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ABSTRACT

Higher corporate taxes reduce corporate business operations, replacing them with operations by noncorporate businesses that are risky and have undiversified ownership. This shift contributes to income dispersion, with effects so large that higher corporate taxes can increase income inequality even when the corporate tax burden falls entirely on capital owned disproportionately by the rich. Estimates suggest that the riskiness of U.S. noncorporate business increases by 12.3% the aggregate income of the top one percent, and that income dispersion created by a higher U.S. corporate tax rate offsets more than half of the distributional effects of reducing average returns to capital.

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1. Introduction

The incidence of the corporate income tax is an important and complex subject, and a timely one too, with recent reforms such as the 2017 U.S. Tax Cuts and Jobs Act making significant changes to corporate taxation. Interest in the incidence of the corporate income tax dovetails with ongoing concerns over income distributions in high-income economies, since the taxation of corporate income may serve as a backdoor method of achieving tax progressivity. High-income individuals tend to own corporate shares, along with other forms of capital, so imposing greater tax burdens on corporations might implicitly tax wealthy owners of corporations. As is now well understood, however, this possibility depends critically on certain general equilibrium aspects of the incidence of the corporate tax. While it is perhaps intuitive that the burden of corporate taxation would fall on capital owners, there are realistic settings in which greater corporate taxation depresses business demand for labor and thereby reduces market wages; and these effects can be so strong that labor bears all, or potentially even more than all, of the corporate tax burden.

This paper considers the effect of corporate taxation on the distribution of after-tax income, which requires a somewhat different perspective than the usual tax incidence calculation. Tax incidence evaluates the extent to which differently situated groups, typically defined on a pre-tax-reform basis, bear the burdens of tax changes. To the extent that taxation also affects the riskiness of economic activity, it will change patterns of realized returns, thereby changing the resulting distribution of income. In order to understand the effect of taxation on the distribution of income, it is therefore necessary to supplement standard tax incidence analysis with consideration of the effect of taxation on income dispersion.

Since the publication of Harberger (1962) it has been clear that one of the important forces determining the incidence of the corporate tax is the effect of the tax in encouraging noncorporate business activity.[1] Higher corporate taxes discourage corporate activity, and therefore indirectly stimulate greater activity by unincorporated businesses. Harberger and subsequent analysts consider the effect of this reallocation of economic resources on expected returns to labor and capital; and this reallocation can – if the noncorporate sector is particularly capital-intensive – impose considerable burdens on labor. But there is a second sense in which this reallocation affects the distribution of income: rising levels of noncorporate business activity have the potential to increase levels of idiosyncratic risk in the economy, thereby leading to greater disparities in economic outcomes.

There is growing evidence that, from the standpoint of individual investors, noncorporate business investments are very risky, and that as a result, individual incomes at the top of the distribution include sizeable components that represent returns to successful noncorporate businesses (e.g., Cooper et al., 2016; Smith et al., 2019). The riskiness of noncorporate business investment reflects both the characteristics of the business activities that tend to be undertaken by unincorporated firms and the nature of their ownership. U.S. investors in unincorporated business ventures generally incur much greater idiosyncratic risk than do investors in publicly traded corporations. Proprietorships have single owners. Partnerships, including LLCs, must specify their owners in partnership agreements, making it difficult to have diversified ownership and costly and cumbersome to change ownership shares at all. S corporations must have 100 or fewer shareholders, all must be U.S. citizens or permanent residents, and all must hold stock with equal rights. In practice, high income individuals commonly receive partnership and S corporation income from firms of which they are the sole owners. C corporations, whose income is subject to the corporate tax, suffer from none of these restrictions, and as a result, can much more easily have diversified ownership. Due to their undiversified ownership, the returns received by owners of unincorporated businesses can be very risky, quite apart from the undoubtedly larger business risks that these smaller businesses tend to face.

The consequences of the risky profile of noncorporate investment are predictable: some noncorporate business owners are very successful, whereas others lose significant portions of their investments. Investors in unincorporated businesses can face return distributions similar to those available by playing lotteries; and with more lotteries, the economy's income distribution widens.

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[1] For ease of exposition firms not subject to the corporate tax are denoted "noncorporate," even though in the United States this category includes S corporations, which while corporations are not generally subject to a separate corporate-level layer of tax.

Higher levels of corporate taxation change the composition of economic activity both by encouraging entrepreneurs to establish their firms as unincorporated businesses, and – more importantly – by reducing the size and growth of corporations, thereby causing noncorporate businesses to expand. This reallocation of economic activity represents substitution away from relatively safer economic forms and styles of business organization into those that offer high returns to some and low returns to others. As a consequence, there will be greater numbers of entrepreneurs who are highly successful and join the ranks of the rich, just as there will be greater numbers of unsuccessful business people. The result is to make the distribution of income less equal – and evidence from the United States for 2014-2017 suggests that this process may reverse half or more of the distributional effect of the corporate tax that arises from reducing average capital returns.

Section 2 of the paper reviews the incidence of the corporate tax and its implications for income distribution. Section 3 considers an example in which the burden of the corporate tax is borne entirely by high-income capital owners, yet a higher corporate tax is associated with a less equal income distribution due to the dispersion of returns attributable to greater noncorporate investment. Section 4 generalizes the analysis of section 3 by considering the effect of corporate taxes on income distribution in a stylized model of the U.S. economy, identifying the extent to which encouragement of relatively risky business activity may dampen or possibly even reverse the effect of corporate taxes on the concentration of higher incomes. Section 5 reviews empirical evidence of the nature of business activity and business risks in the United States, using tax return data to gauge the likely magnitude of the distributional effects of encouraging greater noncorporate business activity. Section 6 is the conclusion.

2. Corporate Tax Burdens

Standard methods of analyzing the effect of corporate taxes on income distribution consider the extent to which tax burdens fall on different income groups in the population. It is perhaps natural to expect the burden of the corporate tax to be borne largely by high-income owners of corporate shares, but one of the contributions of Harberger (1962) was to point out that such an outcome would be generally inconsistent with capital market equilibrium,[2] which requires corporate and noncorporate investments to offer investors equivalent expected after-tax returns. In the Harberger (1962) model, higher corporate taxes increase the cost of corporate capital and therefore encourage corporations to substitute labor for capital, thereby depressing demand for capital generally – not merely corporate capital – and reducing its after-tax return in a closed economy. This implication is part of the basis of the current U.S. Treasury approach to distributing the burden of corporate taxes (Cronin et al., 2013), which is to attribute 82 percent of the burden to all capital income in the economy, and 18 percent to labor income; the Congressional Budget Office attributes 75 percent of the corporate tax burden to capital income, 25 percent to labor income (Congressional Budget Office, 2012).

Even in the closed economy framework of the Harberger (1962) model, however, induced intersectoral reallocations of resources can reduce or possibly eliminate any burden of the tax on capital owners. Corporate taxation increases the cost of producing corporate output, thereby raising output prices, depressing demand, and shifting output from the corporate sector of the economy to the noncorporate sector. This reallocation affects factor demands to the extent that factor input ratios differ between the corporate and noncorporate sectors of the economy. If the corporate sector of the economy has a lower capital/labor ratio than the noncorporate sector, then the introduction of a corporate tax shifts resources into the noncorporate sector and thereby increases the demand for capital. If this effect is large enough, then it has the potential to exceed in magnitude the countervailing impact of factor substitution, in which case higher rates of corporate tax are associated with greater after-tax returns to capital – including capital invested in corporations. It would then follow that labor bears all, or even more than all, of the burden of the corporate tax in the form of lower real wages.[3]

Open economy considerations further complicate the simple intuition that capital owners bear the full burden of the corporate tax. As noted by Diamond and Mirrlees (1971), and applied to open economies by Gordon (1986), Kotlikoff and Summers (1987) and Gordon and Hines (2002), any source-based capital income tax falls entirely on fixed local factors – typically labor

[2] Though Auerbach (2006) notes that, in the presence of significant adjustment costs, capital markets will not equilibrate immediately, so values of corporate shares should decline in response to surprise announcements of higher corporate taxes.

– in a setting with perfect capital mobility and product substitution. It follows from the assumption of perfect capital mobility that after-tax rates of return to capital cannot differ between countries, so higher corporate tax rates must discourage investment and thereby drive up pretax rates of return to the point that after-tax returns remain equal. Since after-tax rates of return to local capital do not change with corporate tax changes, it must be the case that local labor and any other local factor whose location is fixed, the archetypal example being land, bear the full burden of corporate taxes. Additionally, corporate taxes in large open economies may have spillover effects. With fixed world supplies of capital, higher tax rates in one country discourage local investment and drive investment to other countries, where it reduces rates of return to capital and increases wages.

Harberger (1995, 2006, 2008) and Randolph (2006) explore the sensitivity of conclusions drawn from models of perfect capital mobility and fixed world capital supplies. They calibrate models that incorporate what they argue are realistic estimates of relative capital intensities, capital mobility, and product substitutability, finding that labor is apt to bear a significant fraction of the burden of the corporate tax. In the simple models used in these papers, any imperfect substitutability between foreign and domestic traded goods effectively operates as a form of imperfect capital mobility. As the trade and capital accounts must balance, imperfect substitutability between traded goods implies that extensive net borrowing is expensive as it entails importing large volumes of foreign goods for which there is diminishing marginal substitution. Gravelle and Smetters (2006) use a computable general equilibrium model to allow for subtler variants of imperfect product competition, concluding that corporate capital owners may bear the lion's share of the corporate tax burden despite the availability of capital inflows and outflows.[4]

Empirical studies of corporate tax incidence, including Felix and Hines (2009), Arulampalam et al. (2012), Altshuler and Liu (2013), Hasset and Mathur (2015), Suárez Serrato and Zidar (2016), and Fuest, Peichl, and Siegloch (2018), commonly consider the extent to which higher corporate taxes influence wages, thereby indirectly assessing the incidence of the

[3] McLure (1975), Kotlikoff and Summers (1987), and Auerbach (2018) offer reviews and further elaborations of the Harberger model.
[4] For more on the importance of product substitutability, see Davidson and Martin (1985) and Gravelle and Kotlikoff (1989, 1993).

corporate tax. Felix and Hines (2009) analyze the effects of higher state corporate taxes on wage premiums earned by unionized workers, concluding that workers in fully unionized firms capture 54 percent of the benefits of low tax rates. Arulampalam et al. (2012) compare wages paid by firms with differing tax obligations, concluding that about half of the corporate tax is passed on to labor. Liu and Altshuler (2013) compare wages paid by firms in U.S. industries subject to differing levels of taxation, and after adjusting for differing industry concentrations, report that wages absorb 60-80 percent of the corporate tax burden. Hassett and Mathur (2015) find that economies with higher corporate tax rates tend to have lower wages, though Clausing (2013) and Gravelle (2013) call attention to contrary evidence and note that the implied effects of corporate taxes may be implausibly large. Suárez Serrato and Zidar (2016) estimate a model of the effect of U.S. state corporate taxes with imperfect labor and firm mobility, reporting coefficients that imply that firm owners bear 40 percent of the corporate tax burden, workers bear one-third, and landowners the rest. Fuest, Peichl and Siegloch (2018) estimate the effect of subnational German corporate taxes, finding that workers bear roughly half of the tax burden. And Nallareddy, Rouen and Suárez Seratto (2019) find that state corporate tax cuts are associated with greater state after-tax income dispersion.

It appears from this evidence that workers may bear substantial portions of corporate tax burdens in the form of lower real wages, with capital owners also bearing significant burdens. There remain open questions about the distribution of these tax burdens among richer and poorer workers and capital owners, particularly when economic activities have uncertain returns. A small literature extends standard corporate tax incidence models to incorporate economic uncertainty,[5] but its focus remains on the effect of corporate taxes on expected returns to labor and capital. In settings with economic uncertainty, expected returns are ex ante concepts, whereas the income distribution is an ex post realization. Consequently, in order to understand the effect of corporate taxes on the income distribution it is necessary to consider its effects on the distribution of realized outcomes.

3. Possibility of Second-Order Stochastic Dominance

[5] See, for example, Batra (1975), Ratti and Shome (1977), and Baron and Forsythe (1981).

This section explores an avenue by which business riskiness interacts with the tax system to influence the distribution of income. The model considers a simple setting in which corporate taxation does not change expected pre-tax investment returns, so the burden of corporate income taxation falls entirely on capital owners. There are just two types of people, rich and poor, with factor endowments of the rich relatively capital-intensive. In the absence of uncertainty, higher corporate income taxes that generate revenue used to reduce labor income taxes would reduce income inequality by imposing greater tax burdens on high-income individuals whose incomes are largely returns to capital, and reduced tax burdens on low-income individuals whose incomes derive mostly from labor. But if higher corporate taxes also encourage expansion of risky unincorporated businesses, then higher corporate taxes may increase income inequality.

The two types of people are denoted *A* and *B*, with *A* poor and *B* rich, and equal numbers of each. Both types are endowed with fixed supplies of capital and labor, with individuals of type *A* relatively more heavily endowed with labor, and individuals of type *B* more heavily endowed with capital. Capital and labor can move freely between the corporate and noncorporate sectors, but cannot cross national borders,[6] so the economy's total capital stock and total labor supply are fixed. Corporate income is taxed at rate τ, whereas labor income and unincorporated business income are taxed at rate t. Capital and labor markets are perfectly competitive, and individuals and firms risk-neutral, in that they evaluate after-tax investment returns based on their expected values. Labor and capital are equally productive in the corporate and noncorporate sectors, and corporate and noncorporate firms produce identical outputs, earning the same expected pretax rate of return to capital, denoted r.

Appendix A analyzes the effects of corporate taxation on expected after-tax returns in this simple model. Holding the government's budget constraint fixed, higher corporate tax rates finance a reduction in labor income taxes, the net effect of which is to increase the expected after-tax incomes of type *A* individuals from $\hat{y}_A$ to $\hat{y}'_A$, and to reduce the expected after-tax incomes of type *B*s from $\hat{y}_B$ to $\hat{y}'_B$. Viewed strictly from the standpoint of expected incomes, the corporate tax increase reduces income inequality.

[6] The closed economy assumption in this model enables capital owners to bear the full burden of the corporate tax. More realistic open economy specifications, including the model of section 4, imply that domestic capital owners bear less of the corporate tax burden.

In addition to changing expected incomes, corporate taxes affect business organization by discouraging corporate investments and thereby implicitly encouraging noncorporate investments. Assume that an individual *i* choosing to engage in an unincorporated business puts his or her potential income at risk, taking a fair gamble in which with probability 0.5 the investment is successful, increasing after-tax income by a factor *c*, and with probability 0.5 the investment is unsuccessful, reducing after-tax income by the same factor *c*. People evaluate their noncorporate options based on expected returns plus a psychic return of $K_i v_i$ if investor *i* chooses a noncorporate investment, in which K_i is *i*'s capital endowment, and v_i their preference parameter. The parameter v_i can be positive or negative, reflecting the joys and frustrations of working for oneself and participating in a risky small business. As a result, the net expected financial plus psychic return from engaging in a noncorporate business is

$$K_i \left[r(\tau - t) + v_i \right]. \tag{1}$$

Those for whom $r(\tau - t) + v_i > 0$ will choose noncorporate businesses.

Assuming that types *A* and *B* share the same distribution of v_i s, there will be equal numbers of type *A* noncorporate investors and type *B* noncorporate investors. If prior to a tax change $v_i \leq r(t - \tau)$ for every v_i value in the population, then there will be no noncorporate business. A higher corporate tax depresses after-tax corporate returns, encouraging individuals with the highest v_i parameters to start noncorporate businesses. In order to simplify the resulting analysis, it is useful to consider the case in which $\tau < t$ prior to the tax change, and the change makes these two tax rates equal.[7]

Figure 1 plots the effect of a higher corporate tax rate on the distribution of income. The higher corporate tax rate reduces the expected incomes of type *B* individuals from $\hat{y}_B$ to $\hat{y}'_B$, but a fraction *p* of these individuals will be induced to participate in noncorporate businesses. Of these type *B* noncorporate investors, half will be successful, with resulting after-tax incomes

[7] The purpose of assuming that $\tau = t$ after the tax change is that the tax-induced decline in the share of corporate investment then does not affect total tax collections. The example readily generalizes to cases in which $\tau \neq t$.

$\hat{y}'_B(1+c)$, and half will be unsuccessful, with resulting after-tax incomes $\hat{y}'_B(1-c)$. Consequently, the tax reform changes the income distribution so that a fraction $p/4$ of the population has incomes of $\hat{y}'_B(1+c)$. This represents a greater concentration of income at the very top if $\hat{y}'_B(1+c) > \hat{y}_B$, or equivalently

(2) $$c > \frac{\hat{y}_B - \hat{y}'_B}{\hat{y}'_B}.$$

One consequence of a higher corporate tax rate is to increase income dispersion among top income earners, which has the effect of increasing the concentration of realized income at the very top. Condition (2) identifies circumstances in which tax-induced greater dispersion is of sufficient magnitude that, from the standpoint of the top $p/4$ of income earners, it more than offsets the effect of the tax change in reducing expected incomes. If condition (2) holds, then the corporate tax change increases the incomes of the top $p/4$ of income earners, even though the burden of the corporate tax is fully borne by owners of capital. It is noteworthy that (2) does not depend on the value of p, so top tail income dispersion increases for any amount of tax-induced noncorporate investment.

Higher corporate tax rates for which (2) holds, and which therefore increase the concentration of top incomes, may also make the entire income distribution less equal in the sense of second-order stochastic dominance, as the new Lorenz curve can lie weakly below the pre-tax-increase Lorenz curve. The greater income dispersion induced by a higher corporate tax rate raises this possibility, but another necessary (and, together with (2), sufficient) condition for second-order stochastic dominance is that the tax change not increase the aggregate incomes of those whose realized after-tax incomes fall below the median. Since $\hat{y}'_A > \hat{y}_A$ and noncorporate investments are fair gambles, it cannot be the case that a higher corporate tax rate reduces aggregate below-median income if all those with incomes below the median are of type *A*. Hence a necessary condition for a tax-induced reduction in aggregate below-median income is that unsuccessful type *B* noncorporate investors have lower realized incomes than successful type *A* noncorporate investors. This is the scenario depicted in Figure 1.

The tax change does not increase average below-median incomes if

(3) $$\left(1-p\right)\hat{y}'_A + \frac{p}{2}\left[\hat{y}'_A\left(1-c\right)+\hat{y}'_B\left(1-c\right)\right] \le \hat{y}_A .$$

The left side of (3) reflects that the lower half of the after-tax income distribution consists of type *A* individuals who avoid noncorporate investments, and type *A* and *B* individuals who have unsuccessful noncorporate business ventures. The right side of (3) is simply the average below-median income before the tax change. Condition (3) implies

(4) $$\hat{y}'_A - \hat{y}_A \le \frac{p}{2}\left[\hat{y}'_A\left(1+c\right)-\hat{y}'_B\left(1-c\right)\right].$$

Since $\hat{y}'_A > \hat{y}_A$, the right side of (4) must be positive in order for (4) to be satisfied. This requires that $\hat{y}'_A\left(1+c\right) > \hat{y}'_B\left(1-c\right)$, which is simply the condition that unsuccessful type *B* noncorporate investors have lower incomes than successful type *A* noncorporate investors. And since budget balance implies that $\hat{y}_B - \hat{y}'_B = \hat{y}'_A - \hat{y}_A$, (4) also requires that

(5a) $$\hat{y}'_B\left(1+c\right)-\hat{y}_B \ge \hat{y}'_B c\left(1-p\right)+\frac{p}{2}\left(1+c\right)\left(\hat{y}'_B-\hat{y}'_A\right)$$

(5b) $$\hat{y}_A-\hat{y}'_A\left(1-c\right) \ge \hat{y}_A c\left(1-p\right)+\frac{p}{2}\left(1-c\right)\left(\hat{y}'_B-\hat{y}'_A\right).$$

Since the terms on the right sides of (5a) and (5b) are both positive, it follows that (4) implies that $\hat{y}'_B\left(1+c\right) > \hat{y}_B$ and $\hat{y}'_A\left(1-c\right) < \hat{y}_A$, so a higher corporate tax widens both the right and left tails of the income distribution.

If condition (4) is satisfied, then higher corporate taxes fail to raise below-median incomes. Since higher corporate taxes also induce greater income dispersion, the resulting income distribution is dominated in a second-order stochastic sense by the original income distribution. Condition (4) indicates that this will materialize only for sufficiently high values of *p* and *c*. If the corporate tax has little effect on levels of noncorporate activity, or noncorporate business is insufficiently risky, then the effect of the corporate tax on expected returns dominates its impact on aggregate below-median income.

Figure 2 displays Lorenz curves describing income distributions when (4) holds with equality. The solid dark schedule depicts the income distribution prior to the corporate tax increase, and the dashed schedule the income distribution after the tax increase. The lightly shaded schedule depicts what the income distribution would have been if the corporate tax had increased but had not induced some investors to start unincorporated businesses. The lightly shaded Lorenz curve lies everywhere above the original Lorenz curve, reflecting that a higher tax burden on capital income received primarily by the rich levels the income distribution. The dashed Lorenz curve, however, lies weakly below the original Lorenz curve, reflecting that the income dispersion effect of a higher corporate tax rate can have an even stronger effect on the concentration of top incomes.

4. Corporate Taxation and the Concentration of High Incomes

The analysis in section 3 identifies the possibility that higher corporate tax rates may widen income inequality despite producing tax burdens that fall primarily on the rich. The stylized nature of the example in section 3 leaves open the question of the extent to which tax-induced income dispersion influences the distributional effects of corporate tax changes in an economy such as the United States. This and the subsequent section consider this question, focusing on the effect of corporate taxation on the concentration of national income at the top of the distribution.

In specifying the determinants of the income distribution, it simplifies matters to assume that individuals in the population differ in a scalar characteristic θ reflecting factor endowments and other features relevant to income production in a largely open economy. The values of θ are continuously distributed with a cumulative density given by $F(\theta)$, and accompanying marginal density $dF(\theta)$. The after-tax income of someone who chooses not to engage in noncorporate business activity is a function simply of θ and of the corporate tax rate. For notational ease this after-tax income is denoted $y(\theta)$, interpreted as being evaluated at the current corporate tax rate, and consists of both capital and labor returns. Furthermore, units are chosen so that $y(\theta) = \theta$ at the initial corporate tax rate.

Noncorporate business activity is a probabilistic gamble: an individual of type θ whose capital and labor resources would otherwise provide an income $y(\theta)$, and who participates in an unincorporated business that succeeds, receives an income of $(1+k)y(\theta)$; the same individual, if the noncorporate investment is unsuccessful, receives an income of $(1-m)y(\theta)$, with $k > 0$ and $m > 0$. Noncorporate investors are successful with a common probability ϕ, and are therefore unsuccessful with probability $(1-\phi)$; furthermore, noncorporate business is assumed to be a fair gamble, so

(6) $$k\phi = m(1-\phi).$$

The restriction that an investor cannot lose more than he or she has implies that $m \le 1$, which together with (6) implies

(7) $$k \le \frac{(1-\phi)}{\phi}.$$

Risk-neutral individuals choose to participate in noncorporate business activity on the basis of idiosyncratic preference parameters, as in the model of section 3. Among those with sufficient resources that they might someday have very high incomes, these preference parameters have identical distributions at each value of θ, so the fraction investing in noncorporate businesses, still denoted *p*, is the same for all.

4.1. Aggregate high income.

Focusing attention just on the aggregate amount of income (ψ) earned by those with incomes exceeding a high level $\bar{y}$, it follows that

(8) $$\psi = (1-p)\int_{\theta_2}^{\infty} y(\theta)\,dF(\theta) + p\int_{\theta_3}^{\infty} y(\theta)\,dF(\theta) + p\phi\int_{\theta_1}^{\theta_3} y(\theta)(1+k)\,dF(\theta),$$

with $y(\theta_1) = \bar{y}/(1+k)$, $y(\theta_2) = \bar{y}$, and $y(\theta_3) = \bar{y}/(1-m)$. The first term on the right side of (8) is the aggregate income of the portion $(1-p)$ of the population has no noncorporate business dealings and therefore has incomes given by $y(\theta)$. The second term is the aggregate income of those with $y(\theta)$ values exceeding $\bar{y}/(1-m)$ and who invest in noncorporate businesses. The third term captures that among those whose incomes would otherwise have fallen between $\bar{y}/(1+k)$ and $\bar{y}/(1-m)$, and who make noncorporate investments, only a fraction ϕ are successful and therefore wind up with after-tax incomes exceeding $\bar{y}$.

In order to evaluate (8) it is necessary to use a cumulative density function. There is extensive evidence that the distribution of higher incomes in the United States closely resembles a Pareto distribution,[8] which, if applied to incomes earned by those without noncorporate investments, would imply that

(9) $$dF(\theta) = \frac{\gamma}{\theta^{1+\alpha}}\,d\theta,$$

with γ a parameter that is generally a function of the income distribution, and $\alpha > 1$ the Pareto parameter. Since income data include earnings from noncorporate investments, it is possible for the distribution of θ to differ from the distribution of observed incomes – though as it happens, if (9) characterizes the distribution of θ, then the final income distribution inclusive of noncorporate returns will also have a Pareto distribution with the same α parameter.[9] Taking (9) to apply in the range $[\theta_1, \infty]$, and imposing both (6) and that $y(\theta) = \theta$, it follows that (8) and (9) together imply[10]

(10) $$\psi = \Theta_{\bar{y}}(1 + p\Delta),$$

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[8] See, for example, Atkinson, Piketty, and Saez (2011), Jones (2015), Aoki and Nirei (2017), and Jones and Kim (2018).

[9] This is evident from equation (17). Separately, Toda (2014), Jones (2015), and Nirei and Aoki (2016) offer reasons to expect most processes that generate high incomes to have Pareto distributions resembling (9).

[10] Appendix B.1 offers detailed derivations of equations (10), (17), and (22).

in which $\Theta_{\bar{y}}$ is the aggregate value of $y(\theta)$ in the population with $\theta \geq \bar{y}$,

(11) $$\Theta_{\bar{y}} \equiv \int_{\theta_2}^{\infty} y(\theta)\frac{\gamma}{\theta^{1+\alpha}}d\theta = \frac{\gamma}{(\alpha-1)}\bar{y}^{1-\alpha},$$

and

(12) $$\Delta \equiv (1+k)^{\alpha}\phi + (1-\phi-k\phi)^{\alpha}(1-\phi)^{1-\alpha} - 1.$$

The Δ term in (10) captures the extent to which income dispersion due to noncorporate business activity contributes to the concentration of higher incomes. It is evident from (10) that if either $p=0$ or $\Delta=0$, then $\psi=\Theta_{\bar{y}}$. Furthermore, from (12), if either $k=0$ or $\phi=0$, then $\Delta=0$. In the absence of noncorporate business activity, the income distribution is determined simply by the distribution of θ. The value of α matters too; from (12), if $\alpha=1$ then $\Delta=0$. But since $\alpha>1$, and as shown in Appendix B.2, Δ is increasing in α, it follows that $\Delta>0$, and therefore $\psi>\Theta_{\bar{y}}$, for all values of $k>0$, $\phi>0$, and $p>0$, which are conditions that ensure that there is meaningful and risky noncorporate business activity. Furthermore, Δ is increasing and convex in each of k and ϕ, as shown in Appendix B.3.

Equation (10) implies that greater levels of noncorporate business activity increase aggregate higher incomes, a feature that this model shares with the model analyzed in section 3. Greater noncorporate business returns produced by higher values of k and ϕ increase aggregate high income for the same reason. The resulting income dispersion has greater effects on income concentration at higher values of α that reflect the narrowing of the income distribution at high levels.

Table 1 presents values of Δ for different values of k and ϕ constrained by the implied relationship between gains and losses expressed in (7), and with $\alpha=1.67$, which Jones (2015) notes is a commonly estimated value among empirical studies of the U.S. economy. For a given level of p, higher values of k are associated with greater concentrations of high incomes, as are higher values of ϕ. If $k=1.0$ and $\phi=0.40$, so that a noncorporate investor has a 40 percent chance of doubling his or her income, then the table entry 0.37 implies that the aggregate income of the population with incomes above $\bar{y}$ is $\Theta_{\bar{y}}\left(1+0.37p\right)$. If in this circumstance thirty percent of the population undertakes noncorporate business activity, then aggregate high income is 11 percent greater than it would have been in the absence of noncorporate investment. A representative parameter combination for riskier investments in the U.S. economy might be $k=2.4$ and $\phi=0.25$, with noncorporate business investors having one-quarter chances of increasing their incomes by 240 percent, in which case the aggregate income of the population with incomes above $\bar{y}$ would be $\Theta_{\bar{y}}\left(1+0.98p\right)$. There are no systematic economy-wide estimates of the likelihood of success and distribution of returns to noncorporate investment, making it difficult to know a priori whether low-Δ or high-Δ values are more realistic.

Equation (10) can be used to evaluate the effect of changes in the corporate tax rate on aggregate high incomes. Differentiating (10) with respect to the corporate tax rate, denoted τ, and taking changes in τ not to affect *k* and ϕ, yields

(13) $$\frac{d\psi}{d\tau}=\frac{d\Theta_{\bar{y}}}{d\tau}\left(1+p\Delta\right)+\Theta_{\bar{y}}\frac{dp}{d\tau}\Delta .$$

The $\frac{d\Theta_{\bar{y}}}{d\tau}$ term on the right side of (13) is the change in higher incomes as conventionally measured. It has two components: a higher corporate tax rate changes the incomes of those with θs above the $\bar{y}$ threshold, and it changes the threshold itself, and therefore the incomes of those at or above it. Assuming for simplicity that a higher corporate tax rate reduces all higher incomes proportionately, so that $dy\left(\theta\right)/d\tau=-\lambda\theta$, the first component of $\frac{d\Theta_{\bar{y}}}{d\tau}$ is $-\lambda\Theta_{\bar{y}}$. The second component is $\frac{\partial\Theta_{\bar{y}}}{\partial\theta_2}\frac{d\theta_2}{d\tau}$, for which the assumed proportionate income reduction implies that $d\theta_2/d\tau=\lambda\bar{y}$. From the definition of $\Theta_{\bar{y}}$ in (11), it follows that $\frac{\partial\Theta_{\bar{y}}}{\partial\theta_2}=\frac{-y\left(\theta_2\right)\gamma}{\theta_2^{1+\alpha}}=-\bar{y}^{-\alpha}\gamma$, so $\frac{\partial\Theta_{\bar{y}}}{\partial\theta_2}\frac{d\theta_2}{d\tau}=-\lambda\bar{y}^{1-\alpha}\gamma$, and

(14) $$\frac{d\Theta_{\bar{y}}}{d\tau} = -\lambda\Theta_{\bar{y}} - \lambda\bar{y}^{1-\alpha}\gamma = -\lambda\alpha\Theta_{\bar{y}}.$$

Together, (13) and (14) imply that

(15) $$\frac{d\psi}{d\tau} = \left\{ \frac{dp}{d\tau} \frac{1}{\left[\frac{1}{\Delta} + p\right]} - \alpha\lambda \right\} \psi .$$

As captured in (15), the net effect of higher corporate taxes on aggregate incomes received by high-income individuals depends on a comparison of two effects, the first of which arises from greater noncorporate business activity, and the second of which is the change in expected after-tax factor returns. In the representative cases of lower- and higher-risk noncorporate investments that produce $\Delta = 0.37$ and $\Delta = 0.98$, and with assumed values of $p = 0.3$ and $dp/d\tau = 0.3$, (15) implies that a one percent higher corporate tax rate increases aggregate high incomes by 0.10-0.23 percent. If, in a standard incidence calculation with no investment return uncertainty, a one percent higher corporate income tax rate would reduce the incomes of those in the top one percent by 0.13 percent,[11] then given that $\alpha = 1.67$, this standard aspect of higher corporate taxes would reduce aggregate top one percent incomes by 0.22 percent. Consequently, in these examples, the income dispersion effect partially or even entirely offsets the distributional effect of after-tax price changes.

4.2. Concentration of high incomes.

[11] The U.S. Treasury assigns 82 percent of the corporate tax burden to capital owners, which together with other aspects of its methodology implies that individuals in the top one percent of the income distribution bear 43 percent of the corporate tax burden (Cronin et al., 2013). In a long-run framework, the Treasury methodology is inconsistent with prevailing open economy models that imply a much lower tax burden on U.S. capital owners; and even in the short run, the Treasury methodology may be inconsistent with the reality that much of the business income earned by top one percent taxpayers represents returns to labor in unincorporated businesses. Furthermore, the Treasury method is inconsistent with existing empirical estimates of corporate tax incidence. As a result, a more reasonable figure might be one-half its magnitude, so that 22 percent of the corporate tax burden is borne by top one percent taxpayers. In 2016, the top one percent of the U.S. income distribution had $1,465b of income after federal taxes (IRS Statistics of Income, available at https://www.irs.gov/statistics/soi-tax-stats-individual-statistical-tables-by-tax-rate-and-income-percentile), so if a one percent higher corporate tax rate corresponds to an additional annual burden of $8.7b [Congressional Budget Office (2016, p. 178) reports a five-year budget impact of $43.5b], the $1.91b attributable to the top one percent would represent 0.13 percent of its after-tax income.

The components of equation (13) capture the effects of corporate tax changes on the aggregate income earned by those whose incomes are $\bar{y}$ or greater. This is not exactly the same as the effect of corporate tax changes on the concentration of income earned by, say, the top one percent of the income distribution, since corporate tax changes also affect the number of people whose incomes exceed $\bar{y}$. In order to evaluate the effect of the corporate tax on the concentration of income it is necessary to adjust for these changing populations.

The population of individuals with incomes exceeding $\bar{y}$ is

(16) $$n = (1-p)\int_{\theta_2}^{\infty} dF(\theta) + p\int_{\theta_3}^{\infty} dF(\theta) + p\phi\int_{\theta_1}^{\theta_3} dF(\theta).$$

Evaluating the terms in (16) yields

(17) $$n = \frac{(1+p\Delta)\gamma}{\alpha}\bar{y}^{-\alpha}.$$

Since $(1+p\Delta)$ does not vary with $\bar{y}$, the population distribution described by (17) is a Pareto distribution with the same parameter α that characterizes the distribution of θ in (9). Applying (10) and (11), equation (17) implies that $n = \frac{(\alpha-1)}{\alpha\bar{y}}\psi$, so

(18) $$\frac{dn}{d\tau} = \frac{(\alpha-1)}{\alpha\bar{y}}\frac{d\psi}{d\tau}.$$

Letting Ω denote total income earned by a fixed percentage of the income distribution corresponding to incomes of at least $\bar{y}$ prior to the tax change, it follows that

(19) $$\frac{d\Omega}{d\tau} = \frac{d\psi}{d\tau} - \bar{y}\frac{dn}{d\tau}.$$

Equations (18) and (19) imply that $\frac{d\Omega}{d\tau} = \frac{1}{\alpha}\frac{d\psi}{d\tau}$, so applying (15) yields

(20) $$\frac{d\Omega}{d\tau} = \left\{ \frac{dp}{d\tau} \frac{1}{\alpha\left[\frac{1}{\Delta} + p\right]} - \lambda \right\} \psi .$$

Equation (20) indicates that the effect of a higher corporate tax rate on aggregate income of the top given percentage of the income distribution is the familiar net effect of two competing forces: greater noncorporate business activity and changing after-tax factor returns. In order to understand the extent to which these factors may offset each other, it is useful to consider the effects of tax-induced income dispersion over ranges of possible parameter values. Table 2 displays values of the first term in the braces on the right side of equation (20) – $\frac{dp}{d\tau} \frac{1}{\alpha\left[\frac{1}{\Delta} + p\right]}$ – for $p = 0.2$ and $p = 0.3$, along with selected moderate values of k and α, in every case based on an assumed level of $dp/d\tau = 0.30$. The Table 2 entries are increasing in ϕ, k, and α, and display convexity in ϕ and *k*; furthermore, they are slightly higher at $p = 0.2$ than at $p = 0.3$. Taking $\alpha = 1.67$ and $p = 0.30$ to be baseline levels, the entries in Table 2 vary between 0.009 and 0.108, though these depend critically on population values of ϕ and k, about which little is known. As noted earlier, the relevant value of λ for equation (20) is arguably in the neighborhood of 0.13, so the Table 2 entries are smaller, generally somewhat less than half as large. This suggests that the income dispersion effects of higher corporate tax rates may offset half or less of the standard factor return effects in influencing the concentration of high incomes.

High shares of entrepreneurial income among top earners can produce substantial income dispersion effects of higher tax rates. Using ψ_{NC} to denote aggregate income earned by high-income individuals engaging in noncorporate business activities, it follows that

(21) $$\psi_{NC} = p\int_{\theta_3}^{\infty} y(\theta)\,dF(\theta) + p\phi\int_{\theta_1}^{\theta_3} (1+k)\,y(\theta)\,dF(\theta).$$

The first integral in (21) is entrepreneurial income earned by those whose incomes will exceed $\bar{y}$ whether or not their noncorporate business ventures succeed, and the second is income earned by successful noncorporate business entrepreneurs who would not have had incomes of $\bar{y}$ or more if their businesses had been unsuccessful. Equation (21) implies that

$$\psi_{NC} = p\Theta_{\bar{y}}\left(1+\Delta\right), \tag{22}$$

which together with (10) implies

$$\frac{\psi_{NC}}{\psi} = \frac{p\left(1+\Delta\right)}{1+p\Delta}. \tag{23}$$

Applying (23), (20) becomes

$$\frac{d\Omega}{d\tau} = \left\{ \frac{dp}{d\tau} \frac{\left(\frac{\psi_{NC}}{\psi} - p \right)}{p\left(1-p\right)\alpha} - \lambda \right\} \psi . \tag{24}$$

Calculations in section 5 indicate that in 2014-2017, the U.S. ψ_{NC}/ψ ratio for the top one percent of the income distribution was at least 0.35. In order to apply (24) it is also necessary to know the value of *p*, the fraction of the population choosing to engage in noncorporate business activity, which the data do not directly reveal. Unless *p* is sufficiently large, higher corporate tax rates will increase the concentration of top incomes. For example, if $p = 0.2$, then for $\psi_{NC}/\psi = 0.35$, $\lambda = 0.13$, and $\frac{dp}{d\tau} = 0.3$, it follows that $\frac{d\Omega}{d\tau} = 0.038\psi$, which is positive, implying that higher corporate tax rates increase the concentration of top incomes.

5. *Characteristics of Noncorporate Business Activity*

The analysis in section 4 relies on a stylized model of business characteristics that may nonetheless capture important elements of business practice. This section considers evidence from the United States of the factors that influence noncorporate business activity and the extent to which top income earners receive returns from unincorporated businesses.

5.1 Evidence.

There is extensive evidence that labor and capital returns to unincorporated business activities in the United States are considerably riskier than other economic alternatives. For example, Davis et al. (2007) document the significantly greater volatility and dispersion of growth rates of privately held firms than those of publicly held firms. In their analysis of tax return data, DeBacker, Panousi, and Ramnath (2020) find that the idiosyncratic volatility of business returns (in the form of partnership, proprietorship, and S corporation income) is 3-4 times greater than the volatility of wage and salary income for similar individuals. This echoes earlier findings of Hamilton (2000), who reports that self-employed workers have lower mean earnings and much more dispersed outcomes than those who work for others. The risks faced by small business owners are partly the product of heavy external debt financing of their firms and the personal borrowing that owners do to obtain capital that they invest in their companies (Robb and Robinson, 2014; Cole and Sokolyk, 2018). Moskowitz and Vissing-Jorgensen (2002) report that investors in firms that are not publicly traded tend to concentrate very large fractions (averaging 70 percent) of their investment capital in single firms with returns that are highly uncertain and on average no greater than those available from publicly traded alternatives. This evidence and others of modest average returns and significant economic risk prompt observers to infer that nonpecuniary factors such as the benefits of working for one's self, and the social status accorded to business owners, are important determinants of entrepreneurial and other risky noncorporate business activity.[12]

Tax policy also appears to influence levels of noncorporate business activity. Auerbach and Slemrod (1997) note that greater numbers and incomes of S corporations in the United States after 1986 coincided with more favorable tax treatment relative to corporations in the Tax Reform Act of 1986.[13] Using annual U.S. time series data for 1960-1986, MacKie-Mason and Gordon (1997) find that a one percent higher corporate tax rate is associated with a 0.28 percent greater income share of noncorporate business. Goolsbee (1998) reports average tax effects that are less than half as large in a historical time series analysis of annual U.S. data from 1900-1939,

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[12] See, for example, Hamilton (2000), Moskowitz and Vissing-Jorgenson (2002), Roussanov (2010), and Hurst and Pugsley (2011).

[13] Cooper et al. (2016) documents the secular rise in noncorporate business income generally since 1986, and its concentration in the top one percent of the income distribution.

though notes that these tax effects are considerably larger for firms with positive taxable income. Prisinzano and Pearce (2018) update and refine the MacKie-Mason and Gordon analysis using U.S. data for 1960-2012, finding somewhat larger tax effect magnitudes: a one percent higher corporate tax rate is associated with a 0.34 percent greater share of income going to noncorporate business. Chen, Qi, and Schlagenhauf (2018) calibrate a model of organizational choice to U.S. data, finding that a one percent higher corporate tax rate increases the noncorporate share of firms by 1.2 percent and noncorporate employment by 1.3 percent. Goolsbee (2004) analyzes the organizational forms of retail trade firms across U.S. states in 1992, also reporting large tax effects: a one percent higher corporate tax rate is associated with a 1.5 percent greater employment share, and one percent greater payroll and sales shares, in noncorporate firms. And Barro and Wheaton (2020) use different methods to analyze annual U.S. data for 1968-2013, reporting coefficients that imply that a one percent higher corporate tax rate is associated with a roughly 0.3 percent greater noncorporate share of business assets. Devereux and Lui (2016) similarly report large effects of taxation on rates of incorporation in the United Kingdom, and evidence from elsewhere in Europe (de Mooij and Nicodème, 2008; Lejour and Massenz, 2020) points to even larger effects of corporate tax changes on the noncorporate share of business activity.

The high returns associated with successful large undiversified noncorporate business investments make some entrepreneurs very wealthy, and as a result, top U.S. incomes consist disproportionately of returns from unincorporated business activities. Smith et al. (2019) find that 69 percent of those in the top one percent of the U.S. income distribution receive income from noncorporate businesses. Of course, some of this income simply represents casual investment, but the study reports that 39 percent of the incomes of the top one percent of U.S. taxpayers consist of returns from noncorporate firms in which they are active participants; this fraction rises to 44 percent of the incomes of the top 0.1 percent.[14] Smith et al. (2019) also report that U.S. noncorporate firms typically have one to three owners for whom the business generates large shares of their total incomes.[15] Quadrini (2000) likewise finds business owners

[14] Bryan (2017) presents consistent evidence for U.S. taxpayers with incomes above $200,000 in 2014. Bricker et al. (2016) and Guvenen and Kaplan (2017) offer cautionary notes about interpreting tax and survey data on the incomes of top earners.

[15] The IRS similarly reports that, in 2017, 2.2 million of the economy's 3.9 million partnerships had either one or two owners (DeCarlo and Shumofsky, 2019). IRS data also indicate that, in 2016, there were 4.6 million S

and managers to be overrepresented in top U.S. income and wealth groups. Another hint of the impact of entrepreneurial business activity on the distribution of income appears in Aghion et al. (2019), which reports that local areas of the United States with high rates of innovation and patenting have greater income inequality and greater income-based social mobility.

5.2 Empirical implications.

The model of section 4 can be applied to U.S. tax return data to infer the likely size of income dispersion effects of corporate tax changes. The IRS reports numbers of tax returns with positive partnership and S corporation income among the top one percent of income earners (as measured by adjusted gross income), along with the aggregate amounts of their positive partnership and S corporation income.[16] The same source also reports numbers of top one percent tax returns with negative partnership and S corporation income, and the aggregate amount of their losses. One challenge in using these data lies in distinguishing top earners who are casual investors in partnerships and S corporations from entrepreneurs who commit more of their economic livelihoods to them.

A property of the Pareto distribution, such as described in (9), is that, for any value of $\tilde{\theta}$, the average value of θ for the population with $\theta \geq \tilde{\theta}$ is $\alpha\tilde{\theta}/(\alpha-1)$. Defining $\tilde{y} \equiv y(\tilde{\theta})$, it follows that in the absence of noncorporate business activity, the average income of the population with incomes exceeding $\tilde{y}$ will be $\alpha\tilde{y}/(\alpha-1)$. The model posits that successful noncorporate entrepreneurs with top incomes constitute a fraction $p\phi$ of the population that, in the absence of noncorporate activity, would have had incomes of at least $\bar{y}/(1+k)$. Without noncorporate business activity, the average income of this population would be $\alpha\bar{y}/[(1+k)(\alpha-1)]$, and since successful noncorporate entrepreneurs augment their incomes by

corporations with $581 billion of net income, of which 3.0 million with $240 billion of net income had single owners, and another 1.2 million with $130 billion of net income had just two owners (https://www.irs.gov/statistics/soi-tax-stats-s-corporation-statistics).

[16] This information is currently available only for 2014-2017, and can be found at https://www.irs.gov/statistics/soi-tax-stats-individual-statistical-tables-by-tax-rate-and-income-percentile.

a factor of $(1+k)$, it follows that the average income of successful noncorporate entpreneurs is $\alpha\bar{y}/(\alpha-1)$, the same as those with top incomes who do not engage in noncorporate activity.[17]

U.S. tax return data indicate that, in 2014, 673,000 taxpayers in the top one percent of the income distribution received positive partnership and S corporation income, which summed to $463 billion. Smith et al. (2019) report that owner salaries, which are not included in the published partnership and S corporation return statistics, constituted an additional 22 percent of small business returns in 2014. Applying this ratio to partnership and S corporations produces a total owner income of $565 billion. Certainly some of the 673,000 income recipients were casual investors with trivial stakes not well described by the model. Taking the partnership and S corporation incomes of casual investors to be unimportant, and noting that the cutoff income $\bar{y}$ for the top one percent of the U.S. income distribution in 2014 was $466,000, the model implies that there were 485,000 substantial partnership and S corporation investors among the top one percent that year.[18]

U.S. tax return data also indicate that 189,000 taxpayers in the top one percent of the 2014 income distribution had partnership and S corporation losses, which summed to $39 billion. This information does not reveal how many of the 189,000 were casual investors with trivial stakes, but the model can be extended to afford such a calculation. Suppose that casual partnership and S corporation investors have the same likelihood of making and losing money as do substantial investors, albeit in much smaller amounts. Selection on outcomes implies that the top one percent of the income distribution consists disproportionately of those with substantial business gains and those with trivial business losses. As a result, it is possible to use the 72 percent implied ratio of active to total investors with gains to infer the number of investors with substantial noncorporate business losses as a function of model parameters.[19] For 2014, this

[17] Appendix C.1 provides proofs of these properties.

[18] $[\$565,000(\alpha-1)]/[\$0.466\alpha]=485,000$, with $\alpha=1.67$.

[19] Appendix C.2 provides details of this calculation, which simultaneously reconciles data on partnership and S corporation gains and losses. The system has three unknowns (*p*, *k*, and ϕ) and three independent equations that identify them, though the structure of the problem is such that it is possible to solve for *k* and ϕ independently of *p*, and to do so simply by searching over a scalar function of *k* and ϕ. With *k* and ϕ identified there is then a closed form solution for *p* as a function of *k*, ϕ, and observable variables.

works out to be 4,000, meaning that of the 189,000 taxpayers with partnership and S corporation losses who nonetheless had top one percent incomes, 185,000 were casual investors and 4,000 substantial noncorporate entrepreneurs.[20]

The model implies that unsuccessful noncorporate entrepreneurs with top incomes represent a fraction $p(1-\phi)$ of the part of the population that in the absence of noncorporate activity would have had incomes of at least $\bar{y}/(1-m)$. Without noncorporate business activity the average income of this population would be $\alpha\bar{y}/[(1-m)(\alpha-1)]$, and since unsuccessful noncorporate entrepreneurs reduce their potential incomes by a factor of m, it follows that the average income of substantial but unsuccessful noncorporate entpreneurs is $\alpha\bar{y}/(\alpha-1)$, the same as successful entrepreneurs and those with top incomes who do not have noncorporate businesses. Applying this average income to the number of active investors with partnership and S corporation losses, it follows that those in the top one percent with substantial partnership and S corporation losses have aggregate net income of \$4.7 billion. Since they report \$39 billion of aggregate investment losses, it follows that $m = 0.89$.[21]

The model also implies that the ratio of entrepreneurial gains to entrepreneurial losses among top taxpayers is a function of k and ϕ, so it is possible to use the reported gains and losses, along with the implied value of m, to infer the values of these parameters. As described in Appendix C, these relationships produce a nonlinear system with two roots, one of which has higher potential returns to noncorporate activity with associated lower probability of success. In the years for which there are available data, these alternative roots correspond to very different outcomes: one in which entrepreneurs have roughly 50 percent probabilities of success but significant gains if successful, and another in which entrepreneurs have much higher probabilities of success but very small gains if successful. Only the first of these two corresponds to the business situations envisioned by the model, and to other evidence of the riskiness of noncorporate business ventures, so the analysis focuses on their implications.

[20] The model parameters fitted to 2014 data imply that, in the population as a whole, 53 percent of partnership and S corporation owners are casual investors with trivial stakes, but that among those with ex post incomes in the top one percent, 28 percent of owners with gains and 98 percent of owners with losses have trivial stakes. Data for 2015-2017 produce similar estimates; Appendix C.2 describes the basis of these calculations.

Table 3 presents parameter values fit to U.S. tax return data on top one percent earners in 2014-2017, along with implications for the effect of corporate taxation on the concentration of these top incomes. For 2014, the implied value of k is 0.88, meaning that entrepreneurial success increased incomes by 88 percent; and the implied 0.50 value of ϕ means that noncorporate business ventures succeed half the time. The data imply that $p = 0.27$, so 27 percent of those with potentially high incomes undertake noncorporate business ventures (though due to selection the realized fraction of top one percent income earners who are noncorporate entrepreneurs will be considerably higher than 27 percent). The implied value of Δ is 0.456, from which it follows that $(1+p\Delta) = 1.123$, so income dispersion due to the riskiness of noncorporate business activity increases the concentration of top incomes by 12.3%. And as reported in the rightmost column, income dispersion associated with greater noncorporate business activity attributable to a one percent higher corporate tax rate will increase top one percent incomes by 0.073 percent. Data for 2015-2017 yield similar parameter values and implications for the effects of corporate taxation on income concentration.

This data fitting exercise suggests that the greater income dispersion accompanying higher corporate tax rates may significantly dampen or even reverse the net effect of higher rates on the concentration of income in the top one percent. The 0.073 percent figure for 2014 is slightly more than half of the magnitude of the -0.13 adjusted U.S. Treasury estimate for the effect of a one percent higher corporate tax rate on top income concentration, though neither figure is precise, and both are products of strong assumptions. Notably, this data fitting exercise does not consider noncorporate entrepreneurial income from farms and sole proprietorships, which have features that differ from partnerships and S corporations. While partnership and S corporation income greatly exceeds that produced by farms and sole proprietorships, obtaining a complete picture of the effect of corporate taxes on income dispersion requires consideration of all of these sources of income.[22] Furthermore, reported partnership and S corporation losses for tax purposes do not include the opportunity costs of entrepreneurship that displaces other activity

[21] This follows from $4.7\, m/(1-m) = 39$.

[22] In 2017, top one percent U.S. taxpayers had $550.5 billion of partnership and S corporation gains, and $58.8 billion of sole proprietorship and farm gains. As discussed in Appendix C.4, the model of section 4 fits the data for sole proprietorship and farm income only for 2016. Appendix D describes a much stronger fit for the 2014-2017

that would have generated high incomes.[23] As a result, it is difficult to know just how large the income dispersion effects of higher corporate tax rates are apt to be for the U.S. economy – though it is clear that their impact on the concentration of top incomes may be sizeable compared to standard estimates of the distributional effects of corporate taxes.

5.3. Extensions.

The model in section 4 has features that generally correspond to the economic experiences of top income earners in the United States, but that nonetheless contain stylized elements, such as that noncorporate business ventures break even in expectation. Individual risk aversion would require expected noncorporate business returns to be more favorable than captured by equation (6) in order to compensate entrepreneurs for the greater risks that they face.[24] Alternatively, preference for income earned in an entrepreneurial fashion would imply that equilibrium noncorporate business returns are smaller than expressed in equation (6), as investors are willing to accept lower expected returns in exchange for the greater economic autonomy and perhaps even the greater risks associated with noncorporate entrepreneurship.

Appendix D identifies how the model of section 4 changes when investors are not risk neutral, and displays the results of fitting the tax return data to the model under alternative assumptions about the direction and extent of deviations from risk neutrality. Notably, a model in which entrepreneurs are willing to accept somewhat below-market expected returns from their sole proprietorship and farm ventures fits the data for sole proprietorship and farm income much better than does a model in which these entrepreneurs are assumed to be risk neutral. Required investment returns also can be consequential for partnership and S corporation investors – the data are consistent with models of risk-averse, risk-neutral, and risk-loving behavior, with the smallest estimated tax effects on income dispersion arising in cases with risk aversion.

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sole proprietorship and farm data in a model with the feature that entrepreneurs are willing to accept somewhat lower returns in exchange for earning those returns with their own proprietorships or farms.

[23] The model concerns economic losses from unsuccessful noncorporate ventures, which includes opportunity costs, whereas the tax data report losses for tax purposes, which is a different concept. Owners of loss-making noncorporate business ventures have limited ability to claim losses for tax purposes, though in practice, as Lim, Patel, and Saunders-Scott (2018) report, most S corporation losses can be claimed by their owners.

[24] Risk aversion introduces the possibility that higher tax rates may stimulate greater demand for taxed assets, as explored by Domar and Musgrave (1944), Gordon (1985), and others. Evidence that higher corporate tax rates are associated with significantly greater noncorporate business activity relative to corporate activity suggests that these

The model of section 4 assumes that all individuals have the same probability of engaging in noncorporate business activity, and that when they do they face a common combination of k and ϕ. These strong assumptions simplify the model, but can be generalized to incorporate various forms of heterogeneity, as developed in Appendix E. Realistic forms of heterogeneity, such as differences in k due to individuals committing different fractions of their time and capital to entrepreneurial efforts, are likely to increase the implied effect of noncorporate business activity on income dispersion. If there is random heterogeneity, with values of p, k and ϕ distributed identically at each value of θ, then the analysis of section 4 is changed only by replacing p and Δ with their mean values. Notably in such cases, the convexity of Δ in each of k and ϕ implies that, for given population means, investor heterogeneity in k or ϕ increases the average value of Δ. To the extent that values of p, k and ϕ increase with θ, tax-induced income dispersion will have greater effects on the concentration of higher incomes. Appendix E reports parameters of models fit to data for the top 5, 2, and 0.1 percent of top U.S. incomes, with values of p that appear to increase systematically with θ.

The model assumes that entrepreneurs do not avoid other income risks by undertaking noncorporate business activities; Appendix F generalizes this specification to incorporate the possibility that some income risks bear only on those who are not entrepreneurs. Appendix F shows that in such cases the model of section 4 captures relevant tax effects if the risk associated with noncorporate business activity is replaced by the difference between the risks of earning noncorporate business returns and other sources of income. Consequently, the fitted values of Δ reported in Table 3 can be interpreted as this difference.

Applying equation (20) to infer the effect of higher corporate taxes requires that the difference between the risk characteristics of additional noncorporate activities and the marginal corporate activities that they replace be the same as the average risk difference between noncorporate and corporate businesses.[25] If a higher corporate tax rate simply encourages entrepreneurs to organize their firms as partnerships or S corporations rather than C corporations,

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general equilibrium portfolio effects are smaller in magnitude than other effects of higher corporate tax rates in depressing expected after-tax returns and thereby reducing corporate activity.

[25] The Harberger (1962) model has the analogous feature of assuming that the difference between the capital intensities of additional noncorporate activities and the marginal corporate activities that they replace are the same as the average difference between the capital intensities of noncorporate and corporate businesses.

the primary risk difference would lie in ownership limitations, which for many small firms might not be very consequential.[26] The main effect of high corporate tax rates, however, is to depress general levels of corporate business activity, reducing factor demands and creating market opportunities for noncorporate businesses, which expand as a result. This second channel is likely much more consequential for noncorporate business activity than is the first, as most of the corporate tax bears on very large businesses that do not readily switch between corporate and noncorporate status.[27] It is reasonable to expect general reductions in corporate activity accompanied by expansions of noncorporate activity to affect income dispersion in a manner indicated by average differences between the riskiness of corporate and noncorporate business, though in practice the results might be larger or smaller than those based on equation (20) and reported in Table 3.

6. *Conclusion*

Corporations are entities that pool risks and returns. In spreading risks among multiple owners, the corporate form of business organization reduces the dispersion of economic outcomes, and thereby produces more equal distributions of realized incomes than would be the case if the same business risks were instead borne by single owners. If all businesses in the United States were required to be publicly traded corporations with widely diversified ownership, then the U.S. income distribution would be considerably more equal than it is today. Higher rates of corporate taxation move the economy in the direction of having fewer and smaller corporations and therefore less of the risk sharing that corporations provide. This effect of the corporate tax undermines its ability to reduce income disparities.

The finding that higher corporate tax rates may not much reduce income inequality, or possibly even increase it, bears only indirectly on tax incidence calculations as conventionally

[26] Since initial organizational choices of small firms that wind up very successful can have significant effects on the costliness of subsequently expanding ownership, in expectation replacing even small C corporations with partnerships and S corporations increases aggregate idiosyncratic risk.
[27] In 2013, there were 5.9 million active U.S. C corporations, of which the 3,266 with assets exceeding $2.5 billion had combined taxable incomes of $957 billion, representing 76% of total U.S. corporate taxable income, and total assets of $71.7 trillion, representing 85% of total U.S. corporate assets. Adding the 7,312 corporations with assets

performed. The standard incidence calculation considers the effects of taxation on different groups distinguished by their situations prior to tax changes. For this purpose, the effects of small tax changes can be analyzed assuming that behavior is unaffected, whereas behavioral responses matter for income distribution even if they do not for individual welfare. Different individuals induced by the tax system to start noncorporate businesses, applying similar capital and labor resources, and with similar business prospects, may have very different ex post outcomes. The standard incidence calculation treats them identically, whereas understanding the effect of taxation on the distribution of income requires acknowledging their differences.

Would it be appropriate for those who produce estimates of the distribution of tax burdens to adjust their calculations to account for the effects of corporate taxation on the risk patterns of returns? That depends on the objectives of distributional analysis. If its purpose is to judge the potential consequences of tax reforms for income groups defined prior to reforms, then it is not necessary to account for the uncertainty of ex post investment returns. If, however, the purpose of distributional analysis is to evaluate the effect of tax reform on the economy's income distribution, then it is essential to trace the effects of tax changes on activities that create economic disparities.

The nature of business organization, and the resulting risks that business owners face, significantly affects the distribution of income in the economy. In changing forms of business organization, corporate taxes thereby change levels of idiosyncratic risk in the economy, which in turn affect the distribution of income. It follows that other policies that influence forms of business organization, such as legal and regulatory rules that govern the formation of different types of businesses, and the taxation of profits earned by unincorporated firms, likewise affect the distribution of income. Furthermore, tax and other policies that influence risk-taking, such as the extent to which the tax system permits deductions for losses, also influence the income distribution. Economic activities with uncertain returns, including some undertaken long ago, significantly affect economic inequality – so in understanding the distributional effects of corporate taxation and other government policies, it is important to incorporate the extent to which these policies encourage or discourage risky ventures.

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between $500 million and $2.5 billion brings these totals to 87% of total U.S. corporate income and 91% of total U.S. corporate assets (https://www.irs.gov/statistics/soi-tax-stats-table-5-returns-of-active-corporations).

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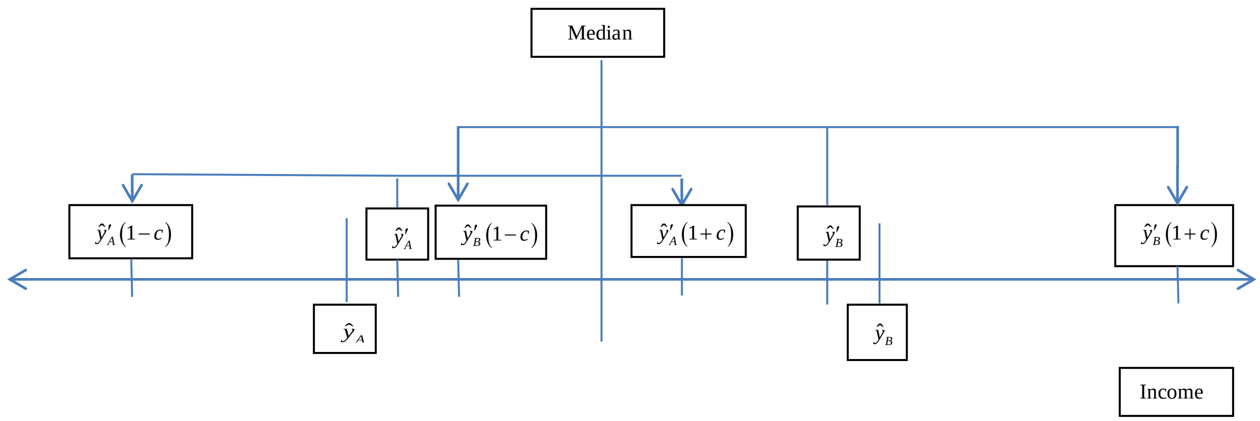
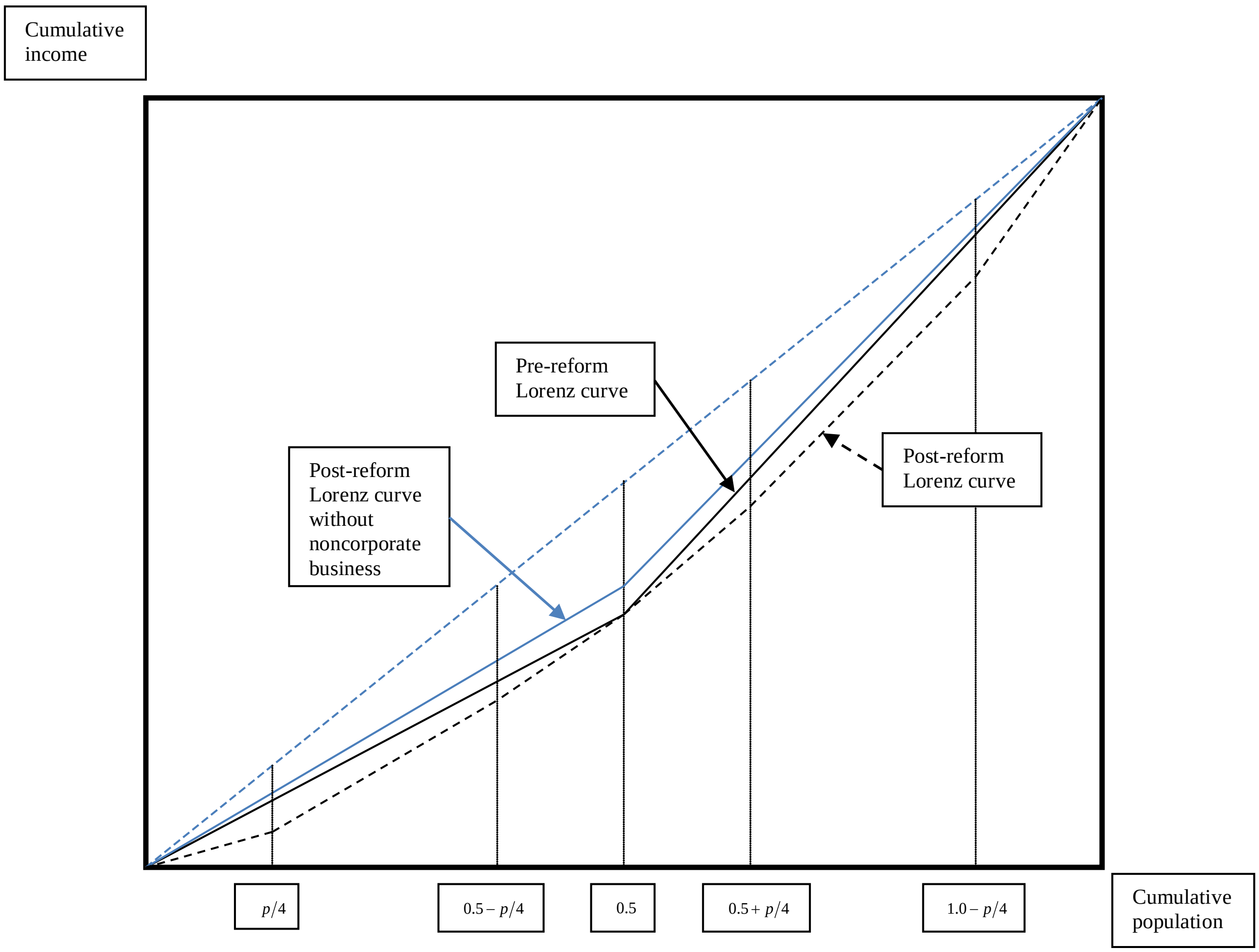
Figure 1: Income Dispersion Effects of a Corporate Tax Increase.



Note: Figure 1 depicts incomes before and after a corporate tax increase. There are two types of individuals, *A* and *B*, with respective incomes $\hat{y}_A$ and $\hat{y}_B$ prior to the tax increase. A higher corporate tax (and accompanying lower labor tax) increases type *A*'s expected after-tax income from $\hat{y}_A$ to $\hat{y}'_A$, and reduces type *B*'s expected after-tax income from $\hat{y}_B$ to $\hat{y}'_B$. The higher corporate tax also stimulates noncorporate investment with risky outcomes, as a result of which a fraction $p/2$ of type *A* individuals have realized incomes $\hat{y}'_A(1-c)$, and a fraction $p/2$ have realized incomes $\hat{y}'_A(1+c)$; similarly, a fraction $p/2$ of type *B* individuals have realized incomes $\hat{y}'_B(1-c)$, and a fraction $p/2$ have realized incomes $\hat{y}'_B(1+c)$.

Figure 2: Lorenz Curves before and after a Corporate Tax Increase.



Note: Figure 2 depicts the distribution of income before and after a reform that increases the corporate tax rate and reduces the labor income tax rate. There are just two types of individuals, and the tax reform increases the expected after-tax incomes of those with lower incomes while reducing the expected after-tax incomes of those with higher incomes. The solid dark Lorenz curve plots the cumulative income distribution prior to the tax reform, and the lightly shaded Lorenz curve plots what the income distribution would have been if a higher corporate tax had not induced some investors to start unincorporated businesses. The dashed Lorenz curve plots the income distribution after the tax reform, including the greater income dispersion due to noncorporate business activity, for a case in which condition (4) in the text holds with equality. Since the post-reform Lorenz curve lies weakly below the original Lorenz curve, the tax reform makes the income distribution less equal in a second order stochastic sense.

Table 1

Noncorporate Business Riskiness and the Concentration of High Incomes

ϕ															
0.55		0.26	0.47												
0.50		0.20	0.37	0.59											
0.45		0.16	0.29	0.46	0.68										
0.40		0.13	0.24	0.37	0.53	0.73									
0.35		0.11	0.19	0.29	0.42	0.57	0.75	0.96							
0.30		0.08	0.15	0.23	0.33	0.45	0.58	0.73	0.91	1.10					
0.25		0.06	0.11	0.18	0.25	0.34	0.44	0.56	0.69	0.83	0.98	1.15	1.33		
0.20		0.05	0.08	0.13	0.19	0.25	0.33	0.41	0.50	0.61	0.72	0.84	0.97		
		0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8		***k***

Note to Table 1: The table presents values of $\left[(1+k)^{\alpha}\phi+(1-\phi-k\phi)^{\alpha}(1-\phi)^{1-\alpha}-1\right]$, denoted Δ in the text, with $\alpha=1.67$, k taking values indicated on the horizontal axis, and ϕ taking values indicated on the vertical axis. k corresponds to the factor by which noncorporate business success increases an entrepreneur's income, and ϕ is the probability of success. An entry such as 0.46 (for $k=1.0$ and $\phi=0.45$) indicates that the aggregate income of the population with incomes above $\overline{y}$ equals $\Theta_{\overline{y}}(1+0.46p)$, in which $\Theta_{\overline{y}}$ is the aggregate income of the population with incomes above $\overline{y}$ in the absence of noncorporate investment, and p is the fraction of the population making noncorporate investments.

Table 2
Effect of a One Percent Higher Corporate Tax Rate on Income Concentration

			p = 0.20				p = 0.30		
		α	1.60	1.67	1.75		1.60	1.67	1.75
ϕ	k								
0.50	1.0		0.088	0.095	0.103		0.084	0.090	0.097
	0.6		0.032	0.035	0.039		0.031	0.035	0.038
0.40	1.4		0.105	0.115	0.125		0.100	0.108	0.117
	1.0		0.056	0.062	0.068		0.054	0.060	0.066
	0.6		0.021	0.023	0.026		0.021	0.023	0.026
0.30	1.4		0.066	0.074	0.082		0.064	0.071	0.078
	1.0		0.035	0.039	0.044		0.035	0.039	0.043
	0.6		0.013	0.015	0.017		0.013	0.015	0.016
0.20	1.4		0.038	0.043	0.049		0.038	0.042	0.047
	1.0		0.020	0.023	0.026		0.020	0.023	0.026
	0.6		0.008	0.009	0.010		0.008	0.009	0.010

Note to Table 2: The table presents the effect of a one percent higher corporate tax rate on the concentration of high incomes due to induced greater income dispersion from noncorporate investments. The table entries correspond to $\left[\frac{d\Omega/d\tau}{\psi}+\lambda\right]$ in equation (20), and assume that $dp/d\tau = 0.3$. The net effect of a one percent higher corporate tax rate then equals the difference between the entry in Table 2 and λ, where λ is the effect of the corporate tax on expected incomes. Thus for example, if $p = 0.20$, $\alpha = 1.67$, $\phi = 0.40$, and $k = 1.4$, then the greater income dispersion caused by a one percent higher corporate tax rate increases the concentration of high incomes by 0.115 percent. If the relevant value of λ is smaller in magnitude than 0.115 percent, it would then follow that a higher corporate tax rate increases the concentration of high incomes.

Table 3

Implications of U.S. Data for the Effect of Corporate Taxes on Top 1% Income Concentration

Year	ψ_{NC}/ψ	k	ϕ	m	Δ	p	$\frac{d\Omega/d\tau}{\psi}+\lambda$
2014	0.350	0.879	0.504	0.892	0.456	0.270	0.0730
2015	0.362	0.861	0.508	0.888	0.446	0.282	0.0711
2016	0.356	0.771	0.535	0.887	0.401	0.282	0.0648
2017	0.368	0.928	0.485	0.875	0.468	0.284	0.0743

Note to Table 3: The table presents values of model parameters fit to U.S. tax return data for taxpayers in the top one percent of the income distribution for years 2014-2017. Column 2 presents the fraction of top one percent income earned from active investments in partnerships and S corporations. Columns 3-5 present fitted model parameters *k*, ϕ, and *m*. *k* corresponds to the factor by which noncorporate business success increases an entrepreneur's income, and ϕ is the probability of success; *m* is the fraction of potential income lost in an unsuccessful noncorporate business venture. Column 6 presents the implied value of $\Delta = \left[(1+k)^{\alpha}\phi + (1-\phi-k\phi)^{\alpha}(1-\phi)^{1-\alpha} - 1\right]$ for $\alpha = 1.67$, in which Δ is the effect of a given level of investment in unincorporated business on the extent of top income concentration. Column 7 presents the implied value of *p*, the fraction of the population engaging in noncorporate business activity. Column 8 presents the change in income earned by the top one percent due to a 1% higher corporate tax rate, restricting attention to that portion of the effect attributable to income dispersion caused by greater investment in partnerships and S corporations.

Appendix A

This appendix considers the model of section 3. Denoting individual *A*'s pretax income prior to the tax change as $\hat{y}_A$, and individual *B*'s as $\hat{y}_B$, it follows that

(A1) $$\hat{y}_A = w(1-t)L_A + r(1-\tau)K_A$$

(A2) $$\hat{y}_B = w(1-t)L_B + r(1-\tau)K_B,$$

in which w is the pretax return to labor, t the tax rate on labor income, r the pretax return to corporate investment, and τ the tax rate on corporate income. Individual *A*'s labor (L_A) and capital (K_A) are inelastically supplied, as are individual *B*'s labor (L_B) and capital (K_B). Tax revenue is denoted *R*, for which

(A3) $$R = tw(L_A + L_B) + \tau r(K_A + K_B).$$

Substituting (A3) into (A1) and (A2) produces

(A4) $$\hat{y}_A = wL_A + rK_A - R\frac{L_A}{(L_A + L_B)} + \tau r(K_A + K_B)\left[\frac{L_A}{(L_A + L_B)} - \frac{K_A}{(K_A + K_B)}\right]$$

(A5) $$\hat{y}_B = wL_B + rK_B - R\frac{L_B}{(L_A + L_B)} - \tau r(K_A + K_B)\left[\frac{L_A}{(L_A + L_B)} - \frac{K_A}{(K_A + K_B)}\right].$$

In an environment with fixed factor supplies, tax changes that do not affect total government revenue also will not affect pretax factor returns.[28] Taking government revenue *R* to be a fixed requirement, it follows from (A4) that a higher corporate tax rate (and accompanying lower labor income tax rate) increases *A*'s after-tax income if *A*'s factor endowment is relatively more labor-intensive than the economy as a whole. Conversely, a higher corporate tax rate reduces *B*'s after-tax income if *A*'s factor endowment is relatively more labor-intensive than the economy's.

[28] See, for example, Kotlikoff and Summers (1987) and Fullerton and Metcalf (2002), who note that the same incidence result can also arise with endogenous corporate-noncorporate substitution if corporate and noncorporate activities have identical production functions (and therefore equal capital intensities), and the elasticity of capital/labor substitution in the production sector equals the elasticity of substitution in demand between corporate and noncorporate goods.

Hence if type *A*s have lower incomes than type *B*s, and individuals of type *A* have relatively labor-intensive factor endowments, it follows that, in the absence of noncorporate investment, higher corporate tax rates narrow the income gap between types *A* and *B*.

Appendix B

This appendix offers detailed derivations of equations (10), (17), and (22) in the text of the paper, and proofs of some properties of Δ for cases in which $k > 0$ and $\phi > 0$, so that there is meaningful risky noncorporate business activity.

B.1. Derivations of (10),(17), and (22).

Equation (8) in the text of the paper is

(B1) $$\psi = (1-p)\int_{\theta_2}^{\infty} y(\theta)\,dF(\theta) + p\int_{\theta_3}^{\infty} y(\theta)\,dF(\theta) + p\phi\int_{\theta_1}^{\theta_3} y(\theta)(1+k)\,dF(\theta),$$

which can be rewritten as

(B2) $$\psi = \int_{\theta_2}^{\infty} y(\theta)\,dF(\theta) - p\int_{\theta_2}^{\theta_3} y(\theta)\,dF(\theta) + p\phi\int_{\theta_1}^{\theta_3} y(\theta)(1+k)\,dF(\theta).$$

Evaluating the integrals in (B2) while applying $y(\theta) = \theta$ and $dF(\theta) = \frac{\gamma}{\theta^{1+\alpha}}d\theta$ yields

(B3) $$\psi = \frac{\bar{y}^{1-\alpha}\gamma}{(\alpha-1)} + p\frac{\bar{y}^{1-\alpha}\gamma}{(\alpha-1)}\left\{(1-m)^{\alpha-1} - 1 + \phi(1+k)\left[(1+k)^{\alpha-1} - (1-m)^{\alpha-1}\right]\right\}.$$

Using (6) to replace $(1-m)$ with $(1-\phi-k\phi)/(1-\phi)$, (B3) becomes

(B4) $$\psi = \frac{\bar{y}^{1-\alpha}\gamma}{(\alpha-1)} + p\frac{\bar{y}^{1-\alpha}\gamma}{(\alpha-1)}\left\{\left(\frac{1-\phi-k\phi}{1-\phi}\right)^{\alpha-1}\left[1-\phi(1+k)\right] - 1 + \phi(1+k)^{\alpha}\right\},$$

from which (10) follows directly.

Equation (16) in the paper is

(B5) $$n = (1-p)\int_{\theta_2}^{\infty} dF(\theta) + p\int_{\theta_3}^{\infty} dF(\theta) + p\phi\int_{\theta_1}^{\theta_3} dF(\theta),$$

which can be rewritten as

(B6) $$n=\int_{\theta_2}^{\infty}dF(\theta)-p\int_{\theta_2}^{\theta_3}dF(\theta)+p\phi\int_{\theta_1}^{\theta_3}dF(\theta).$$

Evaluating (B6) while applying $y(\theta)=\theta$ and $dF(\theta)=\frac{\gamma}{\theta^{1+\alpha}}d\theta$ yields

(B7) $$\psi=\frac{\overline{y}^{-\alpha}\gamma}{\alpha}+p\frac{\overline{y}^{-\alpha}\gamma}{\alpha}\left\{(1-m)^{\alpha}-1+\phi\left[(1+k)^{\alpha}-(1-m)^{\alpha}\right]\right\}.$$

Using (6) to replace $(1-m)$ with $(1-\phi-k\phi)/(1-\phi)$, (B7) becomes

(B8) $$\psi=\frac{\overline{y}^{-\alpha}\gamma}{\alpha}+p\frac{\overline{y}^{-\alpha}\gamma}{\alpha}\left\{\left(\frac{1-\phi-k\phi}{1-\phi}\right)^{\alpha}(1-\phi)-1+\phi(1+k)^{\alpha}\right\},$$

from which (17) immediately follows.

Equation (21) in the paper is

(B9) $$\psi_{NC}=p\int_{\theta_3}^{\infty}y(\theta)dF(\theta)+p\phi\int_{\theta_1}^{\theta_3}(1+k)y(\theta)dF(\theta).$$

Evaluating the integrals in (B9) while applying $y(\theta)=\theta$ and $dF(\theta)=\frac{\gamma}{\theta^{1+\alpha}}d\theta$ yields

(B10) $$\psi_{NC}=p\frac{\overline{y}^{1-\alpha}\gamma}{(\alpha-1)}\left\{(1-m)^{\alpha-1}+\phi(1+k)\left[(1+k)^{\alpha-1}-(1-m)^{\alpha-1}\right]\right\}.$$

Using (6) to replace $(1-m)$ with $(1-\phi-k\phi)/(1-\phi)$, (B10) becomes

(B11) $$\psi_{NC}=p\frac{\overline{y}^{1-\alpha}\gamma}{(\alpha-1)}\left\{\left(\frac{1-\phi-k\phi}{1-\phi}\right)^{\alpha-1}\left[1-\phi(1+k)\right]+\phi(1+k)^{\alpha}\right\},$$

which implies (22).

B.2. Δ is increasing in α.

Expression (12) defines Δ as

(B12) $$\Delta \equiv (1+k)^{\alpha}\phi + (1-\phi-k\phi)^{\alpha}(1-\phi)^{1-\alpha} - 1.$$

Differentiating both sides of (B12) with respect to α produces

(B13) $$\frac{\partial\Delta}{\partial\alpha} = \phi(1+k)^{\alpha}\ln(1+k) - (1-\phi-k\phi)^{\alpha}(1-\phi)^{1-\alpha}\left[\ln(1-\phi)-\ln(1-\phi-k\phi)\right].$$

From the fundamental theorem of calculus,

(B14) $$\left[\ln(1-\phi)-\ln(1-\phi-k\phi)\right] = \int_{k\phi}^{0}\frac{\partial\ln(1-\phi-s)}{\partial s}ds = \int_{0}^{k\phi}\frac{1}{(1-\phi-s)}ds < \frac{k\phi}{(1-\phi-k\phi)}.$$

It follows from (B13) and (B14) that

(B15) $$\frac{\partial\Delta}{\partial\alpha} > \phi\left[(1+k)^{\alpha}\ln(1+k) - k\left(\frac{1-\phi-k\phi}{1-\phi}\right)^{\alpha-1}\right].$$

A separate application of the fundamental theorem of calculus implies that

(B16) $$\ln(1+k) = \ln(1+k)-\ln(1) = \int_{0}^{k}\frac{\partial\ln(1+s)}{\partial s}ds = \int_{0}^{k}\frac{1}{(1+s)}ds > \frac{k}{1+k}.$$

Then (B15) and (B16) together imply that

(B17) $$\frac{\partial\Delta}{\partial\alpha} > \phi k\left[(1+k)^{\alpha-1} - \left(\frac{1-\phi-k\phi}{1-\phi}\right)^{\alpha-1}\right].$$

From expression (7) in the text of the paper, $1 > \left(\frac{1-\phi-k\phi}{1-\phi}\right) \geq 0$; and since $\alpha > 1$, it follows that $1 > \left(\frac{1-\phi-k\phi}{1-\phi}\right)^{\alpha-1} \geq 0$. Given that $(1+k)^{\alpha-1} > 1$, the term in brackets on the right side of (B17) is positive. Consequently, $\partial\Delta/\partial\alpha > 0$.

B.3. Monotonicity and convexity of Δ in k and in ϕ.

It is possible to show that Δ is increasing and convex in k and ϕ individually (though not jointly), for which the necessary and sufficient conditions are that $\partial\Delta/\partial k > 0$, $\partial^2\Delta/\partial k^2 > 0$, $\partial\Delta/\partial\phi > 0$, and $\partial^2\Delta/\partial\phi^2 > 0$.

Differentiating (B12) with respect to *k* produces

(B18) $$\frac{\partial\Delta}{\partial k} = \phi\alpha\left[(1+k)^{\alpha-1} - \left(\frac{1-\phi-k\phi}{1-\phi}\right)^{\alpha-1}\right].$$

The bracketed term on the right side of (B18) is the same as the bracketed term on the right side of (B17), and is positive for the same reasons, from which it follows that $\partial\Delta/\partial k > 0$.

Further differentiating (B18) with respect to *k* produces

(B19) $$\frac{\partial^2\Delta}{\partial k^2} = \phi\alpha(\alpha-1)\left[(1+k)^{\alpha-2} + \left(\frac{\phi}{1-\phi}\right)\left(\frac{1-\phi-k\phi}{1-\phi}\right)^{\alpha-2}\right].$$

Since all of the terms on the right side of (B19) are positive, $\partial^2\Delta/\partial k^2 > 0$.

Differentiating (B12) with respect to ϕ produces

(B20) $$\frac{\partial\Delta}{\partial\phi} = (1+k)^{\alpha} - \left(\frac{1-\phi-k\phi}{1-\phi}\right)^{\alpha}\left(1+\frac{\alpha k}{1-\phi-k\phi}\right).$$

Further differentiating (B20) with respect to ϕ produces

(B21) $$\frac{\partial^2\Delta}{\partial\phi^2} = \frac{\alpha(\alpha-1)k^2}{(1-\phi)^2(1-\phi-k\phi)}\left(\frac{1-\phi-k\phi}{1-\phi}\right)^{\alpha-1}.$$

Since all the terms on the right side of (B21) are positive, it follows that $\partial^2\Delta/\partial\phi^2 > 0$.

In order to determine the sign of $\partial\Delta/\partial\phi$, it is useful to evaluate (B20) at the point at which $\phi = 0$; this value is

(B22) $$\left(1+k\right)^{\alpha}-\left(1+\alpha k\right).$$

If the first term in (B22) is larger in magnitude than the second, then this derivative is positive. The logarithm of the first term is $\alpha\ln\left(1+k\right)$; the logarithm of the second term is

(B23) $$\ln\left(1+\alpha k\right)=\int_0^{\alpha k}\frac{\partial\ln\left(1+z\right)}{\partial z}dz=\ln\left(1+k\right)+\int_k^{\alpha k}\frac{\partial\ln\left(1+z\right)}{\partial z}dz.$$

Since $\int_k^{\alpha k}\frac{\partial\ln\left(1+z\right)}{\partial z}dz<\frac{\left(\alpha-1\right)k}{\left(1+k\right)}$, it follows from (B23) that $\ln\left(1+\alpha k\right)<\ln\left(1+k\right)+\frac{\left(\alpha-1\right)k}{\left(1+k\right)}$. Hence the difference of the logarithms of the two terms in (B22) is greater than

(B24) $$\left(\alpha-1\right)\left[\ln\left(1+k\right)-\frac{k}{\left(1+k\right)}\right].$$

And since $\ln\left(1+k\right)=\int_0^{k}\frac{\partial\ln\left(1+z\right)}{\partial z}dz>\frac{k}{\left(1+k\right)}$, it follows that (B24) is positive, so $\partial\Delta/\partial\phi>0$ at the point at which $\phi=0$. Then $\partial^2\Delta/\partial\phi^2>0$ implies that $\partial\Delta/\partial\phi>0$ for all positive values of ϕ.

Appendix C

This appendix uses the model of section 4 together with U.S. tax return data to infer values of model parameters, as discussed in section 5 and presented in Table 3. Available U.S. tax data on the noncorporate business activities of individuals with top incomes include numbers of tax returns and aggregate gains of those with partnership and S corporation gains and those with sole proprietorship and farm gains, and corresponding information for those with losses.

C.1. Average top incomes.

The Pareto distribution described in (9) implies that the total population with values of θ exceeding $\tilde{\theta}$ is

(C1) $$\int_{\tilde{\theta}}^{\infty} dF(\theta) = \frac{\gamma}{\alpha}\tilde{\theta}^{-\alpha},$$

and the aggregate value of θ in excess of $\tilde{\theta}$ is

(C2) $$\int_{\tilde{\theta}}^{\infty} \theta dF(\theta) = \frac{\gamma}{(\alpha-1)}\tilde{\theta}^{1-\alpha}.$$

The average value of θ among the population with values exceeding $\tilde{\theta}$ is given by the ratio of (C2) to (C1), or $\frac{\alpha}{(\alpha-1)}\tilde{\theta}$. Consequently, in the absence of noncorporate business activity, the average income level of those with incomes exceeding $\bar{y}$ is $\frac{\alpha}{(\alpha-1)}\bar{y}$.

Aggregate tax return data on numbers of taxpayers with positive noncorporate business income do not distinguish those making substantial investments from casual investors with trivial stakes, but the model implies that the number of top income earners with successful and substantial noncorporate businesses (n_g) is

(C3) $$n_g = p\phi\int_{\theta_1}^{\infty} dF(\theta) = \frac{p\phi\bar{y}^{-\alpha}}{\alpha}(1+k)^{\alpha}\gamma,$$

and that their incomes $\left(\psi_{NC}^{g}\right)$ sum to

(C4) $$\psi_{NC}^{g} = p\phi\int_{\theta_1}^{\infty}(1+k)\,y(\theta)\,dF(\theta) = \frac{p\phi\bar{y}^{1-\alpha}}{(\alpha-1)}(1+k)^{\alpha}\gamma .$$

Consequently, the per capita income of top earners with successful noncorporate businesses is the ratio ψ_{NC}^{g}/n_g, which from (C3) and (C4) is $\frac{\alpha\bar{y}}{(\alpha-1)}$. On this basis it is possible to use information on partnership and S corporation income among top taxpayers to infer the number who are entrepreneurs.

Finally, the model also implies that the number of top income earners with substantial but unsuccessful noncorporate businesses (n_l) is

(C5) $$n_l = p(1-\phi)\int_{\theta_3}^{\infty}dF(\theta) = \frac{p(1-\phi)\bar{y}^{-\alpha}}{\alpha}\left(\frac{1-\phi-k\phi}{1-\phi}\right)^{\alpha}\gamma ,$$

and that their incomes $\left(\psi_{NC}^{l}\right)$ sum to

(C6) $$\psi_{NC}^{l} = p(1-\phi)\int_{\theta_3}^{\infty}\left(\frac{1-\phi-k\phi}{1-\phi}\right)y(\theta)\,dF(\theta) = \frac{p(1-\phi)\bar{y}^{1-\alpha}}{(\alpha-1)}\left(\frac{1-\phi-k\phi}{1-\phi}\right)^{\alpha}\gamma .$$

As a result, the per capita income of top earners with unsuccessful noncorporate businesses is the ratio ψ_{NC}^{l}/n_l, which from (C5) and (C6) is $\frac{\alpha\bar{y}}{(\alpha-1)}$.

C.2. Distinguishing substantial from casual noncorporate investors.

In interpreting tax return data on noncorporate income it is important to distinguish substantial noncorporate entrepreneurs from casual investors with trivial stakes. Denote by ω the ratio of the number of those with noncorporate investment gains that are casual investors with trivial stakes in their investments to the number of more substantial investors with significant stakes. It is very helpful to assume that this ratio ω also equals the ratio of the number of casual noncorporate investors with trivial losses to the number of substantial investors with significant losses. It follows that the number with trivial gains $\left(n_g^t\right)$ among the top one percent is

(C7)
$$n_g^t = \omega p \phi \int_{\theta_2}^{\infty} dF\left(\theta\right) = \omega p \phi \frac{\overline{y}^{-\alpha}}{\alpha}\gamma ,$$

in which the lower bound of integration is θ_2 because trivial gains do not materially change whether taxpayers are among top income earners. The number with trivial losses $\left(n_l^t\right)$ is

(C8)
$$n_l^t = \omega p\left(1-\phi\right) \int_{\theta_2}^{\infty} dF\left(\theta\right) = \omega p\left(1-\phi\right) \frac{\overline{y}^{-\alpha}}{\alpha}\gamma .$$

It follows from (C3), (C5), (C7) and (C8) that the ratio of the numbers of taxpayers with trivial losses to those with substantial losses is

(C9)
$$\frac{n_l^t}{n_l} = \frac{n_g^t}{n_g}\left[\frac{1+k}{\left(\frac{1-\phi-k\phi}{1-\phi}\right)}\right]^{\alpha} .$$

And (C9) implies

(C10)
$$n_l = \frac{\left(n_l + n_l^t\right)}{1+\frac{n_g^t}{n_g}\left[\frac{1+k}{\left(\frac{1-\phi-k\phi}{1-\phi}\right)}\right]^{\alpha}} .$$

Since the numerator on the right side is the (observable) total number of taxpayers claiming noncorporate business losses, for given parameters k and ϕ, and empirically inferred values of n_g^t and n_g, equation (C10) can be used to infer the number of top income entrepreneurs with business losses.

The model implies that aggregate value of the business losses (ξ) of top taxpayers with substantial investments and significant losses is

(C11) $$\xi = p(1-\phi)m\int_{\theta_3}^{\infty} y(\theta)\,dF(\theta) = p\phi k\frac{\overline{y}^{1-\alpha}}{(\alpha-1)}\left(\frac{1-\phi-k\phi}{1-\phi}\right)^{\alpha-1}\gamma .$$

Together with (C5), (C11) implies that the per capita business loss for an unsuccessful top income entrepreneur is

(C12) $$\frac{\xi}{n_l} = \frac{\phi k\overline{y}\alpha}{(\alpha-1)(1-\phi-k\phi)} .$$

Since from (C5) and (C6) the per capita income of unsuccessful top income entrepreneurs is $\frac{\alpha\overline{y}}{(\alpha-1)}$, it follows that their per capita loss given by (C12) must reveal the value of *m*. Specifically, (6) and (C12) together imply that

(C13) $$m = \frac{k\phi}{(1-\phi)} = \frac{1}{1+\frac{\overline{y}\alpha n_l}{(\alpha-1)\xi}} .$$

Since $\overline{y}$, ξ, α, $(n_l + n_l^t)$, n_g, and n_g^t are all either observable or inferable from the data, (C10) and (C13) together form a single equation with two unknowns, *k* and ϕ. A second equation is available by taking the ratio of ξ to ψ_{NC}^g, which yields

(C14) $$\frac{\xi}{\psi_{NC}^g} = \frac{k}{\left(\frac{1-\phi-k\phi}{1-\phi}\right)}\left[\frac{\left(\frac{1-\phi-k\phi}{1-\phi}\right)}{(1+k)}\right]^{\alpha} .$$

Together, (C10), (C13), and (C14) constitute two separate equations in two unknowns, which can be readily solved by choosing levels of the single variable $\left[\dfrac{1+k}{\left(\dfrac{1-\phi-k\phi}{1-\phi}\right)}\right]^{\alpha}$ to produce implied values of *k* and ϕ. The resulting discrepancy between chosen and implied values of $\left[\dfrac{1+k}{\left(\dfrac{1-\phi-k\phi}{1-\phi}\right)}\right]^{\alpha}$ can be resolved by numerically iterating over $\left[\dfrac{1+k}{\left(\dfrac{1-\phi-k\phi}{1-\phi}\right)}\right]^{\alpha}$ using Newton's method.

Using (C10), (C13), and (C14) to solve for *k* and ϕ also yields solutions for Δ from (12) and *m* from (C13). Using (C10) to infer n_l from the data and values of *k* and ϕ then permits a calculation of ψ_{NC}/ψ, which can also be used to infer *p*, since from (23),

(C15) $$p = \frac{\psi_{NC}/\psi}{1+\Delta\left(1-\dfrac{\psi_{NC}}{\psi}\right)}.$$

Finally, (C5) and (C8) together imply that

(C16) $$\omega = \frac{n_l^t}{n_l}\left(\frac{1-\phi-k\phi}{1-\phi}\right)^{\alpha}.$$

It is possible to use (C16), together with *k* and ϕ, the value of n_l from (C10), and the implied value of n_l^t from n_l plus data on numbers of taxpayers with noncorporate losses $\left(n_l+n_l^t\right)$, to obtain a fitted value of ω.

C.3. Extraneous Roots.

The solution to the system defined by (C10), (C13), and (C14), given empirical magnitudes of $\bar{y}$, ξ, α, $\left(n_l+n_l^t\right)$, n_g, and n_g^t, generally has either two roots or no roots among solutions satisfying $0 \le p \le 1$ and $0 \le m \le 1$. Table 3 presents the results of fitting this system to data for 2014-2017, in each case reporting parameters corresponding to the more reasonable of the two roots. Parameters corresponding to the extraneous roots differ significantly from those reported in Table 3: ϕ is roughly 0.7, k is roughly 0.10, and p in the neighborhood of 0.43.[29] The solutions described by these extraneous roots share the feature that noncorporate businesses are likely to succeed, but produce little additional income in doing so. As a result, a higher corporate tax rate would have very little effect on income dispersion or the concentration of top incomes. Since the features of these solutions are inconsistent with other empirical evidence of the riskiness of entrepreneurial income earned by top taxpayers, these alternative model solutions appear not to correspond to economic reality, which is why the paper focuses on the other equation roots and the parameters reported in Table 3.

C.4. Sole Proprietorship and Farm Income.

Table 3 reports model parameters fit to data on partnership and S corporation income earned by U.S. taxpayers with top one percent incomes. The IRS also reports data on the sole proprietorship and farm incomes of top one percent taxpayers. Sole proprietorship and farm income of the top one percent is roughly one-tenth the size of the partnership and S corporation income of the top one percent, and appears to have very different business characteristics. The only year for which the model of section 4 fit the data for sole proprietorship and farm income is 2016, in which case the implied value of k is 0.24, and the implied value of ϕ is 0.68, corresponding to business ventures that when successful increase incomes by just one-quarter, and do so two-thirds of the time. The inconsistency of this implication with other evidence of entrepreneurial behavior, together with the inability of the model to fit sole proprietorship and farm income data for 2014, 2015, and 2017, suggests that a model modification, such as that considered in Appendix D, may be needed in order to understand the process generating sole proprietorship and farm income.

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[29] Fitting the model to 2014 data, the extraneous root yields implied values of $\phi = 0.71$, $k = 0.096$, and $p = 0.42$; using 2017 data, the extraneous root produces $\phi = 0.70$, $k = 0.112$, and $p = 0.44$.

Appendix D

The purpose of this appendix is to consider the model of Section 4 with investors who do not evaluate noncorporate investments in a risk-neutral manner. In such cases (6) no longer holds, and can be replaced by

(D1) $$k\phi(1-s) = m(1-\phi),$$

in which $-\infty < s < 1$ reflects the (assumed common) extent to which noncorporate investors require higher or lower expected returns. Investor risk aversion increases *s*, whereas utility benefits of earning financial returns in a noncorporate business venture reduce *s*. Furthermore, *s* may differ across types of noncorporate business ventures. Replacing (6) with (D1) changes the derivation of (10), which becomes

(D2) $$\psi = \Theta_{\bar{y}}\left(1+p\tilde{\Delta}\right),$$

with

(D3) $$\tilde{\Delta} \equiv (1+k)^{\alpha}\phi + (1-\phi)^{1-\alpha}\left[1-\phi-k\phi(1-s)\right]^{\alpha} - 1.$$

The remainder of the analysis of Section 4, including the determination of *n* in (17) and $d\Omega/d\tau$ in (20), is modified simply by replacing Δ with $\tilde{\Delta}$, assuming that $ds/d\tau = 0$.

The Appendix C calculations change when applying (D1). Equation (C5) becomes

(D4) $$n_l = \frac{p(1-\phi)\bar{y}^{-\alpha}}{\alpha}\left(\frac{1-\phi-k\phi(1-s)}{1-\phi}\right)^{\alpha}\gamma,$$

and similarly (C6) becomes

(D5) $$\psi_{NC}^{l} = \frac{p(1-\phi)\bar{y}^{1-\alpha}}{(\alpha-1)}\left(\frac{1-\phi-k\phi(1-s)}{1-\phi}\right)^{\alpha}\gamma.$$

As a result, it remains the case that $\frac{\psi_{NC}^{l}}{n_l} = \frac{\alpha \bar{y}}{(\alpha - 1)}$. Furthermore, (C10) becomes

(D6) $$n_l = \frac{\left(n_l + n_l^t\right)}{1 + \frac{n_g^t}{n_g}\left[\frac{1+k}{\left(\frac{1-\phi-k\phi(1-s)}{1-\phi}\right)}\right]^{\alpha}}.$$

Aggregate business losses in (C11) become

(D7) $$\xi = p\phi k \frac{\bar{y}^{1-\alpha}}{(\alpha-1)}\left(\frac{1-\phi-k\phi(1-s)}{1-\phi}\right)^{\alpha-1}\gamma,$$

and the per capita business loss for an unsuccessful entrepreneur is no longer given by (C12), but instead is

(D8) $$\frac{\xi}{n_l} = \frac{\phi k \bar{y} \alpha}{(\alpha-1)\left(1-\phi-k\phi(1-s)\right)}.$$

It follows from (D8) and (D1) that

(D9) $$m = \frac{1}{1-s+\frac{\bar{y}\alpha n_l}{(\alpha-1)\xi}}.$$

And (D6) and (D7) imply that

(D10) $$\frac{\xi}{\psi_{NC}^{g}} = \frac{k}{\left(\frac{1-\phi-k\phi(1-s)}{1-\phi}\right)}\left[\frac{\left(\frac{1-\phi-k\phi(1-s)}{1-\phi}\right)}{(1+k)}\right]^{\alpha}.$$

These equations can be used to fit the data to model parameters for specified levels of *s*. Appendix Table D1 presents parameters fit to data for sole proprietorship and farm income in a model for which $s = -0.2$, so entrepreneurs are assumed willing to accept lower returns in exchange for earning their income in proprietorships and farms. The model with $s = -0.2$ fits the sole proprietorship and farm data for all four years 2014-2017, which is not true of the model with $s = 0$, suggesting that $s = -0.2$ may better capture the behavior of these entrepreneurs. The model parameters displayed in Table D1 include higher values of *k*, and lower values of ϕ, than is the case for partnership and S corporation income as reported in Table 3 (for $s = 0$). Expected returns from sole proprietorships and farms are $-sk\phi$, which ranges between -8.2% and -10.6% for the parameter values reported in Table D1. The estimated income dispersion effect of a 1% higher tax rate on the concentration of top one percent income lies between 0.06-0.14, which is somewhat higher than the corresponding range for partnership and S corporation income with $s = 0$, as reported in Table 3. The aggregate effect on the U.S. economy is the average of the partnership and S corporation effect and the sole proprietorship and farm effect, weighted by respective shares in the economy.[30]

Appendix Table D2 presents parameters fit to data for partnership and S corporation income in models with different values of *s*. The middle panel presents parameters for a model with $s = 0$; these parameters are identical to those reported in Table 3, and are included to facilitate comparisons. The top panel presents parameters for a model with $s = -0.2$, which corresponds to investors being willing to accept lower returns in exchange for earning their income in partnerships and S corporations. The fitted values of *k* are considerably larger than those reported in the middle panel for $s = 0$, and the fitted values of ϕ correspondingly smaller. As a result, the estimated tax effect on income concentration is three to four times larger than with $s = 0$.

The opposite appears among parameters fit to a model with $s = 0.2$, as reported in the bottom panel. In this case, which corresponds to investor risk aversion dominating any willingness to accept lower expected returns from entrepreneurial ventures, the fitted values of *k* lie in the range 0.35-0.43, so are roughly half the size of those in a model with $s = 0$, and the fitted values of ϕ are very large, ranging from 0.7 to 0.74. These are investments with high

[30] Assuming that noncorporate sectors of the economy expand proportionately in response to corporate tax changes, weights are the *p* values reported in Tables 3 and D1, which are roughly ten times greater for partnership and S corporations than for sole proprietorships and farms.

probabilities of relatively modest payouts, and therefore different than the entrepreneurial ventures described by much of the literature. This suggests that, if the model is valid, risk aversion is not the only important consideration determining expected returns to noncorporate business ventures, as risk aversion appears to be offset by investor desires to earn income in entrepreneurial fashion.

Appendix Table D1

The Effect of Corporate Taxes on Top 1% Income Concentration with Risk Non-Neutrality among Owners of Sole Proprietorships and Farms

Year	ψ_{NC}/ψ	k	ϕ	m	$\tilde{\Delta}$	p	$\frac{d\Omega/d\tau}{\psi}+\lambda$
$s=-0.2$							
2014	0.042	1.412	0.317	0.786	0.431	0.0296	0.0764
2015	0.042	2.145	0.238	0.804	0.663	0.0259	0.1171
2016	0.040	2.522	0.211	0.808	0.776	0.0231	0.1369
2017	0.039	1.128	0.362	0.769	0.334	0.0298	0.0594

Note to Appendix Table D1: The table presents values of model parameters fit to U.S. tax return data on sole proprietorship and farm incomes of taxpayers in the top one percent of the income distribution for years 2014-2017. The model imposes that $s=-0.2$, so entrepreneurs are assumed to receive lower returns from their sole proprietorship and farm activities than they do from other economic activities. Column 2 presents the fraction of top one percent income earned from sole proprietorships and farms. Columns 3-5 present fitted model parameters *k*, ϕ, and *m*. *k* corresponds to the factor by which noncorporate business success increases an entrepreneur's income, and ϕ is the probability of success; *m* is the fraction of potential income lost in an unsuccessful noncorporate business venture. Column 6 presents the implied value of $\tilde{\Delta}=\left[(1+k)^{\alpha}\phi+(1-\phi-k\phi)^{\alpha}(1-\phi)^{1-\alpha}-1\right]$ for $\alpha=1.67$, in which $\tilde{\Delta}$ is the effect of a given level of investment in unincorporated business on the extent of top income concentration. Column 7 presents the implied value of *p*, the fraction of the population engaging in noncorporate business activity. Column 8 presents the change in income earned by the top one percent due to a 1% higher corporate tax rate, restricting attention to that portion of the effect attributable to income dispersion caused by greater investment in sole proprietorships and farms.

Appendix Table D2

The Effect of Corporate Taxes on Top 1% Income Concentration with Risk Non-Neutrality among Owners of Partnerships and S Corporations

Year	ψ_{NC}/ψ	k	ϕ	m	$\tilde{\Delta}$	p	$\frac{d\Omega/d\tau}{\psi}+\lambda$
$s=-0.2$							
2014	0.348	7.225	0.086	0.816	1.957	0.153	0.2706
2015	0.360	6.950	0.089	0.816	1.894	0.163	0.2602
2016	0.353	7.090	0.088	0.818	1.932	0.157	0.2663
2017	0.365	5.927	0.102	0.810	1.646	0.178	0.2286
$s=0$							
2014	0.350	0.879	0.504	0.892	0.456	0.270	0.0730
2015	0.362	0.861	0.508	0.888	0.446	0.282	0.0711
2016	0.356	0.771	0.535	0.887	0.401	0.282	0.0648
2017	0.368	0.928	0.485	0.875	0.468	0.284	0.0743
$s=0.2$							
2014	0.357	0.392	0.726	0.830	0.275	0.303	0.0457
2015	0.369	0.389	0.726	0.824	0.272	0.315	0.0449
2016	0.363	0.354	0.742	0.815	0.247	0.314	0.0411
2017	0.376	0.432	0.702	0.814	0.297	0.317	0.0487

Note to Appendix Table D2: The table presents values of model parameters fit to U.S. tax return data on partnership and S corporation incomes of taxpayers in the top one percent of the income distribution for years 2014-2017. The top panel reports parameters fit to a model that imposes that $s = -0.2$, so entrepreneurs are assumed to receive lower returns from their partnership and S corporation activities than they do from other economic activities. The middle panel reports parameters fit to a model that imposes that $s = 0$; this is the model of section 4 of the paper, and these parameters are the same as those reported in Table 3. The bottom panel reports parameters fit to a model that imposes that $s = 0.2$, so entrepreneurs are assumed to receive higher returns from their partnership and S corporation activities than they do from other economic activities. Column 2 presents the fraction of top one percent income earned from sole proprietorships and farms. Columns 3-5 present fitted model parameters *k*, ϕ, and *m*. *k* corresponds to the factor by which noncorporate business success increases an entrepreneur's income, and ϕ is the probability of success; *m* is the fraction of potential income lost in an unsuccessful noncorporate business venture. Column 6 presents the implied value of $\tilde{\Delta} = \left[(1+k)^{\alpha}\phi + (1-\phi-k\phi)^{\alpha}(1-\phi)^{1-\alpha} - 1\right]$ for $\alpha = 1.67$, in which $\tilde{\Delta}$ is the effect of a given level of investment in unincorporated business on the extent of top income concentration. Column 7 presents the implied value of *p*, the fraction of the population engaging in noncorporate business activity. Column 8 presents the change in income earned by the top one percent due to a 1% higher corporate tax rate, restricting attention to that portion of the effect attributable to income dispersion caused by greater investment in partnerships and S corporations.

Appendix E

The model of section 4 takes individuals to have common values of of *p*, *k* and ϕ. This appendix explores consequences of relaxing this assumption.

It is instructive to consider cases in which the values of *p*, *k* and ϕ differ among individuals, but are entirely uncorrelated with θ, in the sense that the distributions of *p*, *k* and ϕ are the same at each value of θ. In such cases it is possible to redo the analysis of section 4 separately for each value of (p,k,ϕ), which yields expressions for ψ and $d\Omega/d\tau$ identical to those in (10) and (20), with values of Δ corresponding to the chosen *k* and ϕ. Since the economy's value of ψ is simply the sum of the values for each subgroup in the population, the economy's ψ and $d\Omega/d\tau$ are averages of those generated by each value of (p,k,ϕ), weighted by shares of the population with those parameters. Appendix B shows that Δ is convex in each of *k* and ϕ, from which it follows that, holding mean values constant, population heterogeneity in one of these parameters increases aggregate Δ and thereby increases ψ.

Heterogeneity that entails nonzero correlation of (p,k,ϕ) with θ can take many different possible forms. It is useful to consider a simple specification in which these parameters take the values (p_1,k_1,ϕ_1) for all individuals with $\theta < \hat{y}$, and (p_2,k_2,ϕ_2) for all individuals with $\theta \geq \hat{y}$. Considering the case that $\hat{y} > \bar{y}/(1+k_1)$,

(E1)
$$\begin{aligned}\psi &= (1-p_2)\int_{\theta_2}^{\infty} y(\theta)\,dF(\theta) + p_2\int_{\theta_3}^{\infty} y(\theta)\,dF(\theta) \\ &+ p_2\phi_2\int_{\hat{y}}^{\theta_3} y(\theta)(1+k_2)\,dF(\theta) + p_1\phi_1\int_{\theta_1^1}^{\hat{y}} y(\theta)(1+k_1)\,dF(\theta)\end{aligned},$$

in which $y(\theta_2)=\bar{y}$, $y(\theta_3)=\left[\dfrac{\bar{y}}{\left(\dfrac{1-\phi_2-k_2\phi_2}{1-\phi_2}\right)}\right]$ and $y(\theta_1^1)=\bar{y}/(1+k_1)$. Evaluating (E1) yields

(E2) $$\psi = \psi_2 + \Theta_{\bar{y}} \left\{ p_1\phi_1 \left[1 - \left(\frac{\bar{y}}{\hat{y}} \right)^{\alpha-1} + k_1 \right] - p_2\phi_2 \left[1 - \left(\frac{\bar{y}}{\hat{y}} \right)^{\alpha-1} + k_2 \right] \right\},$$

in which ψ_2 is the value of ψ if the whole population had the parameters (p_2, k_2, ϕ_2). Equation (E2) carries the intuitive implications that $\psi_2 < \psi$ for values of (p_1, k_1, ϕ_1) smaller than (p_2, k_2, ϕ_2), and that the difference $(\psi - \psi_2)$ is increasing in the differences between (p_2, k_2, ϕ_2) and (p_1, k_1, ϕ_1). Furthermore, *p* and ϕ influence this difference only through their product, and in the special case that $\hat{y} = \bar{y}$, the difference is a function of $(p_1\phi_1 k_1 - p_2\phi_2 k_2)$. The value of $d\Omega/d\tau$ then depends in part on any differences between $dp_1/d\tau$ and $dp_2/d\tau$.

It is possible to fit model parameters to tax data for incomes other than the top 1%; doing so relies on the model's assumptions holding for these populations. Table E1 presents parameters fit to data for the top 0.1%, 2%, and 5% of the U.S. income distribution. While there is variation in other parameters, the fitted values of *p* for every year increase steadily as the sample narrows to ever higher-income populations. This suggests that *p* may increase with income, though testing that proposition would require a more careful specification along with additional data. Model implications vary with the precise nature of population heterogeneity, though the parameter fits reported in Tables 3, D1, D2, and E1 all suggest that the data are consistent with income dispersion effects of corporate taxation significantly influencing the concentration of top U.S. incomes.

Appendix Table E1

The Effect of Corporate Taxes on Income Concentration among Top 0.1%, 2%, and 5% Income Earners

Year	ψ_{NC}/ψ	k	ϕ	m	Δ	p	$\frac{d\Omega/d\tau}{\psi}+\lambda$
Top 0.1%							
2014	0.400	0.823	0.502	0.830	0.394	0.324	0.0628
2015	0.408	0.815	0.500	0.815	0.383	0.332	0.0610
2016	0.423	0.778	0.514	0.821	0.370	0.348	0.0588
2017	0.421	0.932	0.461	0.797	0.422	0.339	0.0663
Top 2%							
2014	0.301	1.051	0.461	0.899	0.542	0.218	0.0870
2015	0.312	1.018	0.469	0.898	0.526	0.229	0.0843
2016	0.308	0.998	0.475	0.904	0.520	0.227	0.0836
2017	0.315	1.166	0.432	0.888	0.586	0.225	0.0930
Top 5%							
2014	0.220	1.288	0.412	0.902	0.653	0.146	0.1071
2015	0.227	1.312	0.407	0.902	0.664	0.150	0.1085
2016	0.224	1.323	0.407	0.908	0.674	0.147	0.1101
2017	0.231	1.515	0.370	0.891	0.743	0.147	0.1203

Note to Appendix Table E1: The table presents values of model parameters fit to U.S. tax return data for taxpayers in the top 0.1%, 2%, and 5% of the income distribution for years 2014-2017. Column 2 presents fractions of top incomes earned from active investments in partnerships and S corporations. Columns 3-5 present fitted model parameters *k*, ϕ, and *m*. *k* corresponds to the factor by which noncorporate business success increases an entrepreneur's income, and ϕ is the probability of success; *m* is the fraction of potential income lost in an unsuccessful noncorporate business venture. Column 6 presents the implied value of $\Delta = \left[(1+k)^{\alpha} \phi + (1-\phi-k\phi)^{\alpha} (1-\phi)^{1-\alpha} - 1 \right]$ for $\alpha = 1.67$, in which Δ is the effect of a given level of investment in unincorporated business on the extent of top income concentration. Column 7 presents the implied value of *p*, the fraction of the population engaging in noncorporate business activity. Column 8 presents the change in the aggregate income of top earners due to a 1% higher corporate tax rate, restricting attention to that portion of the effect attributable to income dispersion caused by greater investment in partnerships and S corporations.

Appendix F

The model of section 4 posits that noncorporate business activity imposes additional risks to an individual's income. The model does not exclude the possibility that other forms of income are risky, since θ can be interpreted to include the factors that determine risky outcomes, but the model requires that noncorporate business risks are additive to these other risks – that the parameters k and m apply to potential incomes inclusive of any potentially risky components. The purpose of this appendix is to generalize this model to include the possibility that individuals who engage in noncorporate business thereby avoid certain risks, such as employment risks or losses on passive corporate investments.

The determination of income for those not engaging in noncorporate business ventures can be modeled as a probabilistic gamble that is successful with probability ϕ^*, in which case an individual has income $\left(1+k^*\right)y\left(\theta\right)$, and unsuccessful with probability $\left(1-\phi^*\right)$, in which case the individual has income of $\left(1-m^*\right)y\left(\theta\right)$. If this activity is a fair gamble, then

(F1) $$k^*\phi^* = m^*\left(1-\phi^*\right).$$

The restriction that individuals cannot lose more than they have, previously captured in (7), then becomes

(F2) $$k^* \le \frac{\left(1-\phi^*\right)}{\phi^*}.$$

Applying (F1) and (F2), equation (8) becomes

(F3) $$\hat{\psi} = p\hat{\psi}_1 + \left(1-p\right)\hat{\psi}_2 \ ,$$

in which

(F4) $$\hat{\psi}_1 \equiv \int_{\theta_3}^{\infty} y\left(\theta\right)dF\left(\theta\right) + \phi\int_{\theta_1}^{\theta_3} y\left(\theta\right)\left(1+k\right)dF\left(\theta\right)$$

and

(F5) $$\hat{\psi}_2 \equiv \int_{\theta_3^*}^{\infty} y(\theta)\,dF(\theta) + \phi^* \int_{\theta_1^*}^{\theta_3^*} y(\theta)\left(1+k^*\right)dF(\theta),$$

with $y\left(\theta_1^*\right) = \bar{y}\big/\left(1+k^*\right)$ and $y\left(\theta_3^*\right) = \bar{y}\big/\left(1-m^*\right)$. Together, (F3-F5) imply that

(F6) $$\hat{\psi} = \int_{\theta_2}^{\infty} y(\theta)\,dF(\theta) + p\hat{\psi}_3 + (1-p)\hat{\psi}_4,$$

with

(F7) $$\hat{\psi}_3 \equiv \phi\int_{\theta_1}^{\theta_2} y(\theta)\,dF(\theta) + k\phi\int_{\theta_1}^{\theta_3} y(\theta)\,dF(\theta) - (1-\phi)\int_{\theta_2}^{\theta_3} y(\theta)\,dF(\theta)$$

(F8) $$\hat{\psi}_4 \equiv \phi^*\int_{\theta_1^*}^{\theta_2} y(\theta)\,dF(\theta) + k^*\phi^*\int_{\theta_1^*}^{\theta_3^*} y(\theta)\,dF(\theta) - \left(1-\phi^*\right)\int_{\theta_2}^{\theta_3^*} y(\theta)\,dF(\theta).$$

Evaluating the terms in (F6)-(F8), the analogue to equation (10) becomes

(F9) $$\hat{\psi} = \Theta_{\bar{y}}\left[1 + p\Delta + (1-p)\hat{\Delta}\right],$$

with

(F10) $$\hat{\Delta} \equiv \left(1+k^*\right)^{\alpha}\phi^* + \left(1-\phi^* - k^*\phi^*\right)^{\alpha}\left(1-\phi^*\right)^{1-\alpha} - 1.$$

(F9) implies that the analogue to (13) becomes

(F11) $$\frac{d\hat{\psi}}{d\tau} = \frac{d\Theta_{\bar{y}}}{d\tau}\left[1 + p\Delta + (1-p)\hat{\Delta}\right] + \Theta_{\bar{y}}\frac{dp}{d\tau}\left(\Delta - \hat{\Delta}\right).$$

Applying (F9), (F11) yields:

(F12) $$\frac{d\hat{\psi}}{d\tau} = \left\{\frac{dp}{d\tau}\frac{1}{\left[\dfrac{1+\hat{\Delta}}{\left(\Delta-\hat{\Delta}\right)} + p\right]} - \alpha\lambda\right\}\hat{\psi}.$$

Equation (F12) is the analogue to (15) for cases in which noncorporate entrepreneurs avoid income risks with properties summarized by $\hat{\Delta}$.

Denoting by $\hat{\Omega}$ the concentration of top incomes with corporate return riskiness, (F12) implies that

(F13)
$$\frac{d\hat{\Omega}}{d\tau} = \left\{ \frac{dp}{d\tau} \frac{1}{\alpha\left[\frac{1+\hat{\Delta}}{\left(\Delta-\hat{\Delta}\right)}+p\right]} - \lambda \right\} \hat{\psi} .$$

Equation (F13) is identical to (20) for cases in which those who choose not to start noncorporate business ventures thereby avoid any additional income risks, as then $\hat{\Delta}=0$. Alternatively, as $\hat{\Delta}$ approaches Δ, so that noncorporate business activity becomes just as risky as the alternative, then the first term on the right side of (F13) is zero, and the equation implies that $d\hat{\Omega}/d\tau = -\lambda\psi$. It is noteworthy that all of these derivations take the values of ϕ^*, k^*, and m^* to be unaffected by τ, which need not be the case, particularly since k^* and m^* are after-tax returns.