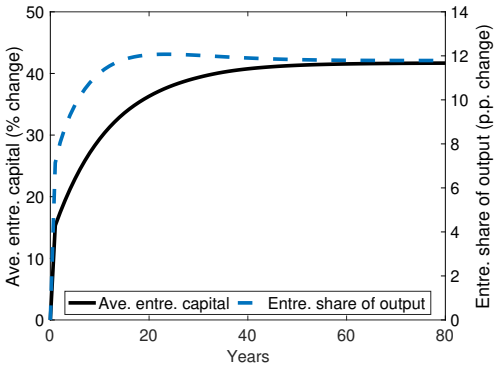
Figure 11: Transition from the Benchmark Economy to Tax Reform Economy



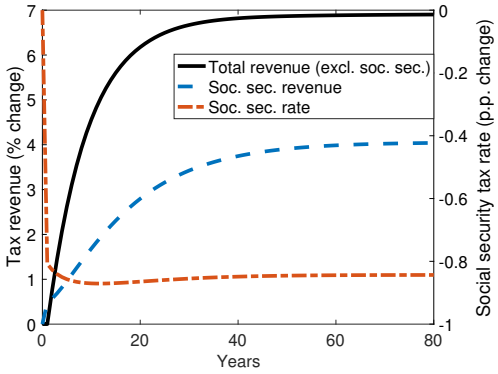
(a) Interest rate and wage



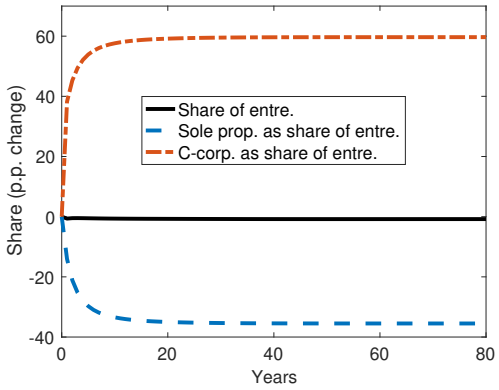
(b) Aggregate output and capital



(c) Ave. entre. k and share of output



(d) Tax revenue and tax rate



(e) Share of entre. and legal forms

Notes: The economy is in the pre-reform (benchmark) steady state in year 0. The figure plots transitional dynamics (in % or p.p. change from the benchmark economy) following the tax reform introduced in year 1. The details of the tax reform (experiment 3) are described in Section 5.2. Fiscal neutrality along the transition path is imposed by adjusting the tax parameter λ_i. The social security tax adjusts such that social security contributions equal total pension expenses every period.