Taxes, Regulations, and Business Organization in the US *

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Abstract

Since the 1980s, the U.S. has undergone a marked shift in business organization: the output share of pass-through entities (S-corporations, LLCs, partnerships, and sole proprietorships) has nearly doubled, while the share of C-corporations has declined. A natural candidate explanation for this reallocation is changes in tax policy. Indeed, tax policy, opportunities for tax avoidance, and the borrowing capacity of private businesses have all changed substantially over this period. To quantify the contribution of these factors to the observed reallocation of output, we develop a dynamic model of entrepreneurship featuring borrowing constraints, taxation with endogenous tax avoidance, and overhead costs. We find that changes in taxation, borrowing capacity, and tax avoidance play only a secondary role, together accounting for less than 20% of the observed reallocation. However, when we consider changes in overhead costs for pass-through entities consistent with the evidence, the model can account for up to two-thirds of the observed reallocation. Our results suggest that additional mechanisms are needed to fully account for the patterns in the data.

Keywords: Business Taxation, Tax Avoidance, Output Reallocation, Pass-through Entities

JEL Codes: E60, K20, H24, H25

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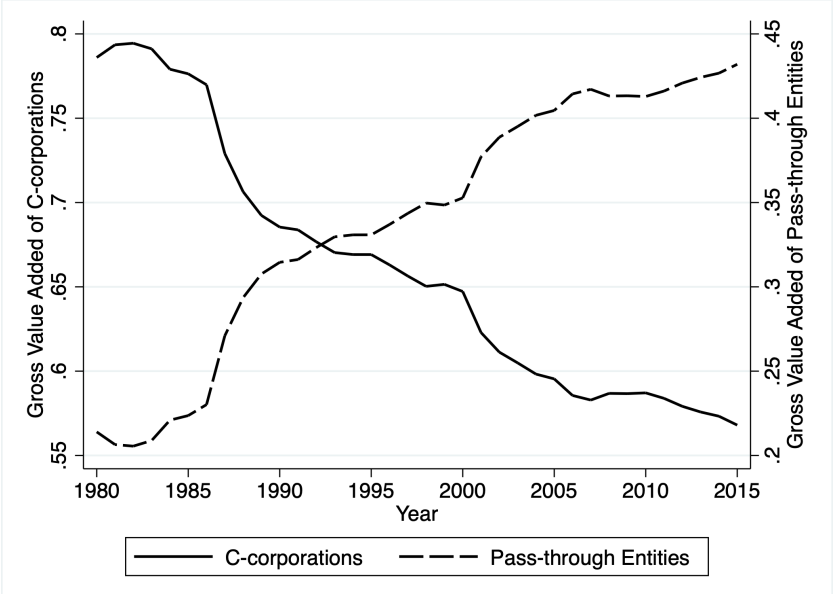
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1 Introduction

The change in the way businesses are organized has been a prominent feature of the US economy since the 1980s. During this period, the share of firms across legal forms, and their business activities have undergone a considerable transformations. Specifically, the dominance of C-corporations in terms of their contribution to output declined substantially—from 78% to 57%—while the output share of pass-through entities (such as S-corporations, LLCs, partnerships, and sole proprietorships) rose from 22% to 43% between 1985 and 2015 (Figure 1). This striking shift raises an important question: what forces have driven the reallocation of economic output across legal forms since the 1980s?

A natural candidate to account for the observed output reallocation is the changing tax treatment of business forms since the 1980s, as several authors have argued. C-corporations face corporate income taxes, and their shareholders are taxed again on dividends, whereas pass-through entities are taxed only at the individual level. The Tax Reform Act of 1986, which significantly lowered personal income tax rates, reduced the relative tax burden on pass-through businesses, making them more attractive than C-corporations. Hence, the tax reform changes likely contributed to the growing importance of pass-throughs. On the other hand, the corporate tax rate has fallen significantly as we subsequently document.

Figure 1: Share of Gross Value Added of Business Structures



Sources and Notes: NIPA, IRS SOI and our calculations Figure 1 shows gross value added of C-corporations and pass-through entities. The corporate sector's gross value added is obtained from NIPA while the non-corporate sector's is estimated using "National Income: Sole Proprietorships and Partnerships" and "Consumption of Fixed Capital: Sole Proprietorships and Partnerships". The rest of the estimation procedure and gross output can be found in the Appendix C.

Tax avoidance and evasion practices in the pass-through sector likely contributed to their growing prevalence. Although these entities are required to report income and expenses, the net tax gap rose from 0.3% of output in 1985 to 0.6% in 2011–2013. One underlying factor is the flexibility in ownership and reporting structures, which allows high-income owners to allocate income and deductions strategically to lower their tax liabilities. Partnerships owned by high-income individuals can similarly achieve lower effective tax rates by shifting income across affiliated entities; see Cooper et al. (2016). Concomitantly, tax enforcement declined: the IRS audit rate for S-corporations and partnerships fell by over 30% during the same period.[1]

In parallel, the access to credit of pass-through entities substantially improved. Between 1985 and 2015, the debt-to-equity ratio of non-corporate businesses rose from 37% to nearly 50%. Altogether, the combination of tax changes, combined with greater opportunities for avoidance and weaker enforcement, plus increased access to credit, likely played a central role in the expansion of pass-through activity in the United States. Quantifying the importance of these changes on the reallocation of aggregate output is a central aim of this paper.

Regulatory changes may have also contributed to the growing popularity of pass-through entities. First, S-corporations experienced a series of reforms in the 1990s that made operating them easier and more flexible. These reforms eliminated the five-year waiting period, introduced qualifications for tax exemptions and deductions, allowed a second class of stock, and increased the maximum number of shareholders.[2] Subsequent Small Business Acts in the 2000s further expanded these benefits. Between 2000 and 2012, about 183,000 firms transitioned from C-corporations to S-corporations (Smith et al. (2019b)). Second, the emergence of limited liability companies (LLCs) in the 1990s offered business owners protection against personal liability without subjecting them to double taxation, similar to S-corporations. Third, loan programs and expanded support from the Small Business Administration (SBA) improved the borrowing capacity of these entities. We subsequently document, using SOI data from the Internal Revenue Service, a large decline in pass-through overhead costs relative to business receipts over 1985–2015 that is robust across alternative overhead definitions. The decline is broad across sectors such as manufacturing, wholesale/retail trade, construction, transportation/utilities, and finance/real estate. Altogether, these changes likely significantly contributed to the shift toward pass-through structures.

To study the determinants of output division between pass-through entities and C-

[1] According to IRS Compliance Research, in 1985, 1% of S-corporations and 1.4% of partnerships were audited; by 2015, that dropped to 0.4%.

[2] The Small Business Job Protection Act of 1996 is an example of these reforms for S-corporations.

corporations, we develop a dynamic model of entrepreneurship under borrowing constraints, taxation with endogenous tax avoidance and fixed costs of operation, following Quadrini (2000), Cagetti and De Nardi (2006), Di Nola et al. (2021), and others. Each period, households decide whether to engage in regular work or operate a pass-through business and choose labor supply. Business owners face financial frictions and uninsured business risks together with overhead costs of operation. Meanwhile, C-corporations are subject to a proportional corporate tax rate, whereas pass-through business owners face a progressive income tax structure. Within this framework, pass-through owners can engage in tax avoidance activities at both the extensive and intensive margins. The decision to engage in tax avoidance involves fixed costs, and if undertaken, owners also incur variable costs that rise with the size of unreported income and the scale of production. Furthermore, if tax avoidance is detected, business owners face penalties proportional to the unpaid taxes.

We parametrize the model to reflect the U.S. tax structure in 1985. In the calibration, we match key features of the U.S. economy, including the share of pass-through entities, the share of value added by pass-throughs, their debt-to-equity ratio, and the net tax gap relative to output. The model also captures whether pass-through entities engage in tax avoidance and if so, the extent of their avoidance relative to reported income. We then evaluate the implied changes in business organization by comparing steady-state equilibria under different changes to the 1985 economy. In doing so, we introduce changes to both corporate and personal income taxes to reflect 2015 policies, changes in the ability to engage in tax avoidance in pass-through businesses and changes in borrowing constraints. We then explore the implications of changes in overhead costs in line with recent data.

Findings Our main results show that changes in corporate and personal income taxes roughly cancels out each other in accounting for the changes in the output share of pass-through entities since the 1980s. Matching the 2015 net tax gap accounts for about 6% of the reallocation of output shift in the US. Combined, tax policy changes and rising tax avoidance account for about less than 10% of the observed reallocation. Meanwhile, aggregate output substantially increases across steady states, with an increase of nearly 4% when all forces are in play.

We then turn our attention to chances in the access to credit of pass-through businesses. Calibrating the model to match the 2015 debt-to-equity ratio, we find that improved access to credit accounts for about 13% of the observed shift in output across legal forms. When combined with tax policy changes and rising tax avoidance, aggregate output sharply rises by

about 4.5% across steady states. Yet, these channels operating in tandem account for nearly 18% of the total reallocation in the U.S. economy. We conclude from these findings that all changes considered so far are of second-order importance in accounting for the observed reallocation of economic activity across business forms.

What else can account for the observed reallocation of output? If we include changes in overhead costs for pass-through entities in line with data, our model environment can go much further. A reduction in fixed costs of 30% leads in itself to an output reallocation of about 29%. When combined with all other changes, our economy can account for about 61 percent of the observed reallocation. If instead we let overhead costs fall by 40%, our model leads to a long-run reallocation of about two thirds of the observed reallocation in data. As we document, changes in overhead costs of these magnitudes can be supported by data.

Our paper makes three key contributions. First, we systematically examine how tax changes since 1985 have contributed to the shift in output shares between C-corporations and pass-through entities — an important question that remains largely unexplored in the literature. Second, we provide a first quantitative equilibrium analysis of the rise in tax avoidance among pass-through entities. While prior work, such as Slemrod (1996), has suggested that avoidance behavior may drive the growth of pass-through entities, our model-based results demonstrate that increased tax avoidance explains a small portion of the observed reallocation in aggregate output. Finally, our paper moves beyond taxation to quantify the contribution of other forces, showing that these other forces can play a role in accounting for the observed changes. We show that when combined with tax changes, it is possible to account for a large fraction of the observed reallocation of output across business forms. Yet, our analysis also points in the direction that other forces must also have played a key role. We elaborate on this point later on.

Related Literature This paper is related to recent literature on business structures, taxation, tax avoidance and reforms in the US. Kopczuk and Zwick (2020) document the dramatic decline in the share of business income derived from C-corporations, falling from 90% to 40% between 1980 and 2012. Beyond changes in business composition, the rise of pass-through entities has been linked to broader trends in inequality: Cooper et al. (2016) show that the share of income earned by the top 1% doubled from 10% to 20% between 1980 and 2010, with 40% of this increase attributed to pass-through business income. The shifting structure of businesses also has implications for labor markets. Smith et al. (2019b) find that the expansion of partnerships and S-corporations between 1978 and 2017 accounts

for 30% of the observed decline in the labor share within the corporate sector.

Several recent studies focus more narrowly on the role of tax policy in shaping these patterns. Dyrda and Pugsley (2019) examine the impact of U.S. tax reforms, highlighting that the surge in pass-through entities accounts for approximately 40% of the rise in pre-tax top 1% income shares since 1980. Their analysis shows that the 1986 Tax Reform Act both expanded pass-through activity and contributed to greater income concentration, although at the cost of lower output and capital accumulation. Dyrda and Pugsley (2025) further argue that the effects of the 1986 reform persisted for decades, with new business entry accounting for 60% of the growth in pass-through entities. Relatedly, Smith et al. (2019a) find that human capital, rather than financial capital, is the primary driver of top incomes in the pass-through sector. Other studies, such as Barro and Wheaton (2020), link the expansion of LLCs and the decline in tax wedges to TFP growth between 1958 and 2013. Bhandari and McGrattan (2021) develop a theory of sweat equity in pass-throughs, estimating that its value—roughly 1.2 times U.S. output—is comparable to the fixed assets held by these firms. While this literature provides key insights, much of it focuses either on the inequality implications of business structure changes, or on the broad impact of tax reforms. Our paper fills a gap by systematically examining how different forces — tax policy, tax avoidance, and changes in the capacity to borrow and overhead costs — jointly shaped the transformation of output shares across legal forms.

A substantial parallel literature emphasizes the distortionary effects of taxation on entrepreneurship and output. Meh (2005) shows that shifting from a progressive to a proportional tax system increases both output and capital stock, with larger magnitudes than in standard models without entrepreneurship. He also shows that the corresponding effects on wealth inequality differ markedly from standard models without entrepreneurs. Bilicka and Raei (2020) quantify the effects of equating the tax treatment across legal forms of organization, and find positive and non-trivial effects on aggregate output. Chen et al. (2018) show that a reduction in the corporate income tax burden encourages adoption of the C-corporate form, which reduces capital constraints on firms and leads to substantial effects on output. Building on this literature, our study extends the analysis beyond taxation effects alone, by incorporating the role of tax avoidance behavior and regulatory reforms in shaping firm organization.

Finally, this paper connects to a long-standing literature on tax evasion and tax avoidance. Recent studies such as Maffezzoli et al. (2011) embed tax evasion in heterogeneous agent models, showing that proportional tax systems can reduce evasion and increase rev-

enue. More recent research, including Di Nola et al. (2021) and Fernández Bastidas (2022), incorporates occupational choice into models of tax evasion, highlighting its effects on entrepreneurship and welfare. Rotberg and Steinberg (2021) and Di Nola et al. (2023) further show that ignoring tax avoidance can substantially understate inequality and welfare losses associated with progressive taxation. Our contribution to this literature is to quantify, within a dynamic equilibrium framework, the extent to which rising tax avoidance has driven the reallocation of output toward pass-through entities.

The remainder of the paper is organized as follows. Section 2 summarizes the institutional changes and reforms that have shaped business structures in the United States and may have contributed to the observed reallocation. Section 3 presents the model economy. Section 4 describes the calibration procedure and the performance of the benchmark economy. Section 5 presents the main results of the quantitative analysis, and Section 6 examines the importance of overhead costs for the model's results. Section 7 discusses our main findings and the supporting data. Section 8 concludes.

2 Institutional Dynamics and Reforms in the US

The United States offers a variety of legal business structures, each characterized by differences in flexibility, costs, access to capital, ownership restrictions, and liability protections. Our primary focus in this paper is on the tax treatment associated with these entities. C-corporations face two layers of taxation—corporate income tax and dividend tax—while pass-through businesses, including sole proprietorships, partnerships, LLCs, and S-corporations, allow profits to pass directly to owners, who are taxed only under the personal income tax system. Table 2 summarizes the key characteristics of these legal forms. In addition to tax considerations, other distinctions regarding ownership rules and liability protection are also important which we discuss in detail.

The C-corporation is the most complex business structure. It is recognized as a separate legal entity, providing owners with limited liability protection. C-corporations can raise capital through public stock or bond markets, offering significant growth opportunities. However, they also incur substantial fixed costs associated with legal filings, accounting, governance, and compliance requirements. A key tax disadvantage is double taxation: the firm first pays corporate income tax, and shareholders then pay dividend taxes on distributed earnings.

Among pass-through entities, the sole proprietorship is the simplest form. A single individual owns and operates the business, bearing unlimited personal liability for all debts

Table 1: Legal Form of Businesses

Business Type	Taxation	Ownership	Advantage
Pass-through Entities			
Sole Proprietorships	Regular Income Tax and SE Tax	One person	Easy to set up Low cost
Partnerships	Regular Income Tax and SE Tax	Two or more	Easy to set up Low cost
LLCs	Regular Income Tax and SE Tax	One or more	Hybrid form of C-corporation and partnerships Limited Liability
S-corporations	Regular Income Tax and SE Tax	No more than 100 US citizens	Tax entity to eliminate double tax Limited Liability
C-corporations	Corporate Tax and Dividend Tax	One or more	Can go public, raise capital Limited Liability

Notes: Partnerships are classified as General or Limited Partnerships. LLC stands for Limited Liability Company. The information in this table is partially sourced from Dyrda and Pugsley (2019).

and obligations. Sole proprietors report business income and expenses on their personal tax returns and are subject to both personal income tax and self-employment tax.[3]

Partnerships, which can be general or limited, involve two or more owners. Like sole proprietors, partners are personally liable for the firm's obligations unless structured otherwise. For tax purposes, partnerships are treated similarly to sole proprietorships, although they must file Schedule K-1 (Form 1065) to report income allocations among partners.

S-corporations are not a distinct legal form but rather a federal tax classification created under the 1958 tax code. They combine the liability protection of C-corporations with the tax advantages of pass-through entities. Unlike other pass-throughs, however, S-corporation owners must divide their income into "reasonable compensation," which is subject to self-employment taxes, and distributions, which are exempt.[4] S-corporations are also subject to ownership restrictions: they may have no more than 100 shareholders, all of whom must be U.S. citizens or residents, and can issue only a single class of stock.

Finally, the Limited Liability Company (LLC) is a more recent innovation, first introduced in Wyoming in 1977 and adopted nationwide by the 1990s. LLCs combine the operational flexibility of partnerships with the liability protections of corporations. Although not formally recognized as a tax entity by the Internal Revenue Service, LLCs can elect to be taxed as sole proprietorships, partnerships, or S-corporations, depending on their structure

[3]The self-employment tax covers Medicare and Social Security contributions, totaling 15.3%. Reporting is done via Schedule C (Form 1040) and Schedule SE.

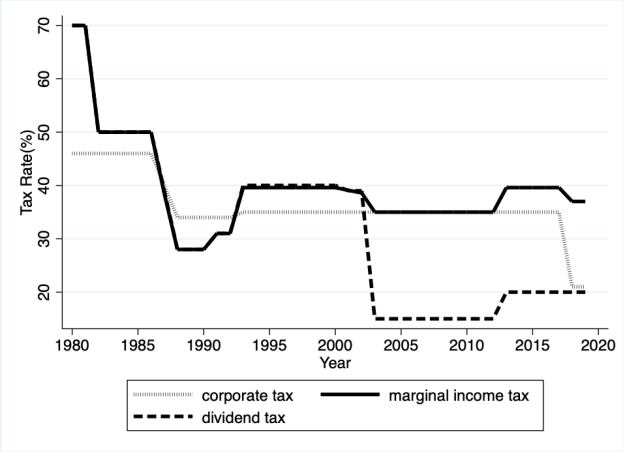
[4]S-corporation owners must file Form 1120S and Schedule SE. IRS guidelines require that the compensation component reflect market wages for comparable services.

and preferences. This hybrid model has contributed to the rapid rise of LLCs in recent decades.

2.1 Tax and Regulatory Changes

The United States has experienced significant changes in taxation and business regulation over recent decades. Figure 2 illustrates the evolution of top tax rates for corporate income, dividends, and personal income. During the Economic Recovery Tax Act of 1981, the top personal income tax rate—affecting both individuals and pass-through entities—fell from 70% to 50%. The Tax Reform Act of 1986 further lowered the top income tax rate to 28% and simplified the tax structure, reducing the number of brackets from fifteen to four. After these reforms, household and pass-through tax rates fluctuated. Marginal rates rose in 1991 and 1993 before falling again in 2003. By 2015, the top marginal income tax rate stood at 39.6%.

Figure 2: Top Bracket Tax Rates



Sources and Notes: SOI Tax Stats – Historical Table 23 & 24 and taxpolicycenter.org. The figure shows the top bracket tax rates of corporate tax, marginal income tax, and dividend tax across time in the US.

The top corporate tax rate for C-corporations also declined substantially, falling from 46% to 34% in 1986. It increased modestly in 1993 following the Omnibus Budget Reconciliation Act. Meanwhile, dividend tax rates, which apply to shareholders of C-corporations, initially tracked the personal income tax rate but were reduced to 15% in 2003. They rose again to 20% in 2012.[5]

In parallel with these tax reforms, important regulatory changes affected the structure of business organization. A notable example is the Small Business Job Protection Act of 1996,

[5]The dividend tax here refers to the qualified dividend tax rate applicable in the United States.

enacted "*to provide tax relief for small businesses, to protect jobs, and to create opportunities.*" This legislation introduced several amendments favoring S-corporations: it raised the shareholder limit from 35 to 75, allowed S-corporations to own stock in C-corporations and establish S-corporation subsidiaries, and expanded eligibility for shareholders to include certain trusts and tax-exempt organizations. The American Jobs Creation Act of 2004 further expanded flexibility by increasing the shareholder limit to 100 and allowing six generations of family members to be treated as a single shareholder entity.

Changes in Tax Avoidance Pass-through entities are obligated to accurately report their profits, losses, and deductions on tax forms such as Schedule C and Schedule K. However, tax noncompliance—particularly the underreporting of pass-through income—presents a significant challenge for the U.S. government.[6] Based on IRS research from the 1985 tax year, non-farm sole proprietorships exhibited a gross tax gap of $13.4 billion and a net misreporting rate of 35%. Partnerships had a smaller gross tax gap of $0.8 billion, with a net misreporting rate of 2.6%.[7] These figures increased substantially over time: by 2011–2013, the tax gap for partnerships and S-corporations reached $19 billion with an 11% net misreporting rate, while non-farm sole proprietorships had a tax gap of $68 billion and a 56% net misreporting rate.

One plausible explanation for the rise in misreporting among pass-through entities is the decline in IRS examinations. Not only did the share of examinations fall, but the auditing shares across income levels changed. For instance, in 1985, the IRS audited 5.4% of sole proprietors with incomes above $150,000. By 2015, only 2% of sole proprietors earning over $140,000 were examined (income levels adjusted by inflation).

Beyond falling audit rates, the growing complexity of pass-through entity structures further impedes tax enforcement. Many partnerships and S-corporations employ ownership layers involving trusts, intermediaries, or additional partnerships, making it difficult to trace tax liabilities. Cooper et al. (2016) document that 15% of partnership income flows through circular ownership structures designed to minimize tax burdens, and 20% of partnership income remains unclassified in IRS data. Circular partnerships face an effective tax rate of just 10.6%, about one-third lower than the average tax rate on partnership income.

Guyton et al. (2021) emphasize that random audits are increasingly ineffective at detect-

[6] According to IRS estimates, approximately 16% of federal taxes went unpaid during the tax years 2011–2013.

[7] See "Federal Tax Compliance Research, Individual Income Tax Gap Estimates for 1985, 1988, and 1992."

Figure 3: Tax Returns Examined by IRS



Sources: Internal Revenue Service Table 9A: Examination Coverage

ing noncompliance among top-income earners, in part due to the complexity of pass-through structures. Audit rates for pass-throughs have consistently been lower than those for C-corporations: in 1997, only 1.04% of S-corporations and 0.58% of partnerships were audited, compared to 2.1% of C-corporations. By 2015, audit rates had declined further, with only 0.5% of S-corporations and 0.4% of partnerships being examined (Figure 3). Moreover, the last random audit program for partnerships occurred in 1982, and for S-corporations in the 2003–2004 tax years.[8] One notable avenue for tax avoidance involves the reporting of profits versus wages. Because wages are subject to income tax, payroll tax, and social insurance taxes—while profits are subject only to regular income tax—S-corporation owners have a strong incentive to classify earnings as profits rather than wages. Smith et al. (2019b) estimate that this classification can reduce tax burdens by approximately 3.8%.

Summary At the big picture level, the combination of tax reforms, regulatory changes, and possibilities for tax avoidance has likely contributed significantly to the reallocation of output across legal forms of organization. In 1985, C-corporations accounted for approximately 78% of total value added, while pass-through entities made up just 22%. By 2015, the C-corporations' output share had fallen by a quarter to about 57%, while the share of pass-throughs exceeded 40% of total output.

[8] As noted by Guyton et al. (2021), audits often focus on small businesses with accessible records rather than large, complex organizations.

This reallocation pattern was broad-based. Appendix Figure A.5 reports the sectoral gross output share of pass-through businesses relative to total output from 1985 to 2015 and shows a substantial increase over time. This growth occurred in all major sectors, including finance, services, wholesale and retail trade, agriculture, construction, manufacturing, mining, and transportation. In every sector, the pass-through share rose between 1985 and 2015, accompanied by a corresponding decline in the output share of C-corporations, as shown in Figure A.6. In the next sections, we examine the extent to which these proximate causes, together with others, contributed to the reallocation of output across organizational forms.

3 Model Economy

We develop a dynamic growth model with occupational choice under uninsurable idiosyncratic risk and borrowing constraints, following Quadrini (2000) and Cagetti and De Nardi (2006). We incorporate endogenous tax avoidance decisions by pass-through business owners, extending the framework developed by Di Nola et al. (2021). A key feature of the model is that the incentive to engage in tax avoidance depends on the structure of income taxation applied to business owners.[9]

The economy consists of households, pass-through businesses, C-corporations, and the government. Time is discrete, with each period corresponding to one year. In every period, households are subject to idiosyncratic shocks to their entrepreneurial and labor abilities. Based on these shocks, households decide whether to become workers or to operate pass-through businesses.

Output is produced by two types of firms: C-corporations, which operate a constant returns to scale technology, and pass-through entities, which are individually owned and managed. This distinction focuses the model on the reallocation of output across these organizational forms, rather than on changes in labor share, markups, or the distribution of income and wealth between firm types. A key assumption is that pass-through business owners have the technological capacity to engage in tax avoidance, while workers and C-corporations do not. This assumption is consistent with empirical evidence: Auten and Langetieg (2020) find that under-reported wage income constituted only 0.2% of total wages between 2002 and 2011, while IRS estimates show that the gross tax gap for corporations relative to output fell from 0.3% to 0.2% between 1985 and 2011–2013.

[9] In the model, the tax system distorts business owners' capital decisions, consistent with IRS tax code practices.

3.1 Demographics

There is a continuum of households of mass one. Each household passes through two stages of life: young and old. A young individual remains young with probability ψ_y and transitions to old age with probability $(1 - \psi_y)$. An old individual survives with probability ψ_o and dies with probability $(1 - \psi_o)$. Upon death, a young individual enters the economy, maintaining a constant population. During the young stage, individuals choose whether to work as employees or operate pass-through businesses. In contrast, old households are retired: they neither supply labor nor run businesses.

3.2 Preferences and Technology

Each individual has preferences on consumption (c) and working hours (l). She discounts future utility at the rate β where $\beta < 1$. The utility function is separable between consumption and labor supplied, given by

$$u(c, l) = \log(c) - \Phi \frac{l^{1+\frac{1}{\theta}}}{1 + \frac{1}{\theta}}$$

where parameter θ governs the intertemporal elasticity of labor supply and Φ determines the intensity of preferences for consumption and labor.

Each individual is endowed with two abilities at the beginning of life: labor productivity (ϵ) and entrepreneurial ability (z). Both abilities are idiosyncratic, positively autocorrelated, and evolve independently according to Markov Process processes with transition functions $\mathcal{F}(z, z')$ and $\mathcal{G}(\epsilon, \epsilon')$, respectively. Newborns draw their entrepreneurial ability from a density function $f(z)$ over $[0, \bar{z}]$ with cumulative distribution function (CDF) $F(z)$, and their labor ability from $g(\epsilon)$ over $[0, \bar{\epsilon}]$ with CDF $G(\epsilon)$.[10] Individuals hold assets denoted by a, where newborns enter the economy with zero wealth. Each period, individuals choose whether to work as employees or operate pass-through businesses.

Workers supply labor elastically and earn income $w\epsilon l$, where l denotes individual labor supply and w is the wage per efficiency unit. Workers save assets a at the after-tax, risk-free rate of return rate r but are not allowed to borrow. Like workers, business owners can save their assets at the same interest rate r. However, unlike workers, they also have access to external financing. Their borrowing capacity is collateral-constrained: the capital they can employ must satisfy $k \leq \Psi a$, where Ψ denotes the leverage parameter. Thus, access to capital increases with asset holdings.

[10] The functions $f(z)$ and $g(\epsilon)$ represent the invariant distributions of the respective Markov processes.

A business owner with entrepreneurial ability z and labor supply on entrepreneurial ability l operates a production technology given by:

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

where γ is the span-of-control parameter following Lucas (1978), α denotes the capital share in production, k is the capital input, and n is the efficiency units of hired labor.

In the second stage of life, individuals neither supply labor nor operate pass-through businesses. Instead, they transition into retirement, financing consumption through their accumulated assets and pension benefits while continuing to save for the next period.

Production also occurs in the C-corporate sector, following the structure introduced by Quadrini (2000) and Cagetti and De Nardi (2006). Both the C-corporate sector and pass-through entities produce a single homogeneous good, and capital depreciates at the same rate across both sectors. The C-corporate sector is composed of a large number of firms operating under Cobb–Douglas production technology:

$$F(K,L) = K^{\alpha}L^{1-\alpha} \tag{2}$$

where α denotes the capital share of output, K is aggregate capital input in the C-corporate sector, and L is aggregate efficiency units of labor employed in the C-corporate sector.

3.3 Government

The government finances its expenditures by collecting taxes from multiple sources. Workers, C-corporations, and pass-through business owners are subject to taxation, while retired individuals receive pension and social security payments. In the C-corporate sector, a proportional corporate tax rate τ_c is applied to output net of labor payments and depreciated capital. On the other hand, there is a progressive taxation schedule for workers' labor income and pass-through entities' taxable business income. Additionally, the government imposes penalties on pass-through business owners who engage in tax avoidance practices. It's important to note that in this environment, there is no altruistic transfer of assets from deceased individuals. Upon an individual's death, the government collects all their assets, which are then allocated for its own spending.

Following Benabou (2002) and Heathcote et al. (2017), the income tax function for individuals is specified as:

$$T(y) = y - \lambda_y y^{1-\tau_y}$$

where y denotes taxable income, λ_y determines the average level of taxation, and τ_y controls the degree of progressivity. When $\tau_y = 0$, the average and marginal tax rates are constant at $(1 - \lambda_y)$. When $\tau_y > 0$, the average tax rate rises with income, implying greater tax burdens on higher earners.

The government monitors pass-through entities according to a probability function $p(k)$, where k denotes the firm's capital investment. A key assumption is that $p(k)$ is strictly increasing in k, implying that larger pass-through entities face a higher probability of being audited. This specification follows Ordonez (2014) and aligns with empirical evidence: audit likelihood tends to rise with income levels (Slemrod et al., 2014), while tax evasion is more prevalent among smaller firms (Ulyssea, 2018).

3.4 Households

We now develop the recursive problem of individuals at different life stages. As our analysis focuses on steady states, we focus on the relevant stationary problems.

The Young Individual's Problem In the first stage of life, each young individual is characterized at the start of a period by three state variables: entrepreneurial ability (z), labor productivity (ϵ), and asset holdings (a), all known with certainty. New entrants are born with zero assets, reflecting the absence of altruistic bequests. Each young individual faces an occupational choice between becoming a worker or operating a pass-through business. The individual's value function is:

$$V(a, z, \epsilon) = \max\{V^{\omega}(a, z, \epsilon), V^{e}(a, z, \epsilon)\} \tag{3}$$

where $V^{\omega}(a, z, \epsilon)$ denotes the value of working and $V^{e}(a, z, \epsilon)$ denotes the value of operating a pass-through business.

The problem for a worker is:

$$V^{\omega}(a, z, \epsilon) = \max_{c, a', l} u(c, l) + \beta\psi_y E(V(a', z', \epsilon')) + \beta(1 - \psi_y)W_r(a') \tag{4}$$

$$c + a' = \epsilon w l + (1 + r)a - T(w l \epsilon) \tag{5}$$

$$c, a', l \geq 0$$

Here, c is current consumption, a' is next period's asset holdings, and l is labor supply.

Labor income is given by $\epsilon w l$, and asset returns are $(1+r)a$. $T(wl\epsilon)$ denotes taxes on labor income. The expectation $E[V(a', z', \epsilon')]$ is taken over next period's productivity draws (z', ϵ'), conditional on the Markov transition functions $\mathcal{F}(z, z')$ and $\mathcal{G}(\epsilon, \epsilon')$. $W_r(a')$ denotes the retirement value function, discounted by β with the probability of aging $(1 - \psi_y)$.

If the young individual chooses to become a business owner, her problem is:

$$V^E(a, z, \epsilon) = \max_{k,\phi} \{p(k) * V^d(a, z, \epsilon, k, \phi) + (1 - p(k)) * V^{nd}(a, z, \epsilon, k, \phi)\} \tag{6}$$
$$k \leq \Psi a$$

where k is the amount of capital invested and ϕ denotes the proportion of income under-reported. $p(k)$ is the probability of detection by tax authorities, assumed to increase with the size of investment. V^d and V^{nd} represent the value functions under detection and non-detection of tax evasion, respectively. In each period, a pass-through business owner chooses the level of capital investment and the extent of income misreporting, subject to borrowing constraints.

The Case of Detection When a pass-through business owner is detected, her value function is:

$$V^d(a, z, \epsilon, k, \phi) = \max_{c,a',l} u(c, l) + \beta\psi_y E(V(a', z', \epsilon')) + \beta(1 - \psi_y) W_r(a') \tag{7}$$

$$\begin{aligned} c + a' = \tilde{\pi}(z, k, \phi, l) + (1 + r)a - \zeta[T(\pi(z, k, l)) - T((1 - \phi)\pi(z, k, l))] \\ -w * \mathbf{1}_{\phi>0} * (\kappa + C(\phi) * f(z, k, \phi, l))\} \end{aligned} \tag{8}$$
$$c, a', l \geq 0$$

In the detection case, the expectation of future value is taken over (z', ϵ') following the Markov transition functions, similar to the worker's problem in Equation (4). With probability $(1 - \psi_y)$, the business owner becomes a retiree in the next period, with continuation value $W_r(a')$ discounted by β. The budget constraint (8) includes several terms. $\tilde{\pi}(z, k, \phi, l)$ denotes after-tax profit of the pass-through business. The second term reflects the gross return on savings. The third term captures penalties paid to the government, proportional to the difference in taxes between full and under-reported profits, where $\zeta > 1$ measures the

severity of penalties and $\pi(z,k,l)$ is taxable income of pass-through business.[11] The final term represents the costs of engaging in tax avoidance.

It is important to note that tax avoidance requires labor, and the cost of avoiding one unit of goods is denoted as w. When tax avoidance is present, the cost of tax avoidance includes both a fixed term, κ, and a variable term $C(\phi)$, which is proportional to the production level. The function $C(\phi)$ is assumed to be strictly increasing and strictly convex, implying that for a given misreported share, the cost of tax avoidance rises with firm output. Following Dyrda et al. (2023), the specific functional form for the variable cost is given by:

$$C(\phi) = B * (\phi + (1-\phi)\log(1-\phi))$$

where $C'(\phi) = -\log(1-\phi) > 0$, $C(0) = 0$, $C(1) = 1$, and $\phi \in [0,1]$. The parameter B governs the curvature and sensitivity of the tax-avoidance cost function, shaping how costs vary with the level of misreporting and production. When $B = 0$, the cost of tax avoidance is fixed in terms of labor input and remains constant regardless of the extent of misreporting or the scale of production. In contrast, when $B > 0$, the cost of tax avoidance becomes proportional to output. In this case, the cost rises with production, and increases at an increasing rate as the business owner conceals a larger fraction of taxable income.

After-tax profit for a business owner, denoted by $\tilde{\pi}(z,a,k,\phi)$, is defined as:

$$\tilde{\pi}(z,k,\phi,l) = \max_{n} \Big\{ \phi \Big[(zl)^{(1-\gamma)} \left(k^{\alpha} n^{1-\alpha}\right)^{\gamma} - wn - \delta k \Big] \tag{9}$$

$$+\lambda_y \Big[(1-\phi) * \Big((zl)^{(1-\gamma)} \left(k^{\alpha} n^{1-\alpha}\right)^{\gamma} - wn - \delta k \Big) \Big]^{(1-\tau_y)} - rk - c_f \Big\}$$

where n denotes the efficiency units of labor hired by the business owner. The optimization problem for after-tax profit maximization incorporates several components. The first term captures the share of gross output, net of labor and capital depreciation costs, that is concealed from the government. Here, ϕ denotes the proportion of taxable business income that is under-reported: $\phi = 0$ corresponds to full compliance, whereas $\phi = 0.5$ indicates that half of taxable income is concealed. The second term represents the reported share of gross output after tax payments. The last two terms account for the business owner's cost of rental capital and fixed overhead costs.

[11] Taxable income for a business is $\pi(z,k,l) = (zl)^{(1-\gamma)} \left(k^{\alpha} n^{*1-\alpha}\right)^{\gamma} - wn^* - \delta k$

The Case of Non-detection When a business owner is not detected, the value function is:

$$V^{nd}(a,z,\epsilon,k,\phi) = \max_{c,a',l} u(c,l) + \beta\psi_y E(V(a',z',\epsilon')) + \beta(1-\psi_y)W_r(a') \tag{10}$$

$$c + a' = \tilde{\pi}(z,k,\phi,l) + (1+r)a - w * \mathbf{1}_{\phi>0} * (\kappa + C(\phi)) * f(z,k,\phi,l))\}$$

$$c, a', l \geq 0$$

The expectation is taken with respect to z' and ϵ', conditional on the Markov transition functions, as in the worker's problem (4). The key difference relative to the detection case is that non-detected business owners do not pay penalties on avoided taxes. Otherwise, the structure of the optimization problem remains the same.

The Retired Individual's Problem In the second stage of life, retired individuals no longer supply labor or operate businesses. They decide only how much to consume and save, given their asset holdings a. Their value function is:

$$W_r(a) = \max_{c,a'} u(c) + \beta\psi_o W_r(a') \tag{11}$$

$$c + a' = (1+r)a + p \tag{12}$$

$$c, a' \geq 0$$

Retired individuals remain alive with probability ψ_o, in which case they continue to the next period; otherwise, they die with probability $1-\psi_o$. The budget constraint (12) shows that the sum of consumption and savings is equal to asset returns and pension or social security payments.

C-corporate Sector's Problem Similar to Quadrini (1999), the problem of the C-corporate sector is as follows:

$$\max_{K_c,L_c}(1-\tau_c)[K_c^{\alpha}L_c^{1-\alpha} - wL_c - \delta K_c] - rK_c \tag{13}$$

where K_c and L_c are demand for capital and labor efficiency in the C-corporate sector, τ_c is the corporate tax rate, r is the rental rate of capital and w is the wage rate for the labor.

3.5 Stationary Equilibrium

At the steady-state equilibrium, the aggregate state of the economy and equilibrium prices are constant over time. Households solve their problem by taking prices and government policies as given. Similarly, given prices and government policies, the C-corporate sector chooses the factor demands, and government budget is balanced.

For ease of notation, let us define $q \equiv (a, z, \epsilon)$ as a summary vector of individual state variables. In the equilibrium, the market clearing condition for factor demands and equilibrium prices is given by:

$$\int_q \epsilon l^*(q) d\mu_w(q) = L_c + \int_q g_n(q) d\mu_e(q) + \int_q \mathbf{1}_{\phi>0}(\kappa + C(\phi^*(q)) * f(q)) d\mu_e(q)$$

where the measures μ_w and μ_e describe heterogeneity across workers and pass-through entrepreneurs. The left-hand side of the equation represents the total labor supplied by workers in the economy. The right-hand side captures aggregate labor demand, which consists of three components: labor demanded by C-corporations, labor demanded by pass-through entities, and additional labor demanded by pass-through entities specifically for tax avoidance purposes.

Similarly, the capital market clearing condition is given by:

$$\int_q a d\mu_w(q) + \int_q a d\mu_e(q) + \int_q a d\mu_o(q) = K_c + \int_q g_k(q) d\mu_e(q)$$

where the measure μ_o describe heterogeneity across retired old agents in standard ways. Aggregate capital supply is described on the left-hand side, containing supply of workers, young pass-through entity owners, and old retired individuals, respectively. The right-hand side shows the aggregate capital demand from C-corporations, and pass-through entities, respectively.

In equilibrium, the C-corporate sector makes zero profits and prices are competitive:

$$w = (1-\alpha)\left(\frac{K_c}{L_c}\right)^{\alpha} \text{ and } r = (1-\tau_c)\left[\alpha(\frac{K_c}{L_c})^{\alpha-1} - \delta\right]$$

The formal definition of stationary recursive competitive equilibrium is left to Appendix B.

3.6 Discussion

It is important to note that tax rates play a crucial role in shaping both capital decisions by pass-through entities and the extent of taxable income concealed from the government.

Given that pass-through business owners face a non-linear income tax schedule, the degree of progressivity is central in determining the magnitude of tax distortions. Under increasing marginal tax rates, larger pass-through businesses experience more severe distortions, while smaller businesses are comparatively less affected. This distortion primarily arises from capital decisions, as capital expenditures are non-deductible under the tax code, whereas labor payments—being deductible—do not distort labor supply choices.

In this framework, an increase in tax progressivity results in more pronounced distortions for larger businesses compared to their smaller counterparts. Consequently, this increase leads to reduced capital and labor demands for business owners, with the magnitude of the decrease being proportional to their respective sizes. Furthermore, higher progressivity rises tax avoidance activities among pass-through businesses, occurring at both extensive and intensive levels. In an effort to mitigate the distortionary effects of high tax rates, some businesses choose to engage in tax avoidance practices and allocate additional resources to such activities, and, at the intensive level, business owners raises their engagement in tax avoidance strategies. With a higher level of concealed income, the costs associated with tax avoidance activities surge at an increasing rate. A rise in tax avoidance activities increases both the net-tax gap and the resources allocated to these activities.

4 Parametrization

This section describes the parameter values used in the model. The calibration targets the U.S. economy in 1985, just prior to the 1986 Tax Reform Act (TRA). We group the parameters into two sets. The first set is either taken directly from the literature or calculated from the data. The second set is jointly calibrated with the model to match key features of the U.S. economy. One model period corresponds to one year. Table 2 Panel A lists the externally fixed parameters, and Panel B reports the calibrated parameters.

Externally Calibrated Parameters We set $\psi_y = 0.975$ and $\psi_o = 0.9$ to imply an expected working life of 40 years and an average retirement span of 10 years, respectively. Working hours are normalized so that 100 hours correspond to one unit of labor supply in the model. The intertemporal elasticity of labor supply is set to 1. The annual capital depreciation rate is calibrated to 0.06, following Stokey and Rebelo (1995). The span-of-control parameter γ is set to 0.8, consistent with Guner et al. (2008). The capital share for

the C-corporate sector, α, is set at 0.36, broadly in line with the literature.[12] To maintain a consistent capital share across sectors, the elasticity of capital for pass-through entities, α_2, is set at 0.45.[13]

Labor productivity is assumed to follow the first-order autoregressive process in logarithm with mean labor productivity λ_ϵ, persistence ρ_ϵ, and a standard deviation of innovations with σ_ϵ:

$$\log \epsilon_t = \lambda_\epsilon + \rho_\epsilon \log (\epsilon_{t-1}) + \varepsilon_\epsilon \tag{14}$$

where ε_ϵ is i.i.d. with mean zero and variance σ_ε^2. We discretize the process using the method of Rouwenhorst (1995). We set $\lambda_\epsilon = 0$, $\rho_\epsilon = 0.95$, and $\sigma_\varepsilon = 0.1225$, consistent with estimates in the literature.

We approximate taxation of incomes in a parametric way, via the average income tax function $t(y) = 1 - \lambda_y y^{-\tau_y}$, introduced by Benabou (2002). Dyrda and Pugsley (2019) estimate the progressivity parameter $\tau_y = 0.149$ for the year 1983-1985. They calculated the progressivity parameter by using the data on the average marginal income tax on wages, salaries, and entrepreneurial income provided by Mertens and Montiel Olea (2018), and IRS data. The estimated progressivity parameter includes both average marginal individual income tax rate (AMIITR) and average marginal payroll tax rate(AMPTR). Therefore, we take the progressive parameter equal to 0.149.

The corporate tax rate, τ_c, is calculated as the ratio of corporate tax liabilities to corporate profits before tax, following the approach of McGrattan and Prescott (2005). Federal Reserve Bank profits, which are taxed at 100%, are excluded from both the numerator and denominator. Specifically, we compute τ_c as the ratio of NIPA profit tax liability (Table 1.16) less Federal Reserve Bank profits (Table 6.16) to corporate before-tax profits (Table 1.16) less Federal Reserve Bank profits. This yields a corporate tax rate of 18.6% for the 1983–1985 period.

The penalty rate for detected tax avoidance is set to 1.5, consistent with the civil fraud penalty of 50% in 1985 (IRS, 1985). Finally, the parameter governing the variable cost level of tax avoidance is normalized to 1.

Internally Calibrated Parameters The remaining parameters are chosen such that the stationary equilibrium of the model matches twelve features of the US economy in 1985: (i) after-tax return to capital, (ii) mean working hours, (iii) exit rate of the pass-through en-

[12] Castaneda et al. (1999) set $\alpha = 0.376$; Domeij and Heathcote (2004) use $\alpha = 0.36$.

[13] An equal capital share across sectors implies $\alpha = \alpha_2 \gamma$.

Table 2: Parameters of the Model

Parameter		Value
A. Fixed Parameters		
Prob. of Staying Young	ψ_y	0.975
Prob. of Staying Old	ψ_o	0.9
Depreciation	δ	0.06
Span of Control	γ	0.8
Capital Share for C Sector	α	0.36
Capital Share for Pass Through Sector	α_2	0.45
Mean of ϵ_t	λ_ϵ	0
Autocorrelation of ϵ_t	ρ_ϵ	0.95
Standard Dev. of $\varepsilon_{\epsilon,t}$	σ_ε	0.1225
Progressivity Parameter	τ_y	0.149
Corporate Tax	τ_c	0.186
Penalty Rate	ζ	1.5
Variable Cost Parameter	B	1
Frisch Elasticity of Labor Supply	θ	1
B. Calibrated Parameters		
Discount Factor	β	0.956
Mean of Entrepreneurial Productivity	λ_z	0.127
Persistence of Entrepreneurial Productivity	ρ_z	0.925
Standard Deviation of ε_z	σ_z	0.336
Overhead Cost of Pass-through Entities	c_f	0.0925
Average Tax Rate	λ_y	0.657
Borrowing Limit	Ψ	1.405
Pension	p	0.13
Parameter of $p(.)$	p_1	59
Parameter of $p(.)$	p_2	0.48
Fixed cost of tax avoidance	κ	0.013
Disutility from working	Φ	7

Notes: Table 2 Panel A illustrates the fixed parameters and Panel B indicates the calibrated parameters.

tities, (iv) share of production from pass-through entities, (v) share of pass-through entities, (vi) mean income of pass-through entities relative to workers, (vii) tax revenue to output ratio (viii) debt to equity ratio of pass-through entities, (ix) pension and social security payments to mean income ratio (x) net tax gap to output ratio (xi) tax avoidance rate of 90-95 percentile of reported business income relative to the of 40-60 percentile and (xii) tax avoidance rate of 0-40 percentile reported business income relative to that of 60-80 percentile. Table 2 Panel B illustrates the calibrated parameter values that are jointly determined with the equilibrium of the model to match these features of the US economy in 1985.

Gomme et al. (2011) estimate the after-tax return to capital as 5.16 percent, which is the target value for the discount factor, β. Likewise, entrepreneurial productivity is assumed to

follow a logarithmic form of first-order autoregressive process which is as follows:

$$\log z_t = \lambda_z + \rho_z \log (z_{t-1}) + \varepsilon_z \tag{15}$$

where λ_z is the mean entrepreneurial ability, ρ_z is the persistence of the autoregressive process for entrepreneurial ability, and ε_z is i.i.d shock with mean zero and variance σ_z^2. We calibrate λ_z to match the share of output produced by pass-through entities (22.4 percent, based on IRS and NIPA data). The persistence parameter ρ_z is chosen to match the average business exit rate of 14 percent, as estimated by Quadrini (1999). The standard deviation σ_z is calibrated to match a 6.6 percent share of self-employed active pass-through business owners, computed from the 1989 SCF following the definition of entrepreneurs in Cagetti and De Nardi (2006).[14]

We also calibrate overhead costs for pass-through entities to match the ratio of pre-tax pass-through income to labor income, estimated between 1.4 and 1.9 based on Quadrini (1999) and SCF 1989 data. The debt-to-equity ratio for pass-through entities is targeted to 0.39, based on Flow of Funds and IRS balance sheet data. Finally, pension and social security payments are calibrated to match 40 percent of mean income, following Kotlikoff et al. (1999).

Tax Avoidance Parameters The audit probability function follows a logistic form as in Di Nola et al. (2021):

$$p(k) = \frac{1}{p_1 + e^{-p_2 k}}$$

with $p_1 > 0$ and $p_2 > 0$. In this specification, p_1 determines the baseline level of audit probability at zero capital ($p(0) = 1/(1 + p_1)$), and p_2 governs the curvature of the audit function. When $p_2 = 0$, audit probability is flat across firm sizes. We calibrate p_1 and p_2 to match two key moments from the data: the ratio of tax avoidance between the 90–95th and 40–60th percentiles of reported business income, and the ratio between the 0–40th and 60–80th percentiles. These moments correspond to values of 0.1 and 0.7, respectively, based on estimates from Auten and Langetieg (2020). The last parameter, the fixed cost of tax avoidance κ, targets the 0.3% net tax gap to output ratio, derived from IRS Federal Compliance Research.

It is important to highlight a few implications from the calibrated parameters. First, the mean of entrepreneurial ability (λ_z) exceeds that of labor productivity (λ_ϵ). Second,

[14] Cagetti and De Nardi (2006) use the definition of self-employed active business owners as the one who is self-employed, has an active management role, and own or share ownership in any privately held businesses.

Table 3: Model Fit

Target	Data	Model Fit	Source
Return to capital(%)	5.16	5.13	Gomme et al. (2011)
Mean Hours Worked	0.33	0.33	Di Nola et al. (2021)
Exit Rate(%)	0.14	0.13	Quadrini (1999)
Share of Production from PT(%)	22.4	22.4	IRS, NIPA
Share of self-employed PT Owners(%)	6.6	6.6	SCF 1989
Relative Income of PT to Worker	$1.4 - 1.9$	1.6	Quadrini (1999) & SCF 1989
Tax Revenue to Output Ratio(%)	18.6	18.9	NIPA
Debt to Equity Ratio(%)	0.39	0.39	Flow of Funds
Pension to Mean Income	0.4	0.4	Kotlikoff et al. (1999)
Net Tax Gap to Output Ratio	0.3	0.3	IRS
Tax Avoidance Ratio (0-40 to 60-80)	0.7	0.7	Auten and Langetieg (2020)
Tax Avoidance Ratio (90-95 to 40-60)	0.1	0.1	Auten and Langetieg (2020)

Notes: Table 3 illustrates the moments targeted with their counterparts. *Return to capital* stands for the after-tax average returns to capital, and *Mean Hours Worked* refers to the average working hours in the economy. *Exit Rate* refers to the share of workers who were pass-through business owners in previous year relative to the share of pass-throughs in the economy. *Share of production from PT* stands for the share of production from pass-through entities, and *Share of self-employed PT Owners* refers to the percentage of self-employed active business pass-through owners in the economy, *Relative Income of PT to Worker* refers to the average income of pass-through entity business owners relative to the average income of the workers.

the persistence of labor productivity (ρ_ϵ) is greater than the persistence of entrepreneurial ability (ρ_z). Third, the standard deviation of entrepreneurial shocks (σ_{ε_z}) substantially exceeds that of labor productivity shocks ($\sigma_{\varepsilon_\epsilon}$). These patterns imply that entrepreneurship entails substantially higher risk than wage work, consistent with empirical findings. Finally, the calibrated borrowing constraint parameter implies that entrepreneurs can borrow up to 41% beyond their asset holdings which is consistent with estimates of Evans and Jovanovic (1989).

The Benchmark Economy Table 3 describes the moments targeted in the model and their corresponding counterparts in the US economy. The model replicates key features of the US economy in 1985, including the share of production of pass-through entities, share of self-employed pass-through business owners, mean hours worked and the debt-to-equity ratio of pass-through entities. The model also closely matches the exit rate, after-tax return to capital, tax revenue to output ratio and relative income of pass-through business owners relative to workers.

In terms of tax avoidance targets, the model generates precise counterparts when compared to empirical data. Notably, the model accurately reflects the net tax-gap to output ratio of 0.3%, a value estimated through IRS Compliance Research. The model also nicely matches both the extensive and intensive margin of tax avoidance. For example, the model

aligns with the data in exhibiting the reported income distribution of the 0-40 percentile as lower than that of the 40-60 percentile. Additionally, the model shows that the top 1% and top 0.1% of reported business income do not engage in significant tax avoidance, primarily due to the substantial costs associated with such activities. The model also matches the relative avoidance rates between the 90–95th and 40–60th percentiles, and between the 0–40th and 60–80th percentiles of reported income.[15] These results suggest that medium-sized businesses engage more heavily in avoidance than both smaller and larger firms, consistent with the empirical data.

5 Drivers of Business Organization: 1985-2015

In this section, we present our main quantitative findings by computing different steady states in different cases. We first introduce tax changes into the benchmark economy, adjusting corporate and income tax rates to their 2015 levels. We implement each case separately to isolate their quantitative effects on output reallocation, and then in a joint fashion. We subsequently examine the contribution of increased tax avoidance by targeting the observed rise in the net tax gap. Finally, we assess the impact of relaxing borrowing capacity for pass-through businesses, reflecting improvements in financial intermediation and reduced regulations since 1985. We then evaluate the effects of all changes simultaneously.

5.1 Changes in the Tax Structure

Corporate Tax Column II of Table 4 presents the stationary equilibrium under the 2015 corporate tax regime. In the benchmark economy, the corporate tax rate was 18.6%, whereas by 2015 it had declined to 14.5%. The model predicts a reallocation away from pass-through entities: the pass-through production share falls from 22.4% to 21.8%, and pass-through capital use declines from 15.3% to 14.7%. This is intuitive: a lower corporate tax rate increases the after-tax return to capital and triggers a transition to a new steady state. As a result, some pass-through business owners transition into workers, reducing the share of pass-through entities.

The corporate tax cut generates two offsetting forces on aggregate capital accumulation. On the one hand, a higher after-tax return on savings encourages greater capital accumu-

[15] It is important to note that the model does not fully replicate the absolute value of tax avoidance due to the presence of under-reported income percentiles in the data, particularly within the range of $500 to $30,000 in business income.

lation. On the other hand, the decline in the number of pass-through entrepreneurs—who typically have a higher marginal propensity to save—reduces aggregate savings. Quantitatively, the first effect dominates: total capital accumulation rises by 4%, and aggregate output increases by amount, 1.2%. This output growth is primarily driven by a 4.1% rise in production by C-corporations, while the output of pass-through entities falls by 0.1% relative to the benchmark economy.

Table 4: Change in Taxation

	Benchmark	Corporate Tax	Tax Progressivity	Both Tax Changes	Only Tax Avoidance	Tax Avoidance and Tax Changes
Capital used by pass-through entities(%)	15.3	14.7	15.8	15.2	15.9	16.1
Production from pass-through entities(%)	22.4	21.8	23.0	22.3	23.7	24.1
$\frac{\Delta Model}{\Delta Data}$ (%)		-3.0	2.8	-0.6	6.2	8.1
Interest Rate(%)	5.13	5.19	5.13	5.16	5.13	5.13
Output Change(%)		1.2	3.4	4.4	-0.2	3.9
PT. entities in the non-retired pop.(%)	6.6	6.5	6.7	6.6	7.3	7.4
Debt to Equity Ratio	0.39	0.39	0.39	0.39	0.38	0.39
Net Tax Gap to Output Ratio (%)	0.3	0.3	0.2	0.2	0.6	0.6
Resource Allocated to Tax Avoidance (Relative to Output) (%)	0.28	0.24	0.16	0.17	0.46	0.46

Notes: Table 4 reports different stationary equilibria under cases. The benchmark economy in column II shows the results in which corporate tax(τ_c) and tax progressivity(τ_y) are equal to 18.6% and 0.149, respectively. Column III indicates the changes where the only corporate tax rate changed to its 2015 level (14.5%). Column IV shows the changes with the change of tax progressivity only, 0.095 in 2015 while Column V column illustrates the combination of both tax changes that happened in 2015. Column VI indicates the stationary equilibrium with the change of the variable cost of tax avoidance parameter, B from 1 to 0.64, match the net tax gap to output ratio to 0.6%. The last column illustrates the combination of both tax changes and tax avoidance to the 2015 level by changing B to 0.45. The variable $\frac{\Delta Model}{\Delta Data}$ stands for the change in model in the output share of pass-through entities relative to change in the output share of pass-through entities in the US observed between 1985 and 2015. *PT. entities in the non-retired pop.*stands for the percentage share of pass-through entities in the non-retired population.

Tax Progressivity Column III of Table 4 presents the counterfactual results under the 2015 income tax progressivity.[16] The model shows a rise in pass-through activity: the pass-through production share increases from 22.4% to 23.0%, and pass-through capital use rises from 15.3% to 15.8%. This suggests that the model accounts for roughly 3% of the observed change in the output share of pass-through entities. The reform operates through both the worker side and the pass-through side of the model. On the worker side, lower progressivity reduces marginal tax rates on labor income, raising the after-tax return to supplying hours and to saving out of labor earnings. As a result, workers increase hours

[16]Specifically, the progressivity parameter (τ_y) falls to 0.095, following the estimates in Dyrda and Pugsley (2020).

supplied and accumulate more assets. Quantitatively, aggregate labor supply rises by 2.6% in this counterfactual, which directly increases production capacity and expands the economy's effective labor input. In general equilibrium, part of this additional labor is absorbed by the C-corporate sector—which hires labor competitively under constant returns—thereby supporting an increase in C-corporate production even though the pass-through sector's output share rises. In fact, C-corporate output share increases by 2.6% relative to benchmark economy.

On the pass-through side, lower progressivity reduces the tax wedge on scale for high-productivity pass-through firms, especially those operating at higher income levels where tax rates are most affected. This alleviation of scale distortions generates a dominant intensive-margin response: more productive incumbents expand capital and hired labor by more than marginal firms, raising pass-through output and increasing the pass-through capital share. A second channel operates through the extensive margin: the higher after-tax value of business ownership induces some workers to switch into pass-through entrepreneurship. This entry response is small in the aggregate, consistent with the limited change in the pass-through ownership share (6.6% to 6.7%). Overall, output share of pass-throughs increased 6.1% relative to benchmark economy.

Like corporate tax changes, a decline in income tax progressivity reduces distortions and leads to higher aggregate output, which rises by 3.4%. The reform also improves compliance incentives. Lower tax rates reduce the opportunity cost of under-reporting for the pass-through firms, leading to a substantial decline in avoidance: relative to benchmark economy, net tax gap decreased by 34%. This implies that the net tax gap declines from 0.3% to 0.2% of output, and resources allocated to avoidance fall from 0.28% to 0.16% of output.

Tax Progressivity and Corporate Tax Changes The two tax changes push the economy in opposite directions in terms of business organization. The corporate tax cut strengthens incentives for production in the C-corporate sector, while the reduction in income tax progressivity lowers the effective tax wedge on pass-through income and alleviates the distortions for high-productivity pass-through firms. When both reforms are imposed together, these forces largely offset in terms of output reallocation across legal forms. This suggests that the pass-through production share declines only slightly from 22.4% to 22.3%, and the share of capital employed by pass-through entities falls from 15.3% to 15.2%. Even though pass-through shares barely move, aggregate activity expands substantially. Aggregate output rises by 4.4%, alongside a 2.6% increase in aggregate labor input and a 7.4%

increase in aggregate capital. In fact, the results indicate that output share of C-corporations increased by 4.5% while that of pass-through sector rose by 3.9% relative to the benchmark.

The Role of Tax Avoidance Column V of Table 4 presents the stationary equilibrium consistent with the 2015 net tax gap-to-output ratio, which we match by adjusting the value of B, the variable cost parameter. Reducing the variable cost of tax avoidance changes the incentives faced by business owners: individuals who previously complied with tax laws now choose to engage in avoidance, while those already engaged in avoidance intensify their activities. The model accounts for rougly 6% of the observed reallocation of output toward pass-through entities in the U.S.

However, the rise in tax avoidance prompts business owners to scale back their capital investments to reduce the risk of detection. As a result, firms operate at smaller scales, leading to a decline in the average productivity of pass-through entities. Concomitantly, the expansion of avoidance opportunities encourages entry by less productive entrepreneurs, increasing the share of pass-through entities to 6.8%. The extensive margin responds strongly: the share of pass-through owners in the non-retired population increases from 6.6% to 7.3%. Intuitively, cheaper avoidance raises the net-of-tax value of pass-through operation, transitioning marginal households into entrepreneurship and encouraging existing pass-through owners to conceal a larger fraction of income. At the same time, the avoidance channel generates a distortion on the intensive margin. Because audit probability increases with firm scale, higher misreporting raises the expected cost of operating at large sizes. This creates an incentive to stay small: incumbents reduce their capital level to reduce detection risk, which pushes firms toward smaller scales and lowers average productivity in the pass-through sector. Consistent with this mechanism, resources devoted to avoidance rise sharply—from 0.28% to 0.46% of output—and the net tax gap increases from 0.3% to 0.6% of output by construction. In aggregate, these resource costs and scale distortions dominate the increase in pass-through activity: despite the expansion of pass-through production, total output declines slightly by 0.2% relative to the benchmark.

When tax changes and increased tax avoidance are considered jointly, the model accounts for 8.1% of the observed output reallocation toward pass-through entities. The reduction in tax progressivity is therefore much amplified by the changes in tax avoidance. All this is accompanied by an overall 3.9% increase in aggregate output, as shown in Column VI of Table 4. Clearly, as our results show, the contribution of all tax changes to the observed reallocation is quantitatively small. The bulk of the reallocation is still unaccounted for.

5.2 Changes in the Capacity to Borrow

Pass-through business owners often face barriers due to financial constraints. Relaxing these borrowing constraints allows pass-through entities to expand their operations, increase firm size, and boost production. A useful indicator of borrowing capacity is the debt-to-equity ratio, which has non-trivially increased after 1985. What is the importance of these changes and how do they complement all other changes associated to taxation?

Table 5: Changes in Capacity to Borrow

	Benchmark	Capacity to Borrow to Match Data	Tax and Borrowing Changes	Change in All Channels
Capital used by pass-through entities(%)	15.3	17.3	17.8	17.8
Production from pass-through entities(%)	22.4	25.1	25.5	26.1
$\frac{\Delta Model}{\Delta Data}$ (%)		13.0	14.9	17.8
Interest Rate(%)	5.13	5.13	5.13	5.09
Output Change(%)		0.4	5.0	4.5
PT. entities in the non-retired pop.(%)	6.6	7.3	7.4	7.7
Debt to Equity Ratio	0.39	0.50	0.50	0.50
Net Tax Gap to Output Ratio (%)	0.3	0.4	0.2	0.6
Resource Allocated to Tax Avoidance (Relative to Output)(%)	0.28	0.31	0.17	0.46

Notes: Table 5 reports four different stationary equilibria in each column. The benchmark economy in column II shows the results in which the borrowing limit is calibrated to 1985 pass-through entities' debt-to equity ratio. Column III illustrates stationary equilibrium in which borrowing limit is calibrated to 2015 pass-through entities' debt-to equity ratio (0.50). Column IV illustrates the effects of borrowing and tax changes. Column V shows the effects of all channels, including tax avoidance. The variable $\frac{\Delta Model}{\Delta Data}$ stands for the change in model in the output share of pass-through entities relative to change in the output share of pass-through entities in the US observed between 1985 and 2015. *PT. entities in the non-retired pop.*stands for the percentage share of pass-through entities in the non-retired population.

Between 1985 and 2015, the debt-to-equity ratio of non-corporate businesses in the U.S. rose from 37% to 49%. Similarly, the debt-to-equity ratio for pass-through entities, including S-corporations, increased from 39.2% to 50.3%.[17] Several factors contributed to this rise, including improvements in financial intermediation and easier access to credit following regulatory changes. These reforms allowed for the holding of safe-harbor debt, expanded eligible loan structures, and broadened the shareholder base for S-corporations. The emergence of

[17]The debt-to-equity ratio for pass-through entities is calculated by weighting the debt and equity of S-corporations based on IRS balance sheet data for S-corporations and C-corporations, as detailed in the appendix.

limited liability companies (LLCs), which face fewer restrictions on ownership, also enhanced financing opportunities. Additionally, the introduction of lending funds and small business loan programs in the 2000s further alleviated borrowing constraints. Together, these developments suggest that by 2015, pass-through business owners faced fewer financial barriers compared to 1985.

To capture the changes in the debt-to-equity ratio observed in the data, we now conduct experiments in which the borrowing capacity of business owners is relaxed relative to the benchmark economy. Column II of Table 5 presents a calibration where the borrowing limit is adjusted to exactly match the debt-to-equity ratio observed in 2015.

Focusing on Column II, the relaxation of capacity to borrow for pass-through business owners leads to a significant increase in their production share, accounting for approximately 13% of the shift. This change is substantial: by easing financial frictions, pass-through owners can rent more capital and labor, thereby expanding their operations. Consequently, the average marginal product of capital declines. The expanded access to borrowing induces a 0.7 percentage point increase in the share of pass-through business owners in the non-retired population, and an increase in aggregate output of about 0.4%.

Combination of Tax Changes with Capacity to Borrow The expansion of borrowing capacity for pass-through entities, combined with the reduction in tax progressivity, alleviates both the effects of taxation and financial frictions on pass through owners. Column III of Table 5 presents the stationary equilibrium incorporating both tax changes – corporate taxation and progressivity – and the rise in capacity to borrow in order to match the data in 2015.

These two channels now account for roughly 15% of the observed reallocation of output toward pass-through entities in the United States. This is intuitive: easing financial frictions together with lower tax progressivity enables relatively productive workers to transition into entrepreneurship, while a reduction in corporate taxes provides a countervailing force. Together, these effects generate about 0.8 percentage point increase in the share of business owners among the non-retired population. Business owners also respond along the intensive margin, expanding their capital and labor inputs as financing conditions and tax incentives improve. As a result, the output share of pass-through entities rises by 19.3% relative to the benchmark, and output increases by about 5% across steady states.

All Together Now Column IV of Table 5 combines the three forces we have emphasized—tax reforms, higher tax avoidance, and a relaxation of borrowing constraints calibrated to match the 2015 debt-to-equity ratio. Together, these channels account for about 18% of the observed long-run reallocation of output toward pass-through entities. Therefore, the effect of all forces in tandem is quantitatively of second order.

Intuitively, easier credit allows pass-through owners to operate at larger scale, tax reforms improve after-tax returns (especially for high-productivity businesses), and cheaper avoidance raises the net payoff to organizing as a pass-through. In the aggregate, these effects reinforce one another and produce a meaningful expansion in activity: total output rises by 4.5% in the new steady state.

6 The Importance of Overhead Costs

The tax changes and the increase in borrowing capacity since 1985 can account for less than one-fifth of the observed changes in the reallocation of output in the US. What could account for the rest of the changes?

In this section, we discuss the potential role of regulatory changes, mimicked by the overhead costs that pass-through business owners are subject to, on the reallocation of output. We find that changes in this channel in line with evidence can indeed contribute to a considerable reallocation of output toward pass-through entities.

Motivated by the institutional changes that we document in the next section, we interpret part of the long-run shift toward pass-through activity as reflecting a reduction in fixed operating burdens. Using alternative definitions of overhead costs, we document that overhead costs relative to business receipts for pass-through entities substantially declined by roughly 34–44% between 1985 and 2015. To quantify the implications, we run a counterfactual exercise in which pass-through overhead costs fall by 30%. Table 6 reports the resulting across steady states.

A reduction in overhead costs *alone* accounts for about 29% of the output reallocation toward pass-through entities. Lower overhead costs reduce the entry threshold for entrepreneurship, raising the share of pass-through owners by 2.7 percentage points. Pass-through owners also respond by increasing their demands for capital and labor services, as lower overhead boosts after-tax income and savings. Nonetheless, the overall aggregate impact on output is modest, with total output increasing by 0.5%.

Yet, including a 30% reduction in overhead costs alongside all other changes leads to

Table 6: Change in Overhead Costs

	Benchmark	Change in All Channels	30% Fall in Overhead Costs	Change in All & 30% Fall in Overhead Costs	Change in All & 40% Fall in Overhead Costs
Capital used by pass-through entities(%)	15.3	17.8	20.2	25.8	26.8
Production from pass-through entities(%)	22.4	26.2	28.4	35.1	36.2
$\frac{\Delta Model}{\Delta Data}$ (%)		17.8	28.8	61.1	66.3
Interest Rate(%)	5.13	5.09	5.04	4.97	4.95
Output Change(%)		4.5	0.5	5.5	5.3
PT. entities in the non-retired pop.(%)	6.6	7.7	9.3	11.2	9.7
Debt to Equity Ratio	0.39	0.50	0.37	0.50	0.50
Net Tax Gap to Output Ratio (%)	0.3	0.6	0.4	0.6	0.6
Resource Allocated to Tax Avoidance (Relative to Output)(%)	0.28	0.46	0.31	0.52	0.51
Change in Overhead Costs Relative to PT Output (%)		-4.2	-23.2	-26.7	-35.5

Notes: Table 6 reports different stationary equilibria in each column. Column III shows the new stationary equilibrium incorporating all the changes analyzed – tax policy changes, increased tax avoidance, and relaxed borrowing constraints. Column IV shows the new stationary equilibrium where there is a decline in overhead costs by 30% only, while Column V adds a 30% decline in overhead costs to all other channels. Column VI considers a 40% decline in overhead costs together with all other channels. The variable $\frac{\Delta Model}{\Delta Data}$ denotes the model-implied change in the output share of pass-through entities relative to the observed shift in the U.S. data between 1985 and 2015. The variable *PT. entities in the non-retired pop.* refers to the percentage of pass-through businesses within the non-retired population.

an increase in total output of about 5.5%, and a reduction in the overhead costs relative to output of pass-through entities of about 26.6%. This is is concomitant with substantial increase in the share of output reallocation relative to what is observed in the data – about 61.1%. If instead we let overhead costs fall by 40%, we find a long-run reallocation of about two thirds of the observed reallocation in data. Overhead costs fall relative to the output of pass throughs by about 35%.

Overall, these are quantitatively important findings. In big picture terms, we find that tax changes and changes in borrowing access are quantitatively not central in accounting for the observed reallocation. But changes in all drivers in tandem – when overhead costs are included in magnitudes suggested by evidence – can go a long way. Nonetheless, there is still a substantial fraction of the output reallocation – about a third or more – that needs to be accounted for.

7 Discussion

In this section, we explore how the reallocation of output across legal business forms varies in alternative economic scenarios. First, we present and discuss evidence related to the reduction in overhead costs over the years. Second, evaluate the extent of reallocation in our economy under lower elasticities of labor supply. Third, we consider the case of a partial deductibility of depreciated capital. Finally, we conduct an exercise to account for the near full deductibility of business debt in practice.

7.1 The Fall in Overhead Costs: Evidence

Multiple regulatory and legal changes over 1980-2015 period plausibly lowered the fixed costs of operating in formal pass-through forms. A central development was the diffusion of the limited liability company (LLC), whose flexibility—and the simplification introduced by check-the-box entity classification—made pass-through organization easier to implement and maintain for a broad set of firms. In parallel, reforms such as the Small Business Job Protection Act of 1996 reduced frictions for S-corporations by relaxing constraints around re-election following termination, weakening the persistence of organizational barriers. Consistent with this broader direction, IRS administrative relief also expanded the set of cases in which late elections and certain inadvertent terminations could be resolved conditional on reasonable-cause standards, reducing the expected risk that organizational form choices would be disrupted by procedural errors. Other changes expanded ownership flexibility and simplified retirement-plan provisions for pass-through entities.[18]

More broadly, reducing the administrative burden created by tax regulation has been an explicit policy objective in many settings. The OECD's 2010 cross-country review document programs aimed at lowering paperwork and filing burdens for businesses.[19] In the United States, one concrete example is the simplification of the S-corporation election (Form 2553), which is reported to reduce annual paperwork burden by about 8 million hours in 2007.[20] These evidences supports the view that administrative frictions and overhead costs faced by formal pass-through entities declined over time.

Over the same period, pass-through activity shifted toward organizational forms that are typically less costly to administer. The IRS's SOI partnership statistics show that by 2015,

[18] See Small Business Job Protection Act of 1996.

[19] For details, see OECD report.

[20] See OMB, Information Collection Budget of the U.S. Government, FY2007; see also the OECD (2010) discussion of this initiative.

domestic LLCs constituted 67.7% of partnerships, reflecting a large-scale reorganization of partnership activity toward LLC-type structures.[21] This shift is especially relevant because the largest overhead declines in our SOI aggregates occurred among partnerships, as we document below.

Overhead costs in SOI aggregates. We now proceed to quantify a substantial decline in overhead costs using IRS Statistics of Income (SOI) income-statement aggregates. Because SOI does not report "overhead" as a single line item, we construct it from reported income-statement components and compute overhead intensity under multiple definitions. We define overhead as operating expenses that remain after netting out core production inputs—cost of goods sold, labor compensation, and depreciation/depletion/amortization. We consider four related definitions; a cost or expense-based notion, as well as a receipts-based residual measure following Hanson et al. (2021). Across definitions, overhead captures organizational and back-office expenses—such as legal and professional services, office and administrative costs, payments to intermediaries, and other operating expenses—that behave like fixed or quasi-fixed costs of operating a formal business entity. Using both expense-based and identity-based constructions helps ensure that the measured decline is not driven by a single accounting identity or reporting convention.

Let R denote business receipts and let Π denote profits measured in SOI as *net income after interest*. Our first two measures focus on a cost or expense approach:

$$\begin{aligned}\text{Overhead}_1 \equiv\ & \text{Total Expenses} - \text{Costs of Goods Sold} \\ & - \big(\text{Salaries and Wages} + \text{Compensation of Officers}\big) \\ & - \big(\text{Depreciation} + \text{Depletion} + \text{Amortization}\big), \qquad (16)\\ \text{Overhead}_2 \equiv\ & \text{Overhead}_1 - \text{Interest Paid}. \qquad (17)\end{aligned}$$

Our next two measures follow an accounting-identity approach in the spirit of Hanson et al. (2021):

$$\begin{aligned}\text{Overhead}_3 \equiv\ & R - \text{Costs of Goods Sold} \\ & - \big(\text{Salaries and Wages} + \text{Compensation of Officers}\big) \\ & - \big(\text{Depreciation} + \text{Depletion} + \text{Amortization}\big) - \Pi, \qquad (18)\\ \text{Overhead}_4 \equiv\ & \text{Overhead}_3 - \text{Interest Paid}. \qquad (19)\end{aligned}$$

[21] See Partnership returns in 2015.

Because Π is net of interest, Overhead_4 nets out financing costs and isolates an operating-overhead concept. For each definition $k \in \{1, 2, 3, 4\}$, define overhead intensity $\omega_k \equiv \text{Overhead}_k / R$.

The decline in overhead intensity: 1985–2015. Table 7 reports overhead intensity in SOI aggregates for 1985 and 2015 by legal form and definition. Overhead intensity falls sharply for pass-through entities under all four measures. Using Definitions 1–4, the aggregate pass-through overhead ratio declines by 33.9%, 29.3%, 43.5%, and 39.2%, respectively. The decline is largest for partnerships, while overhead intensity rises for sole proprietorship entities, suggesting that the downward trend is critically concentrated in the other pass-through forms. Furthermore, the decline remains large when we net out interest payments (Definitions 2 and 4), naturally implying that it is not driven by interest or financing costs.

Table 7: Overhead intensity in SOI aggregates: 1985 vs. 2015

Entity	Definition	% change
All pass-through	Defn. 1	−33.9
All pass-through	Defn. 2	−29.3
All pass-through	Defn. 3	−43.5
All pass-through	Defn. 4	−39.2
Sole proprietorship	Defn. 1	+26.5
Sole proprietorship	Defn. 2	+34.1
Sole proprietorship	Defn. 3	+26.2
Sole proprietorship	Defn. 4	+33.9
Partnership	Defn. 1	−53.1
Partnership	Defn. 2	−45.0
Partnership	Defn. 3	−69.0
Partnership	Defn. 4	−65.5
S-corporation	Defn. 1	−32.5
S-corporation	Defn. 2	−29.6
S-corporation	Defn. 3	−31.7
S-corporation	Defn. 4	−28.2

Sources: Our calculation from data from Statistics of Income (SOI) from the Internal Revenue Service.

In Appendix D, we show via a series of decompositions that the decline in overhead costs

occurred mostly within legal forms, not across. We also show that a substantial portion of the decline is accounted by economic activity reallocated towards legal forms whose overhead intensity was falling, e.g. partnerships.

7.2 The Role of the Labor Supply Elasticity

Changes in the tax structure affect both labor supply decisions of households and labor demand from businesses. Consequently, the quantitative results regarding output reallocation are sensitive to the responsiveness of labor supply among workers and pass-through business owners. We parameterized the benchmark economy to a labor Frisch elasticity of 1, a reasonable value in macroeconomic terms. We now evaluate the importance of this choice, by setting the elasticity of labor supply to sharply lower values (0.25, 0.5), recalibrating the model to match the 1985 U.S. economy.

Table 8: Changes in All Channels under Different Elasticity of Labor Supply

	All Changes ($\theta = 0.25$)	All Changes ($\theta = 0.5$)	All Changes ($\theta = 1$)
Capital used by pass-through entities(%)	26.3	26.7	25.8
Production from pass-through entities(%)	34.6	35.3	35.1
$\frac{\Delta Model}{\Delta Data}$ (%)	58.7	62.0	61.1
Interest Rate(%)	5.09	5.28	4.97
Output Change(%)	3.4	3.8	5.5
Mean Hours Worked Change (%)	1.1	1.8	2.7
PT. entities in the non-retired pop.(%)	11.1	11.5	11.2
Debt to Equity Ratio	0.50	0.50	0.50
Net Tax Gap to Output Ratio (%)	0.6	0.6	0.6
Resource Allocated to Tax Avoidance (Relative to Output)(%)	0.50	0.53	0.52
Change in Overhead Costs Relative to PT Output (%)	-26.3	-25.8	-26.7

Notes: Table 8 presents different steady states, each corresponding to a different elasticity of labor supply parameter. Column II shows the new stationary equilibrium incorporating all the changes considered -— tax policy changes, increased tax avoidance, relaxed borrowing constraints together with a 30% decline in overhead costs – when elasticity of labor supply is 0.25 while Colum III is under 0.5. Column IV pertains to the baseline parameterization. The variable $\frac{\Delta Model}{\Delta Data}$ denotes the model-predicted change in the output share of pass-through entities, relative to the observed change between 1985 and 2015. *PT entities in the non-retired pop.* refers to the percentage of pass-through business owners among the non-retired population.

Table 8 shows three stationary equilibria where elasticity of labor supply is 0.25, 0.5 and the benchmark value 1.0, respectively. Across the three elasticities, the model generates a large increase in pass-through activity: the pass-through production share is 34.6% when

the Frisch elasticity is 0.25, 35.3% when it is 0.5, and 35.1% in the benchmark case. The implied fraction of the observed reallocation accounted by the model remains around 58.7%, 62.0%, and 61.1%, respectively. Similarly, the share of pass-through owners in the non-retired population is essentially close across three different economies. (11.1%–11.5%).

The primary quantitative difference shows up in aggregate output rather than in organizational shares. With a lower Frisch elasticity, hours respond less to the policy and financial changes, dampening the increase in aggregate labor input and therefore limiting the aggregate expansion. Consistent with this mechanism, output rises by 3.4% under an elasticity of 0.25 and by 3.8% under 0.5, compared to 5.5% in the benchmark. Importantly, however, these changes in aggregate output do not translate into different conclusions about the model's ability to account for the long-run shift toward pass-through production. Overall, the reallocation results are not driven by the assumed elasticity of labor supply.

7.3 The Role of Depreciation Deductibility

The benchmark model assumes full deductibility of depreciated capital. In practice, depreciation allowances can be constrained (e.g., through provisions such as Section 179 and related limits), so the effective deductibility rate may be below one. Using balance sheet data from pass-through entities, we estimate that approximately 77% of depreciated capital is actually deductible.[22] To assess whether this feature matters for our quantitative results, we recalibrate the model under partial depreciation deductibility, setting $\phi_d = 0.77$ while holding tax rates at their 1985 levels and comparing 1985 2015 staionary equilibria.

Column II of Table 9 shows that partial depreciation deductibility reduces the model-implied reallocation toward pass-through production. Relative to the baseline "all changes" case in Column I, the pass-through production share falls from 35.1% to 32.9%, and pass-through capital use declines from 25.8% to 22.6%. Accordingly, the fraction of the observed reallocation explained by the model drops from 61.1% to 50.0%. The intuition is straightforward: lowering depreciation deductibility raises the user cost of capital for pass-through firms. This makes scaling up less attractive and weakens the intensive-margin expansion that is central to the reallocation in our benchmark. However, the aggregate output is essentially unchanged (5.5% in both columns), indicating that this adjustment operates mainly through margins within the sector, with little effect on aggregate output.

[22] See Appendix C for estimation details.

Table 9: Changes under Deductibility of Debt and Depreciated Capital

	All Changes in Baseline Case	All Changes Under Capital Depreciation, $\phi_d = 0.77$	All Changes Under Deductibility of Debt, $\phi_r = 0.97$
Capital used by pass-through entities(%)	25.8	22.6	28.5
Production from pass-through entities(%)	35.1	32.9	37.1
$\frac{\Delta Model}{\Delta Data}$ (%)	61.1	50.0	70.9
Interest Rate(%)	4.97	4.99	4.91
Output Change(%)	5.5	5.5	5.7
PT. entities in the non-retired pop.(%)	9.4	10.7	12.6
Debt to Equity Ratio	0.50	0.50	0.50
Net Tax Gap to Output Ratio (%)	0.6	0.6	0.6
Resource Allocated to Tax Avoidance (Relative to Output)(%)	0.36	0.47	0.51
Change in Overhead Costs Relative to PT Output (%)	-26.7	-26.1	-24.4

Notes: Table 9 reports three different steady states in each column. Column II presents the baseline case that incorporates all channels – tax changes, relaxed borrowing constraints, changes in tax avoidance and 30% reduction in overhead costs. Column III presents the case that incorporates all channels when only 77% of depreciated capital is tax-deductible. Column III shows the case when 97% of debt is tax-deductible. The variable $\frac{\Delta Model}{\Delta Data}$ denotes the model-predicted change in the output share of pass-through entities, relative to the observed change between 1985 and 2015. *PT. entities in the non-retired pop.* refers to the percentage of pass-through business owners among the non-retired population.

7.4 The Role of Debt Deductibility

The benchmark model also assumes that interest payments are not deductible. In the U.S. tax code, interest on business debt is often deductible from taxable income, implying a lower effective cost of debt-financed capital for many pass-through firms. Using balance sheet data from pass-through entities, we estimate that approximately 97% of their debt qualifies for this deduction.[23] To incorporate this feature, we recalibrate the model to reflect a tax environment in which 97% of debt is deductible.

Column III of Table 9 shows that allowing debt deductibility strengthens the reallocation toward pass-through entities. The pass-through production share rises to 37.1% from 35.1% in the baseline scenario, and pass-through capital usage increases to 28.5% from 25.8%. The fraction of the observed reallocation accounted by the model rises from 61.1% to 70.9%. The mechanism is that interest deductibility lowers the effective user cost of capital for pass-through firms precisely along the margin that matters most when borrowing constraints loosen: firms can scale up more aggressively by financing capital through deductible debt,

[23]See Appendix C for estimation details.

which amplifies the intensive-margin response. This amplification also shows up on the extensive margin: the share of pass-through owners increases from 9.4% to 12.6%. Moreover, aggregate output rises slightly, from 5.5% to 5.7%, reflecting the stronger expansion in pass-through sector under cheaper debt-financed capital.

8 Concluding Remarks

We document a striking feature of the US economy: since the 1980s, there has been a reallocation of output towards pass-through entities, accompanied by a sharp fall in the output of C-corporations. This reallocation has resulted in a one-fourth decrease in the share of output attributed to C-corporations, while the share of pass-through entities has doubled. To examine the underlying forces driving this output reallocation, we develop a dynamic growth model with an occupation choice and entrepreneurial risk, in which a pass-through business owner faces and can avoid non-linear taxes. The model replicates the crucial features of the US, including the share of pass-through entities, the share of production of pass-through entities, and debt-to-equity ratio based on the tax levels observed in 1985. The quantitative results show that tax changes, changes in tax avoidance and borrowing capacity jointly account for about about 18% of the observed change in the output share of pass-through entities. Hence, forces usually deemed central in this reallocation are of a second-order importance. When adding changes in overhead costs for pass-through entities in line with evidence, our analysis can account for 60-70% percent of the observed reallocation. While this is reassuring, it raises another key question: what factors could have contributed to this change apart from tax-related factors, tax avoidance, and borrowing capacity?

One potential explanation lies in sectoral dynamics. While the output of pass-through entities increased across all sectors—a pattern consistent with Dyrda and Pugsley (2025), who document a widespread shift in organizational form across industries and geographic regions—the magnitude of this reallocation varied substantially by sector. During this period of structural transformation, the services sector expanded from 58.5% to 67.2% of gross output (Figure A.4). The rise in pass-through entities was especially pronounced within this sector, as A.6 and A.5 illustrate. For example, the pass-through share of gross output increased from 18% to over 40% in wholesale and retail trade, from 5% to nearly 40% in transportation and public utilities, and from 40% to 60% in the broader service sector. Remarkably, around 70% of the overall reallocation in gross output can be traced back to the service sector, with manufacturing and agriculture contributing 29% and 1%, respectively.

Altogether, these findings suggest a strong complementarity between the rise of pass-through entities and broader structural changes in the U.S. economy.

The surge in productivity growth within the pass-through sector can also be linked to the expansion of these entities themselves. Barro and Wheaton (2020) document that between 1958 and 2013, approximately one-third of total factor productivity (TFP) growth in the United States can be attributed to improved tax treatment and legal reforms that influenced firms' organizational choices—particularly enhancements in the efficiency of pass-through entities such as LLCs. Additional evidence from Dyrda and Pugsley (2019) shows a notable increase in the average size of pass-through entities over time. Between 1980–1984 and 2005–2009, the mean number of employees per firm rose from 8.4 to 18.4 for partnerships, from 10.7 to 12.0 for S-corporations, and from 3.9 to 5.5 for sole proprietors. Over the same period, the average size of C-corporations declined from 23.1 to 19.1. These patterns suggest deeper improvement in the productivity of pass-through businesses, contributed to their growth size. Hence, productivity changes that we have abstracted from could have played a non-trivial role in the rising output of the pass-through sector. We leave these and other issues for further research.

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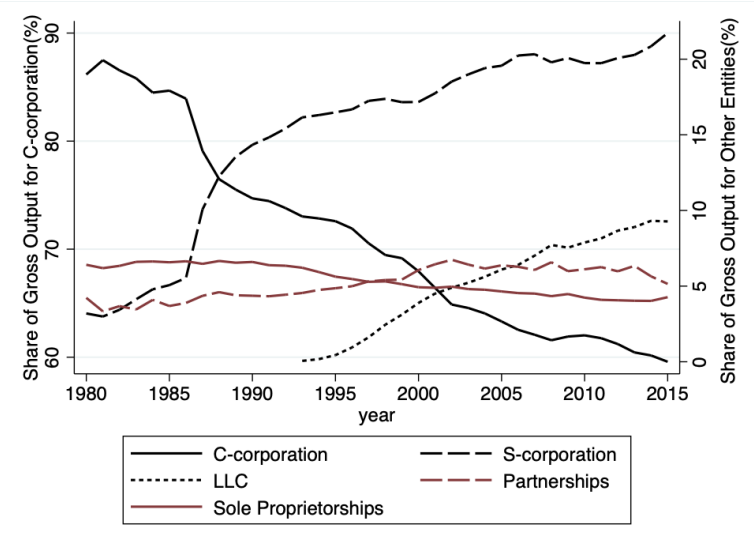
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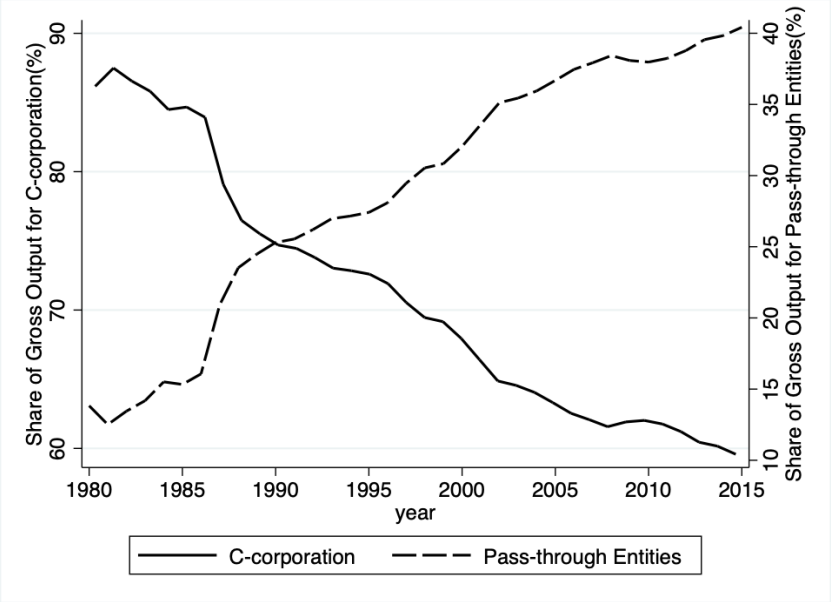
A Appendix: Figures

Figure A.1: Share of Gross Output for Business Structures



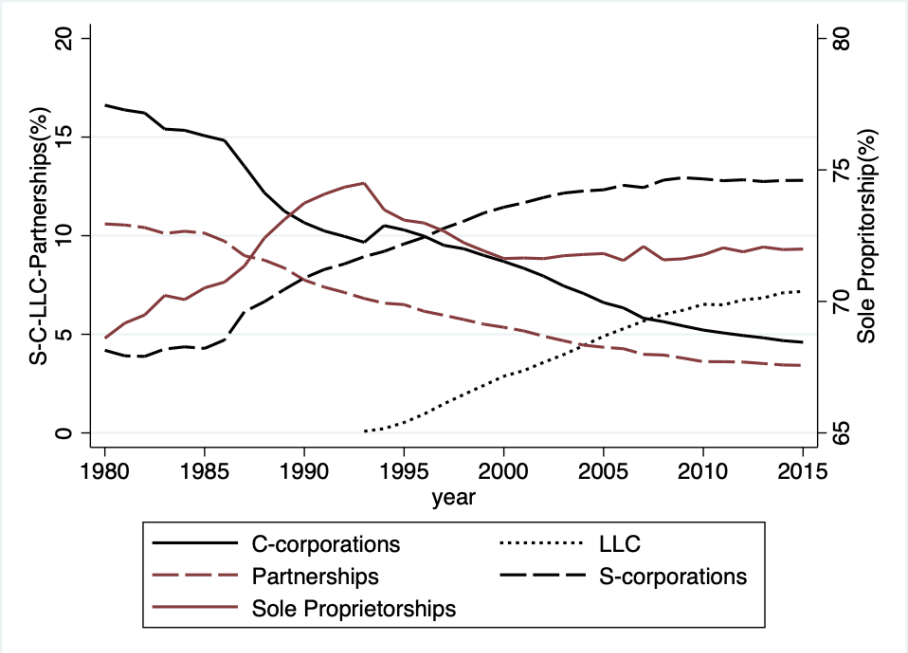
Sources: Internal Revenue Service and author's calculation. *Notes:* Gross output are calculated from sum of business receipts for different form of businesses. Regulated investment companies (1120-RIC) and Real Estate Investment Trusts(1120-REIT) are excluded.

Figure A.2: Share of Gross Output: C-corp versus Pass-through Businesses



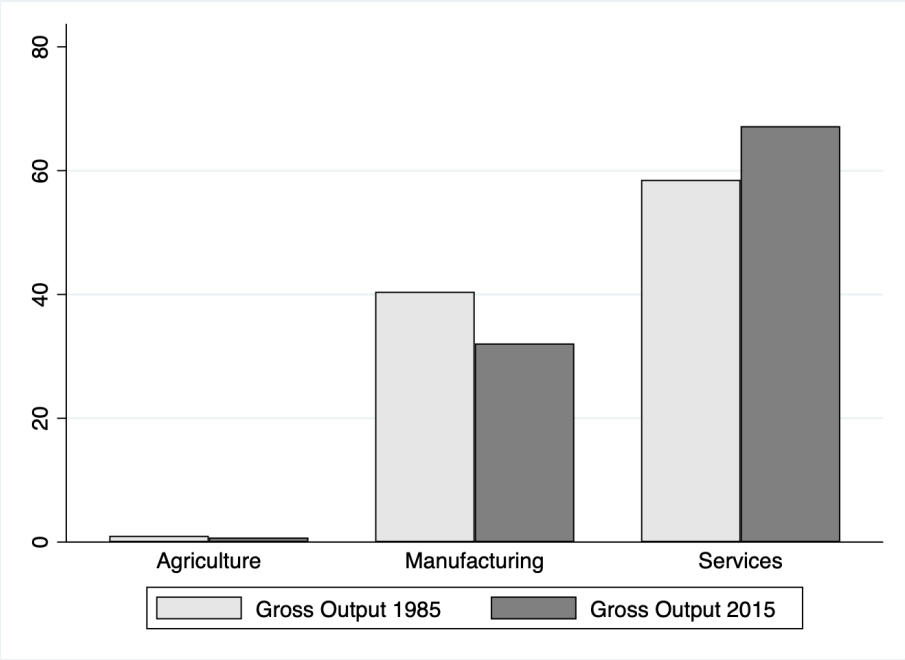
Sources and Notes: Internal Revenue Service and author's calculation. Gross output is calculated as the sum of business receipts for different forms of businesses. Regulated investment companies (1120-RIC) and Real Estate Investment Trusts(1120-REIT) are excluded.

Figure A.3: Share of Businesses by Form of Organization



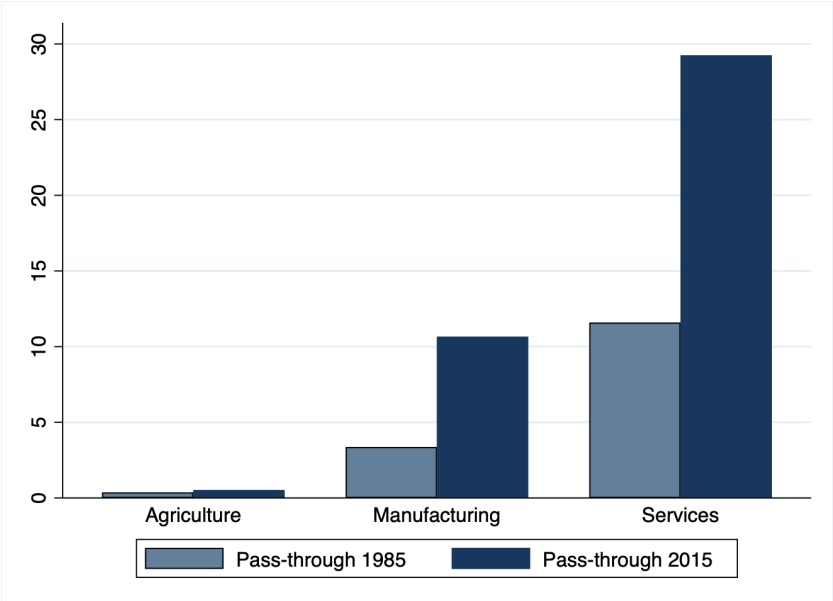
Sources and Notes: Internal Revenue Service and author's calculation. Share of businesses are calculated from the number of tax returns in the US.

Figure A.4: Gross Output Across Three Broad Sectors



Sources and Notes: Internal Revenue Service and our calculation. We define sectors as: agriculture includes farms, fishing, forestry; manufacturing includes construction, manufacturing, and mining; and services includes all other industries (i.e. wholesale, finance, service, trade, transportation, etc.)

Figure A.5: Gross Output Across Three Sectors (Pass-through Entities)



Sources and Notes: Internal Revenue Service and our calculation. We define sectors as: agriculture includes farms, fishing, forestry; manufacturing includes construction, manufacturing, and mining; and services includes all other industries (i.e. wholesale, finance, service, trade, transportation, etc.)

Figure A.6: Gross Output Across Three Sectors (C-corporations)



Sources and Notes: Internal Revenue Service and our calculation. We define sectors as: agriculture includes farms, fishing, forestry; manufacturing includes construction, manufacturing, and mining; and services includes all other industries (i.e. wholesale, finance, service, trade, transportation, etc.)

B Stationary Recursive Competitive Equilibrium

Let the vector $q = (a, z, \epsilon)$ consists of state variables. A stationary competitive equilibrium(SRCE) consists of

- set of government policies $\{\tau_c, T(.), G, p, \kappa\}$

- set of prices $\{w, r\}$

- decision rules for business owners $\{g_a(q)$, $l^e(q)$, $c^e(q), d^e(q)$, $g_n(q)$,$g_k(q)$,$\phi(q)\}$,

- decision rules for workers $\{h_a(q)$, $c_w(q)$, $l^w(q)$,$d_w(q)\}$,

- decision rules for retired agents $\{o_a(q)$, $c_o(q)\}$,

- profit functions of business owners $\hat{\pi}(q)$ and $\pi(q)$,

- value functions $V(q), V^e(q), V^w(q), W_r(q)$

- labor demand and capital demand for corporate sector $\{K_c, N_c\}$ and

- distribution of households $\mu = (\mu_w^*, \mu_e^*, \mu_o^*)$ where $\mu_e^* = (\mu_e^{*d}, \mu_e^{*nd})$ with its law of motion function $H(\mu^*)$ such that

i) Given prices and government policies, decision rules for occupation choice for business owners, decision rules for workers, decision rules for old agents, and value functions solve the individuals' problem given by (3), (4), (7), (10) and (11).

ii) Given prices and government policies, decision rules for corporate sector solves its problem given by (13).

iii) Labor market clears.

$$\int_q \epsilon l^*(q) d\mu_w(q) = L_c + \int_q g_n(q) d\mu_e(q) + \int_q \mathbf{1}_{\phi>0}(\kappa + C(\phi^*(q)) * f(q) d\mu_e(q)$$

iv) Capital market clears.

$$\int_q a d\mu_w(q) + \int_q a d\mu_e(q) + \int_q a d\mu_o(q) = K_c + \int_q g_k(q) d\mu_e(q)$$

The labor market-clearing condition (iii) indicates that the left-hand side is aggregate labor in efficiency unit supplied by workers, and the right-hand side is the aggregate demand for labor by C-corporation and pass-through entities. The capital market clearing condition(iv)'s left-hand side is equal to the aggregate capital supply in the economy. The first term is the capital supply of workers, and second and third terms are the capital supply of young and old business owners in pass-through entities, respectively. The last term is capital supply of retired individuals. The right-hand side of (iv) consists of aggregate capital demand by C-corporation and pass-through entities.

v) Corporate sector makes zero profits and prices are competitive:

$$w = (1-\alpha)\frac{K_c}{L_c}^{\alpha} \text{ and } r = (1-\tau_c)[\alpha(\frac{K_c}{L_c})^{\alpha-1} - \delta]$$

vi) Government budget is balanced.

$$G = \tau_c \frac{r}{1-\tau_c} K_c + \int_q T(w\epsilon) d\mu_w(q) + (1-\psi_o) \int_q (1+r) a d\mu_o(q) - \int_q p d\mu_o(q)$$

$$+ \int_q T(\tilde{\pi}(z,a,\phi^*(q))) d\mu_e(q) + \int_q \mathbf{1}_{\phi>0} \zeta [T(\tilde{\pi}(z,a,0)) - T(\tilde{\pi}(z,a,\phi^*(q)))] d\mu_e^d(q)$$

(vii) The distribution is stationary:

$$H(\mu^*) = \mu^* \text{ where the law of motion function is } H(\mu) = \mu'$$

C Calculation of Key Moments

A Gross Value Added of Pass-Through Entities

We compute the gross value added using the data from NIPA, following Smith et al. (2021). The corporate sector's gross value added is obtained from NIPA Table 1.14 *"Gross Value*

Added of Corporate Business (line 1)." while the non-corporate sector's is estimated using *"National Income: Sole Proprietorships and Partnerships"* and *"Consumption of Fixed Capital: Sole Proprietorships and Partnerships"*. One limitation of NIPA is that C-corporations and S-corporations are not distinguished. To divide the gross value added, we take the business receipts of S-corporations and C-corporations from IRS SOI and calculate their weights. The business receipts in corporate sector is:

$$\textit{Business Receipts in Corporations} = \textit{C-corp's Business Receipts} + \textit{S-corp's Business Receipts}$$

Using business receipts in corporate sector, we calculate the S-corporation's weight

$$w_S = \frac{\textit{Business Receipts in S-corporations}}{\textit{Business Receipts in Corporations}}$$

Then using this weight, we calculated the gross value added of S-corporations from NIPA as below:

$$\textit{Gross Value Added of S-corporations} = (w_S) \times \textit{Gross Value Added of Corporate Sector}$$

Then, we calculate the gross value added of pass-through entities as follows:

$$\textit{Gross Value Added (VA) of PT} = \textit{Gross VA of S-corp's} + \textit{Gross VA of Non-corporate Sector}$$

The ratio of gross value added of PT and C-corporations to GDP are not equal to 1 due to other components in the National Income calculation, such as other private businesses (tax-exempt cooperatives), government enterprises, general government, rest of the world, households, and institutions. Therefore, we calculate the total gross output as the summation of gross value added of C-corporations and pass-through entities as in Figure 1.

B Debt-to-Equity Ratio for Pass-through Entities

In order to calculate the S-corporations debt, we calculated the ratio of S-corporations debt relative to corporations using Corporation Income Tax Returns for 1985 from Statistics of Income. The total debt is defined as the sum of accounts payable, mortgages, notes, bonds payable in less than 1 year, loans from shareholders, mortgages, notes, bonds payable in 1 year or more, following Board of Governors of Federal Reserve System Data.

$$\text{Debt in Corporation} = ((1 - w_S) \times \text{C-corporations' Debt}) + (w_S \times \text{S-corporations' Debt})$$

Similarly, we estimated the weight of equity using Corporation Income Tax Returns for 1985 from Statistics of Income.

$$\text{Equity in Corporation} = ((1-v_S) \times \text{C-corporations' Equity}) + (v_S \times \text{S-corporations' Equity})$$

After finding v_S and w_s we assumed that the ratio found in SOI Data equals to ratio in Board of Governors of Federal Reserve System Data. The debt of S-corporations, then, calculated as:

$$\text{Debt in Pass-Through Entities} = w_S \times \text{Corporate Sector's Debt} + \text{Non-corporate Sector's Debt}$$

Likewise, the equity of pass-through entities equals to

$$\text{Pass-Through Entities' Equity} = v_S \times \text{Corporate Sector's Equity} + \text{Non-corporate Sector's Equity}$$

C Deductibility of Depreciated Capital

The balance sheet of the pass-through entities includes deduction from depreciation. Taking the ratio of deduction in depreciation relative to gross output equals

$$\hat{\delta}_{data} = \frac{\text{Deduction in Depreciation}}{\text{Gross Output}} = \frac{\phi_d \delta k}{\frac{\text{Gross Output}}{\text{Value Added}} \times \text{Value Added}} = \frac{\phi_d \delta}{\frac{\text{Gross Output}}{\text{Value Added}}} \times (\frac{K}{Y})_{PT}$$

In the data, this ratio is equal to $\hat{\delta}_{1985} = 0.048$.

In 1985, according to NIPA, gross output to value added ratio is equal to

$$\frac{\text{Gross Output}}{\text{Value Added}} = 1.79$$

From the model, $\delta = 0.06$

Capital-output ratio for pass-through entities under 1985 tax levels:

$$(\frac{K}{Y})_{1985} = 1.85$$

This gives the deductibility of depreciated capital parameter to:

$$\phi_{d1985} = 77.4\%$$

D Deductibility of Debt

The balance sheet of the pass-through entities includes deduction from interest paid. Taking the ratio of deduction in interest paid relative to gross output equals

$$\hat{\sigma}_{data} = \frac{\text{Deduction in Debt}}{\text{Gross Output}} = \frac{\phi_r r \max\{k-a,0\}}{\frac{\text{Gross Output}}{\text{Value Added}} \times \text{Value Added}} = \frac{\phi_r * r * \text{ Total Debt of PT}}{\frac{\text{Gross Output}}{\text{Value Added}} \times \text{Value Added}}$$

In the data, this ratio is equal to $\hat{\sigma}_{1985} = 0.0387$.

In 1985, according to balance sheets of pass-through entities

$$\frac{\text{Total Debt}}{\text{Value Added}} = \frac{974.718}{707.12} = 1.3784$$

In 1985, according to NIPA, gross output to value added ratio is equal to

$$\frac{\text{Gross Output}}{\text{Value Added}} = 1.79$$

This gives the deductibility of debt parameter:

$$\phi_{r1985} = \frac{0.039 * 1.79}{0.052 * 1.38} = 97.3\%$$

D The Fall of Overhead Costs: Further Evidence

Decomposition of the decline in overhead intensity. Aggregate overhead intensity is a convenient summary statistic, but it does not reveal whether the decline is driven by (i) lower overhead intensity *within* legal forms or (ii) a shift in receipts *across* legal forms toward those with lower overhead intensity. This distinction demonstrates that within-form decline maps naturally into a time-varying operating/organizational cost wedge for formal pass-through entities, while a pure composition effect would instead point to legal-form re-sorting. We therefore decompose the change in aggregate overhead intensity into within and between components.

Aggregate overhead intensity is a receipts-weighted average of legal-form-specific overhead ratios. Let $j \in \{\text{sole prop}, \text{partnership}, \text{S-corp}\}$ index pass-through legal forms. Define $R_{j,t}$ as receipts of form j in year t, $R_t \equiv \sum_j R_{j,t}$ as total receipts, and $s_{j,t} \equiv R_{j,t}/R_t$ as the receipts share. Let $O_{j,t}$ denote overhead costs for form j (under a given overhead definition), and define within-form overhead intensity as $r_{j,t} \equiv O_{j,t}/R_{j,t}$. Then aggregate overhead intensity

is the identity

$$r_t \equiv \frac{O_t}{R_t} = \sum_j s_{j,t}\, r_{j,t}. \tag{20}$$

We decompose the change in aggregate overhead intensity between 1985 and 2015, $\Delta r \equiv r_{2015} - r_{1985}$, into a *within* component (changes in $r_{j,t}$ holding the receipts composition fixed) and a *between* component (changes in $s_{j,t}$ holding within-form overhead ratios fixed), using a symmetric midpoint decomposition:

$$\Delta r = \underbrace{\sum_j \bar{s}_j\, \Delta r_j}_{\textit{Within}} + \underbrace{\sum_j \Delta s_j\, \bar{r}_j}_{\textit{Between}}, \tag{21}$$

where $\Delta r_j \equiv r_{j,2015} - r_{j,1985}$, $\Delta s_j \equiv s_{j,2015} - s_{j,1985}$, and bars denote midpoints, $\bar{s}_j \equiv (s_{j,1985} + s_{j,2015})/2$ and $\bar{r}_j \equiv (r_{j,1985} + r_{j,2015})/2$. Equation (21) is an exact identity and allocates the interaction between changing shares and changing ratios symmetrically across the within and between terms.

We implement this decomposition using Definition 4 overhead costs (net of interest), which yields $r_{1985} = 0.274$ and $r_{2015} = 0.167$, so $\Delta r = -0.107$.[24] The within component is

$$\text{Within} = \sum_j \bar{s}_j\, \Delta r_j = -0.067, \tag{22}$$

and the between (reweighting) component is

$$\text{Between} = \sum_j \Delta s_j\, \bar{r}_j = -0.040, \tag{23}$$

so that Within + Between $= \Delta r$.

These magnitudes imply that aggregate overhead intensity net of interest falls by 10.7 percentage points of receipts between 1985 and 2015. Roughly 6.7 percentage points (about 63% of the total decline) reflects lower overhead intensity *within* legal forms holding the receipts composition fixed, driven primarily by partnerships (and to a lesser extent S-corporations), and partially offset by rising overhead intensity among sole proprietorships. The remaining 4.0 percentage points (about 37%) reflects a shift in receipts *across* legal forms away from sole proprietorships—which exhibit higher and rising overhead intensity—and toward other pass-through forms. This decomposition indicates that the aggregate decline in overhead intensity reflects both a within-form reduction in operating/organizational overhead for formal

[24] Values are computed from SOI income-statement aggregates and the overhead constructions in Definitions 1–4.

pass-through entities and a meaningful compositional reallocation across legal forms.

Alternative start-year (1985-weighted) decomposition. We also report a base-year (start-year) decomposition, which is commonly used in shift-share analyses. Substituting $r_{j,2015} = r_{j,1985} + \Delta r_j$ and $s_{j,2015} = s_{j,1985} + \Delta s_j$ into (20) yields the exact three-term decomposition

$$\Delta r = \underbrace{\sum_j s_{j,1985}\,\Delta r_j}_{\textit{Within (1985 weights)}} + \underbrace{\sum_j \Delta s_j\, r_{j,1985}}_{\textit{Between (1985 levels)}} + \underbrace{\sum_j \Delta s_j\,\Delta r_j}_{\textit{Cross / interaction}}. \tag{24}$$

The cross term arises mechanically because aggregate overhead intensity is a weighted average: when both the weights ($s_{j,t}$) and the within-group ratios ($r_{j,t}$) change, there is an additional interaction component proportional to $\Delta s_j \Delta r_j$.

Using Definition 4, the start-year decomposition yields:

$$\text{Within (1985 weights)} = -0.033, \tag{25}$$

$$\text{Between (1985 levels)} = -0.006, \tag{26}$$

$$\text{Cross (interaction)} = -0.069, \tag{27}$$

so that the three terms sum to $\Delta r = -0.107$, which correspond to roughly 31%, 6%, and 65% of the total change. The within term implies a 3.3 percentage-point decline in overhead intensity would have occurred even if the legal-form distribution of receipts had remained at its 1985 shares. This pattern indicates that overhead intensity fell *within* formal pass-through forms over time, consistent with a meaningful reduction in operating/organizational overhead within partnerships and S-corporations (partially offset by rising overhead within sole proprietorships).

The between term is small: evaluated at 1985 overhead levels, shifting receipts shares across legal forms reduces aggregate overhead intensity by only 0.6 percentage points. On the other hand, the interaction term is quantitatively dominant: the remaining 6.9 percentage-point decline reflects that receipts reallocated toward the legal forms whose overhead intensity was simultaneously falling, most notably partnerships. Economically, this indicates a reinforcing joint movement—the forms gaining receipts share are precisely those experiencing the largest within-form declines in overhead intensity—so the aggregate decline reflects both a reduction in overhead within formal pass-through organizations and a contemporaneous shift of activity toward those improving forms.

Within-sector changes. Tables D.1 and D.2 show that the decline in overhead intensity is broad across sectors. Mining, construction, manufacturing, transportation/utilities, and wholesale/retail experienced large declines under every definition, around 20–45 percent. Manufacturing and wholesale/retail are particularly robust: the declines look similar across the deductions-based and identity-based measures and remain large when overhead is net of interest (Definitions 2 and 4), so the pattern is unlikely to be driven by financing costs or a particular accounting construction.

Table D.1: 2015: Sectoral Changes under four definitions (Imputed)

Sector	Defn 1	Defn 2	Defn 3	Defn 4
Agriculture, forestry, and fishing	-3.6	4.1	0.2	11.9
Mining	-28.1	-28.8	-34.7	-36.5
Construction	-23.5	-19.8	-23.3	-19.2
Manufacturing	-42.5	-40.7	-45.6	-44.0
Transportation, communication, electric, gas, and sanitary services	-23.7	-20.3	-29.3	-26.4
Wholesale and retail trade	-41.3	-39.8	-46.6	-45.4
Finance, insurance, and real estate	-58.2	-50.4	-60.2	-41.8
Services	-10.8	-4.9	-11.2	-4.8

Notes: For S-corporations, some sub-industry data in Agriculture, forestry, and fishing; Finance, insurance, and real estate; and Services are withheld for confidentiality reasons and therefore omitted. For these omitted cells, we impute the overhead-costs-to-business-receipts ratio by assuming it matches the ratio in the corresponding "other/not separately reported" sub-industry within the same sector.

Two caveats are worth keeping in mind. Agriculture is the main exception, where the sign depends on how withheld S-corporation sector detail is handled. Services shows smaller declines, especially in the interest-netted measures. Finance/insurance/real estate shows very large declines, but the magnitude varies more across definitions, which is consistent with the larger role of interest flows and profit measurement in that sector. Overall, the sectoral evidence supports the view that the aggregate decline reflects widespread within-sector reductions in overhead intensity rather than a simple shift of activity across sectors.

Table D.2: 2015: Sectoral Changes under four definitions (Raw)

Sector	Defn 1	Defn 2	Defn 3	Defn 4
Agriculture, forestry, and fishing	12.8	21.6	-20.4	-13.0
Mining	-28.1	-28.8	-34.7	-36.5
Construction	-23.5	-19.8	-23.3	-19.2
Manufacturing	-42.5	-40.7	-45.6	-44.0
Transportation, communication, electric, gas, and sanitary services	-23.7	-20.3	-29.3	-26.4
Wholesale and retail trade	-41.3	-39.8	-46.6	-45.4
Finance, insurance, and real estate	-52.3	-43.9	-65.9	-53.6
Services	-5.3	0.6	-6.8	-0.5

Notes: For S-corporations, some sub-industry data in Agriculture, forestry, and fishing; Finance, insurance, and real estate; and Services are withheld for confidentiality reasons and therefore omitted.