Optimal Tax Avoidance and Corporate Social Responsibility with Heterogeneous Consumers and Investors

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ABSTRACT

This study characterizes the optimal tax-avoidance strategies in an industry that comprises two firms. Both consumers and investors have heterogeneous preferences over the firms' tax-avoidance strategies. The presence of consumers who care about a firm's tax-avoidance activities induces the two *ex ante* identical firms to choose different tax-avoidance strategies. The firm that chooses the less aggressive tax-avoidance strategy commands a price premium and earns above-normal profits. This in turn allows the more tax aggressive firm to price above marginal cost and also earn above-normal profits. We incorporate investors who care about the firms' tax-avoidance strategies. These investors avoid holding the stock of the more aggressive tax-avoiding firm. Their presence increases the risk premium and thus decreases the stock price of the tax-avoiding firm.

JEL Classifications: G32, G33, H25

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1. Introduction

Friedman (1970) famously asserted that the social responsibility of business is to lawfully maximize its profits. As corporate income taxes reduce profits, Friedman's perspective suggests that legally avoiding corporate income taxes should be part of profit maximization. Yet there is considerable variation in the extent to which firms engage in tax avoidance. As Gallemore, Maydew and Thornock (2014) put it: "What is puzzling is not that some firms engage in tax avoidance, but rather why some firms engage in it enthusiastically while others appear to shun it." We show that variation in firms' tax avoidance strategies arises in an equilibrium in which all firms strive to maximize their after-tax profits.

We characterize the optimal tax policies of firms in a duopolistic industry in which both consumers and investors have heterogeneous preferences over the firms' tax policies. If neither consumers nor investors are averse to buying from or investing in firms that engage in tax avoidance, then firms will fully exploit all lawful tax-avoidance opportunities available in an effort to maximize profits. However, this strategy need not maximize firm value if consumers and/or investors avoid buying from or investing in firms that engage in aggressive tax avoidance. Our analysis is fully consistent with the spirit of Friedman's view that managers strive to maximize firm value; nevertheless, we find that some firms will refrain from lawful tax avoidance in our setting.

When corporations pay taxes, they help fund public goods that improve the well-being of their employees and consumers. A tax-avoiding firm takes full advantage of the provisions in the tax law that allow them to legally reduce their tax liability. There is anecdotal evidence that some consumers are averse to buying from firms that engage in aggressive tax avoidance. For example, Starbucks faced a consumer backlash in the United Kingdom (UK) in 2012 following

news reports that Starbucks reported tax losses in the UK in 14 of the last 15 years despite earning high positive operating profits (Campbell and Helleloid, 2016).[1] A shareholder resolution asked Facebook to endorse principles that would guide its tax policies and to consider the impact on the local economies and public services of those strategies (Phillips, 2018).

Our model includes a parameter to capture how sensitive the consumer population is to the firms' tax-avoidance strategies. For example, greater disclosure of tax-avoidance activities in a firm's financial statements could increase consumer awareness of aggressive tax avoidance.

We find that the presence of consumers who prefer not to buy from an aggressive tax avoider induces the two firms in the industry to choose different tax-avoidance strategies. The aggressive tax avoider, which we refer to as Firm A, takes full advantage of its opportunities to engage in lawful tax avoidance. The other firm, Firm Z, refrains from some or all tax-avoidance activities if consumers are sufficiently sensitive to the firms' tax-avoidance strategies. The presence of consumers who are willing to pay more for a product produced and sold by Firm Z when it refrains from aggressive tax avoidance means that Firm Z can charge a premium price for its product. This in turn allows Firm A to charge a price that is lower than Firm Z's, but still above marginal cost, enabling both firms to earn positive economic profits. This result is similar in spirit to the model in Albuquerque, Koskinen and Zhang (2019), which features an equilibrium in which CSR firms engage in product differentiation and generate higher profit margins.

Some investors consider good corporate citizenship when making portfolio decisions. Specifically, ESG (environmental, social, governance) investors consider a company's operating polices, believing that firms with strong ESG policies are better positioned for long-run success. Chaim and Parchomovsky (2024) argue that a firm's tax policies are the missing 'T' in ESG

[1] Starbucks was able to legally report tax losses by making royalty payments to foreign subsidiaries located in low-tax countries.

investing. As in Friedman and Heinle (2016), we consider two types of investors. One type, which we refer to as Green investors, are unwilling to hold the shares of Firm A. The other investors, which we refer to as Brown investors, are willing to hold shares of both Firm A and Firm Z. Consequently, the risk of Firm A is borne entirely by Brown investors, whereas the risk of Firm Z is borne by both types of investors. Accordingly, Firm Z has a higher stock price, *ceteris paribus,* than does Firm A. The product market interaction could either exacerbate or attenuate the stock price difference, so it is theoretically ambiguous whether Firm A or Firm Z has a higher market value. This also implies that Firm Z could achieve a higher stock price than Firm A even if it earns lower economic profits. This finding provides insights in the debate over whether firms that do good also do well by generating testable empirical predictions relating the operating and information environments to a firm's market value.

We find that if consumers become more sensitive to firms' tax strategies, the less aggressive tax avoider, Firm Z, becomes weakly less aggressive while having no effect on Firm A. This in turn increases Firm Z's output price, market share, and economic profits. It increases Firm A's output price, decreases its market share, and has an ambiguous effect on its economic profits. Therefore, an improvement in the information environment that increases consumer sensitivity could make both firms better off.

Section 2 reviews the literature on consumer and investor responses to firm tax-avoidance strategies. Section 3 characterizes the product market competition, given the two firms' tax-avoidance strategies, and derives the firms' optimal tax-avoidance strategies. Section 4 explores the effects of changes in consumer sensitivity to tax avoidance. Section 5 characterizes the stock market equilibrium and finds which firm has the higher market value. Section 6 concludes.

2. Prior literature

Consumer behavior

In experimental work, Antonetti and Anesa (2017) find that consumers react negatively to tax-aggressive firms, although the reactions are mediated by the perceived ethicality of the firm. On the other hand, Asay, Hoopes, Thornock, and Wilde (2024) find that consumers do not generally respond, either through reduced purchases or full boycotts, to aggressive tax-avoidance behavior. Consumers report a preference for purchasing brands with environmentally responsible products or from companies with ethical practices, but results are mixed on whether consumers buy green goods when faced with higher prices. One recent study found that 65% of consumers say they want purpose-driven brands, but only 26% make such purchases (White, Hardisty, and Habib, 2019). Another argues that there is indeed unprecedented growth in products with ESG-claims (Frey, Bar Am, Doshi, Malik and Noble, 2023). We are not aware of any empirical papers that consider the price-purpose tradeoff related specifically to tax strategies.

Consumers will only respond to firms' tax-avoidance strategies if they are aware of what those strategies are. One way consumers have of discovering tax-avoidance strategies is negative press coverage, but the evidence for this is mixed. Menicacci and Simoni (2024) find that negative press coverage of tax avoidance deters tax avoidance. In addition, watchdog organizations rate firms and encourage consumers to consider how much a company pays in taxes and to whom. For example, Ethical Consumer writes, "Amazon is known for its shameless tax avoidance... The company has been the subject of an Ethical Consumer global boycott." Further, they provide links on their website suggesting consumers "Tweet or email Amazon to let

them know what you think of their ethics."[2] On the other hand, Chen, Schuchard, and Stomberg (2019) find little evidence that firms reduce their tax avoidance following media coverage.

Consumer awareness is related to fundamental issues of what corporations should be required to disclose regarding corporation income tax expense and payments. Dechow (2023) writes: "Without measurement, it is hard to know what to improve or how to create incentives to improve or punish for nonimprovement." Bilicka, Casi, Seregni, and Stage (2022) find that disclosure requirements provide incentives for firms to appear less aggressive. This leads firms to make unsubstantiated claims that they do not engage in tax avoidance without changing their tax-avoidance practices (i.e., greenwashing). Hoopes, Robinson, and Slemrod (2018) argue that increasing mandatory tax disclosure may "create compliance burdens, divulge sensitive information, generate confusion about company behavior, and impose reputational damage on firms."

Investor behavior

Socially responsible investing has been around for decades. Initially pitched as a way for investors to align their portfolios with their personal values (e.g., anti-apartheid, anti-child labor), current incarnations tout the notion that corporate responsibility also leads to better returns on investment. Specifically, firms with ESG practices firms can generate higher ROI because (a) consumers care about ESG and (b) risks are lower for firms that engage in ESG initiatives. Edmans (2020) writes "The most successful companies don't target profit directly but are driven by purpose–the desire to serve a societal need and contribute to human betterment."

Some investors only invest in firms that are highly ranked in terms of ESG practices. Tax practices reflect both the "S" and "G" components of ESG. Regarding the social aspect of

[2] https://www.ethicalconsumer.org/company-profile/amazoncom-inc

corporate tax avoidance, there are many views on this issue. Some embrace Friedman's view that firms should maximize profits. In contrast, Norges Bank Investment Management, which manages the world's largest sovereign wealth fund, states: "Tax is one of the ways in which businesses contribute to the societies on whose legal and financial infrastructure they rely for the orderly execution of their activities" and that "taxes should be paid where economic value is generated." Consistent with this perspective, Dutch multinationals including Philips, Shell, Unilever, KLM and Heineken have endorsed a Dutch tax governance code, pledging not to use tax havens for tax-avoidance purposes (Tolman and Molenaars, 2022). Krieg and Li (2021) provide an extensive review of the literature on tax avoidance and corporate social responsibility.

Regarding the governance aspect of corporate tax avoidance, Desai and Dharmapala (2009) find that tax-avoidance activities that transfer wealth from the government to shareholders often involve efforts to obscure these activities from tax authorities. This in turn makes it easier for managers to transfer wealth from shareholders to themselves, particularly for poorly governed firms. This is another reason that ESG investors may prefer to avoid firms that engage in aggressive tax avoidance.

Empirical support for reputational costs of tax shelters has been scant. Hanlon and Slemrod (2009) find small short-term negative effects on a firm's price when a tax shelter is announced, but Gallemore, Maydew and Thornock (2014)'s longer window results suggest the investor reaction is temporary. Further, GMT find no evidence of a reputational cost for the top executives of firms involved in tax sheltering.

There is mixed evidence on whether aggressive tax policies and other ESG practices (such as environmental responsibility or best governance practices) go hand in hand. Landry, Deslandes, and Fortin (2013) and Davis, Guenther, Krull and Williams (2016) find that high ESG

firms are more tax aggressive, whereas Lanis and Richardson (2012, 2015) and Davis et al. (2016) find that corporate social responsibility (CSR) practices and tax avoidance seem to be substitutes. Huang et al. (2017) delves more deeply into the specific tax practice of corporate inversion. They find that firms with higher CSR performance are less likely to engage in a corporate inversion than firms with poor CSR performance. Inger and Vansant (2019) show that tax avoidance offsets the positive market effect of high ESG.

3. Product market competition

Model overview

An industry comprises two *ex ante* identical firms, denoted Firm A and Firm Z. At time zero, the two firms choose their tax-avoidance strategies to maximize their respective stock prices. The tax-avoidance strategies we envision feature locating valuable intellectual property in subsidiaries located in zero-tax rate countries. Firm A chooses a tax-avoidance strategy α and Firm Z chooses a tax-avoidance strategy ω. Without loss of generality, we assume that $0 \leq \omega \leq \alpha \leq 1$, which means that Firm A is the more aggressive tax avoider. Investors then invest in Firms A and Z to maximize the certainty equivalent of their portfolios, taking the firms' tax strategies as given and rationally anticipating the firms' future product market competition. On each future date, the firms choose their respective output prices to maximize their economic profits on each date. In this section, we first characterize the firms' equilibrium pricing strategies, taking their tax strategies as given. We then characterize their optimal tax strategies assuming each firm strives to maximize its own economic profits, i.e., its after-tax income minus the normal return to capital. In the next section, we show how the choices made by both consumers and investors affect the firms' stock prices. Either firm could have higher economic profits depending on the parameter values. Firm Z could have the higher stock price even when it earns

lower economic profits if sufficiently many investors prefer not to hold the stock of the more aggressive tax avoiding firms. Figure 1 shows the sequence of events.

[PLEASE INSERT FIGURE 1ABOUT HERE]

Product market equilibrium

Consumers are uniformly distributed on the interval [0, 1], which is the standard way of modeling price and non-price competition (Hotelling 1929; Tirole 1980). Consumer i's type is γ_i, where the lower the value of γ, the lower the consumer's concern with a firm's tax-avoidance strategy. Although consumers may have innate preferences for corporate social responsibility, they rely on information in the public domain to learn about companies' tax behavior.

Each consumer wants to buy one unit of the product made by Firm A or Firm Z at the minimum combined financial and psychic cost. The financial cost of buying a unit is the price p_j, $j \in \{A, Z\}$. The psychic cost is increasing linearly in the product of the consumer's type γ_i, the statutory tax rate $\tau > 0$, the firm's tax strategy, and parameter δ, where a high value of δ indicates that consumers are more sensitive to the firms' tax strategies. This sensitivity could arise due to greater coverage of the firms' tax-avoidance strategies in the popular press, mandatory disclosures in the firm's audited financial statements, or the ability of firms to make credible voluntary disclosures about their tax strategies. More generally, the parameter δ transforms the range of consumer types from the uniform interval [0, 1] to the uniform interval $[0, \delta]$. A consumer who is of type γ^* is indifferent between buying from Firm A and Firm Z, which implies

$$p_A + \delta\gamma^*\tau\alpha = p_Z + \delta\gamma^*\tau\omega \quad (1)$$

and thus

$$\gamma^* = \frac{p_Z - p_A}{\delta\tau(\alpha - \omega)}. \quad (2)$$

Consumers in the interval $[0, \gamma^*)$, with low sensitivity to aggressive tax avoidance, prefer to buy from Firm A and consumers in the interval $(\gamma^*, 1]$ prefer to buy from Firm Z. Because γ^* is the fraction of the population buying from Firm A, we require $0 \leq \gamma^* \leq 1$.

The production and sale of one unit requires inputs (e.g., labor and material) with a cost of c and one unit of manufacturing capacity with a cost rk, where k is the cost of one unit of manufacturing capacity and r is the cost of equity capital. Material and labor costs c are tax-deductible; the cost of equity capital rk is not. If the manufacturing capacity decays with use, the cost of restoring the capacity to its original value is part of the deductible cost c.[3] Firm A's effective tax rate is $T_A = \tau(1 - \alpha)$ and Firm Z's tax rate is $T_Z = \tau(1 - \omega)$. The tax strategies α and ω represent the fraction of taxable income that the firm can legally shift to an affiliate located in a zero-tax rate foreign country by locating intellectual property in that country and paying a tax-deductible royalty to the affiliate. Firm A's annual economic profit is

$$\gamma^*\{(p_A - c)(1 - T_A) - rk\}. \quad (3)$$

Firm Z's annual economic profit is

$$(1 - \gamma^*)\{(p_Z - c)(1 - T_Z) - rk\}. \quad (4)$$

First, we characterize each firm's pricing strategy, taking their tax-avoidance strategies as given. Substituting γ^* from equation (2) into equations (3) and (4) and differentiating each firm's payoff with respect to its own output price yields equilibrium output prices of

$$p_A^* = c + \frac{\delta\tau(\alpha - \omega)}{3} + \frac{2rk}{3(1 - T_A)} + \frac{rk}{3(1 - T_Z)} \quad (5)$$

and

[3] This approach assumes that the rate of tax depreciation is equal the rate of economic decay of the manufacturing capacity.

$$p_Z^* = c + \frac{2\delta\tau(\alpha-\omega)}{3} + \frac{2rk}{3(1-T_Z)} + \frac{rk}{3(1-T_A)}. \quad (6)$$

When $\alpha > \omega$, Firm Z charges a higher price because consumers prefer to buy from Firm Z when prices are equal. The price difference is

$$p_Z^* - p_A^* = \tau(\alpha - \omega)\left[\frac{\delta}{3} + \frac{rk}{3(1-T_A)(1-T_Z)}\right], \quad (7)$$

which is 'increasing in α and decreasing in ω. Substituting p_A^* and p_Z^* back into equation (2) yields

$$\gamma^* = \frac{1}{3} + \frac{rk}{3\delta(1-T_A)(1-T_Z)}. \quad (8)$$

In the special case of $rk = 0$, the optimal tradeoff between a higher price and a lower market share results in Firm Z having two-thirds of the market. As the nondeductible cost rk increases, both firms increase their prices and the difference $p_Z^* - p_A^*$ grows, which in turn decreases Firm Z's market share. Figure 2 illustrates how the output prices p_A^* and p_Z^* and Firm A's market share γ^* change as ω varies between zero and one when $\alpha = 1$.

[PLEASE INSERT FIGURE 2 ABOUT HERE]

First, we consider the case in which $\delta \leq rk/2$. In this case, consumers care so little about the firms' tax strategies that Firm A can choose $\alpha = 1$ and obtain 100 percent of the market unless Firm Z does the same. To see this, suppose Firm A chooses $\alpha = 1$ and Firm Z chooses $0 \leq \omega \leq 1$ and its lowest possible price,

$$p_Z = c + \frac{rk}{1-t(1-\omega)}. \quad (9)$$

This is the lowest possible price because any lower price would generate an economic loss for every unit sold. Firm A can then respond by choosing $\alpha = 1$ and

$$p_A = c + \frac{rk}{1-t(1-\omega)} - \delta\tau(1-\omega). \quad (10)$$

Using equation (2), this price ensures the consumer type $\gamma = 1$ is indifferent between buying

from Firm A and Firm Z and so every other consumer strictly prefers to buy from Firm A. Firm A's economic profit per unit sold is $p_A - c - rk > 0$ because $\delta \leq rk/2$. Firm Z earns zero economic profit and so its choice of ω is irrelevant. However, using the trembling hand refinement in Selten (1975) indicates that Firm Z should choose $\omega = 1$ in case Firm A mistakenly chooses $\alpha < 1$; this would allow Firm Z to use Firm A's pricing strategy to capture the entire market and earn positive economic profits. Using this refinement, the unique equilibrium is for the firms to choose $\alpha = \omega = 1$ at date zero and $p_A = p_Z = c + rk$ on dates one and thereafter. All consumers are indifferent between buying from Firms A and Z and both firms earn zero economic profits.

Next, we consider the case in which $\delta > rk/2$. We conjecture that $\gamma^* < 1$. If this conjecture is true, then using equations (3), (5) and (8), the economic profit for Firm A, Π_A, is

$$\Pi_A = \frac{\tau(\alpha-\omega)[\delta(1-T_A)(1-T_Z)+rk]^2}{9\delta(1-T_A)(1-T_Z)^2}. \tag{11}$$

Using equations (4), (6), and (8), the economic profit for Firm Z, Π_Z, is

$$\Pi_Z = \frac{\tau(\alpha-\omega)[2\delta(1-T_A)(1-T_Z)-rk]^2}{9\delta(1-T_A)^2(1-T_Z)}. \tag{12}$$

Differentiating expression (11) with respect to α and noting the dependence of T_A on α shows that Firm A's economic profit is increasing in α and thus $\alpha^* = 1$. This occurs because a more extreme response both increases the difference in the firms' tax strategies, thereby increasing pretax profits, and reduces Firm A's effective tax rate.

Given the more aggressive firm chooses maximal tax avoidance, we substitute $\alpha = 1$ into equation (12). Then differentiating equation (12) with respect to ω and noting the dependence T_Z on ω of shows that the derivative has up to two positive real roots,

$$\omega_1 = \frac{rk}{2\delta\tau} - \frac{1-\tau}{\tau} \text{ and } \omega_2 = \frac{4\tau-3+\sqrt{\frac{\delta+4rk}{\delta}}}{4\tau}. \tag{13}$$

There are three cases to consider. First, if $rk/2 < \delta \leq rk/[2(1-\tau)]$, then $0 < \omega_1 < \omega_2 < 1$, ω_2 is a local maximum and ω_1 is a local minimum. Therefore, the optimal tax-avoidance strategy for Firm Z is either $\omega = \omega_2$ or $\omega = 0$. If Firm Z chooses $\omega = \omega_2$, then equation (8) shows that $\gamma^* < 1$ because $\delta < rk/[2(1-\tau)]$. However, if Firm Z chooses $\omega = 0$, then $\gamma^* > 1$ because $\delta > rk/2$. Therefore, if $\omega = 0$, the firms will choose the prices from equations (9) and (10), all consumers will buy from Firm A, and Firm Z will earn zero economic profits. Therefore, Firm Z will choose $\omega = \omega_2$.

Second, if $rk/[2(1-\tau)] < \delta < rk/[2(1-\tau)(1-2\tau)]$, then $\omega_1 < 0 < \omega_2 < 1$ and ω_2 is a maximum between zero and one. Therefore, $\omega^* = \omega_2$ and $\gamma^* \leq \sqrt{9-8\tau}/3 < 1$. Unlike Firm A, Firm Z does not necessarily try to maximize the difference between the two firms' tax strategies even though doing so maximizes the firms' pretax profits because a lower value of ω increases Firm Z's effective tax rate.

Finally, if $\delta \geq rk/[2(1-\tau)(1-2\tau)]$, then $\omega_1 < \omega_2 < 0$, ω_2 is a local maximum, and ω_1 is a local minimum. Because $0 \leq \omega^* \leq 1$, this implies that $\omega^* = 0$ and thus $\gamma^* \leq (3-4\tau)/3 > 1$. Proposition 1 summarizes these results.

Proposition 1

a. The aggressive firm avoids taxes to the full extent possible by choosing $\alpha^* = 1$.

b.i. If $\delta \leq rk/2$, the conservative firm choose to maximize tax avoidance by choosing $\omega^* = 1$.

b.ii. If $\frac{rk}{2} < \delta < \frac{rk}{[2(1-\tau)(1-2\tau)]}$, the conservative firm chooses a moderate level of tax avoidance by choosing $\omega^* = \omega_2 < 1$.

b.iii. If $\delta \geq \frac{rk}{[2(1-\tau)(1-2\tau)]}$, the conservative firm forgoes all tax avoidance by choosing $\omega^* = 0$.

Proposition 1 indicates that the two *ex ante* identical firms may pursue different tax-avoidance strategies. Firm A will pursue the maximum level of tax avoidance. Unless δ is very low, Firm Z refrains from complete tax avoidance to attract consumers who are willing to pay more to buy from tax-avoiding firms. Firm Z charges a price premium, which, given their distaste for tax avoidance, consumers with high values of γ_i are willing to pay. Firm Z's decision to forgo some or all of the legal tax breaks available to it both increases the price premium it enjoys and increases its market share. With Firm Z charging a price that exceeds its marginal cost, Firm A optimally also charges a price in excess of marginal cost, enabling both firms to earn positive economic profits.

Firm Z's level of tax avoidance depends on the parameters *r, k,* δ, and τ. Figure 3 shows that Firm Z's level of tax avoidance is weakly increasing in the statutory tax rate τ and the non-deductible cost parameters *r* and *k*. To see this, compare the solid line ($\tau = 20\%$) with the dotted line ($\tau = 30\%$) in Figure 3. Firm Z's level of tax avoidance is weakly decreasing in δ because an enhanced disclosure environment magnifies consumer dislike of a firm's tax-avoidance activities.

[PLEASE INSERT FIGURE 3 ABOUT HERE]

4. Consumer sensitivity

The parameter δ reflects how sensitive consumers are to a firm's tax-avoidance strategy when purchasing their product. For example, consumers are more sensitive to tax strategies in an environment in which there is significant coverage of a firm's tax strategy in the popular press. Press coverage in turn figures to be greater when a firm's disclosures, either mandatory or

voluntary, regarding tax position are transparent as opposed to opaque. Chaim and Parchomovsky (2024) suggest the adoption of country-by-country reporting requirements for public companies to discourage tax avoidance among large multinationals. In this section, we examine the effect of a change in δ on each firm's tax-avoidance strategy, output price, market share, and economic profits.

Using Proposition 1 and equation (13), an increase in δ has no effect on α^* and weakly decreases ω^*. An increase in δ induces Firm Z to pursue a weakly less aggressive tax strategy to make its product more attractive to consumers. Despite the fact that taxes matter to consumers, optimal tax-avoidance strategies may be unaffected by an increase in δ, which is consistent with the empirical findings in Chen et al. (2019) that firms do not change their tax-avoidance behavior in response to media coverage. Differentiating p_Z^* from equation (6) shows that an increase in δ causes p_Z^* to increase as its product becomes more attractive to consumers. Differentiating p_A^* from equation (5) shows that an increase in δ causes p_A^* to increase as the price competition with Firm Z has softened. Finally, differentiating γ^* in equation (8) with respect to δ and noting the dependence of T_z on δ shows that γ^* is decreasing in δ. Therefore, as δ increases, Firm A loses market share to Firm Z. Figure 4 illustrates these effects.

[PLEASE INSERT FIGURE 4 ABOUT HERE]

We next consider the effect of δ on Firm Z's economic profits. There are two cases to consider. When $\delta \geq rk/[2(1-\tau)(1-2\tau)]$, $\omega^* = 0$. A further increase in δ has no effect on T_z, but increases both the output price p_Z^* and Firm Z's market share and thus strictly increases Π_Z. When $rk/2 < \delta < rk/[2(1-\tau)(1-2\tau)]$, $\omega^* = \omega_2 < 1$, which is decreasing in δ. Differentiating Π_Z with respect to δ yields

$$\frac{\partial \Pi_Z}{\partial \delta} > 0 \text{ because } \delta > \frac{rk}{2} \tag{14}$$

and thus Π_Z is increasing in δ within the range $rk/2 < \delta < rk/[2(1-\tau)(1-2\tau)]$. Therefore, an increase in the quality of the information environment always makes Firm Z strictly better off.

Finally, we consider the effect of δ on Π_A. When $\omega^* = 0$ and $\alpha^* = 1$,

$$\Pi_A = \gamma(\delta)[p_A(\delta) - c - rk]. \tag{15}$$

Differentiating Π_A with respect to δ yields

$$\frac{\partial \Pi_A}{\partial \delta} = \gamma(\delta)p_A'(\delta) + \gamma'(\delta)[p_A(\delta) - c - rk] \tag{16}$$

$$= \frac{\tau[\delta(1-\tau)+rk]}{\delta(1-\tau)} - \frac{rk[\delta\tau(1-\tau)+3c(1-\tau)+rk(3-2\tau)}{9\delta^2(1-\tau)^2},$$

which is negative if τ is sufficiently small and positive if rk is sufficiently small.

When $\omega^* = \omega_2 < 1$,

$$\Pi_A = \frac{1}{36}\left(3 - \sqrt{\frac{4kr+\delta}{\delta}}\right)(4kr + \delta). \tag{17}$$

Differentiation shows that Π_A is increasing in δ for all values of δ in the range $rk/2 < \delta < rk/[2(1-\tau)(1-2\tau)]$. Figure 5 illustrates how Π_A and Π_Z vary with δ when τ is sufficiently small relative to rk that the derivative in equation (16) is negative. Note that whether Firm A or Firm Z is more the profitable firm also depends on the size of δ. As the figure indicates, for these parameters, $\Pi_A > \Pi_Z$ for $\delta < 2.55$ and $\Pi_A < \Pi_Z$ for $\delta > 2.55$.

[PLEASE INSERT FIGURE 5 ABOUT HERE]

An important implication of this analysis is that both firms may benefit from more transparent disclosure of their tax planning strategies. Transparent disclosure makes both firms' tax strategies clearer to consumers, thereby increasing δ. This allows Firm Z to command a higher price for its product, which in turn allows Firm A to raise its price. Proposition 2 summarizes the results of this section.

Proposition 2

a. An increase in δ weakly decreases Firm Z's tax avoidance and strictly increases Firm Z's output price, market share, and economic profits.

b. An increase in δ has no effect on Firm A's tax avoidance, strictly increases its output price, strictly decreases its market share, and has ambiguous effects on its economic profits.

c. Firm A's profits are higher than Firm Z's profits for low values of δ; Firm Z's profits are higher than Firm A for high values of δ.

Proposition 2 helps us see why finding a long-term reputation effect of tax shelters might be empirically elusive (e.g., Gallemore, et al., 2014). Depending on the starting value of δ, Firm A can be better or worse off with an enhanced information environment. It might be necessary to partition the group of tax avoiders based on industry characteristics or other factors related to the information environment to make predictions about the long-term reputation costs of tax shelter revelations.

5. Stock market equilibrium

Stock prices and ownership

This section takes firms' tax-avoidance strategies and product pricing decisions from the previous section as given and derives each firm's stock ownership and stock price. Firm j generates future cash flows with a present value of $\Pi_j/r + \varepsilon_j$, where ε_j is a firm-specific, normally distributed price shock with a mean of zero and a variance of σ^2. The realizations of ε_A and ε_Z are independent.

We begin by assuming there are *N* risk-averse investors who can invest in either firm. The investors have a utility function over each future wealth $\tilde{V}$ of the form $-e^{-\rho_i \tilde{V}}$. This utility

function has the property that if investor *i* owns all the stock of firm *j*, the investor's expected utility from owning firm *j*'s stock is

$$\frac{\Pi_j}{r} - \frac{\rho_i \sigma^2}{2}. \tag{18}$$

We define $w = \sum_{i=1}^{N} \frac{1}{\rho_i}$, which is the measure of the aggregate tolerance for risk for investors. We assume

$$w > \frac{r\sigma^2}{\Pi_j} \ \forall j, \tag{19}$$

which ensures that the aggregate risk tolerance of investors is sufficiently high that both stock prices will always be positive.

We solve for the current stock price P_j that equalizes supply and demand for firm *j*'s stock. Outstanding shares of firm *j* are normalized to one. An equilibrium is defined as a portfolio for each investor that maximizes that investor's expected utility given market prices, and a stock price at which all markets clear. Each investor $i \in \{1, \ldots N\}$ buys x_{ij} shares of firm *j* at a price of P_j per share to solve the following maximization problem.

$$\max_{x_{ij} \geq 0} \left\{ \frac{x_{ij} \Pi_j}{r} - \frac{(x_{ij})^2 \sigma^2 \rho_i}{2} - P_j x_{ij} \right\} \tag{20}$$

Differentiating expression (20) with respect to x_{ij} yields the following first-order condition for each investor.

$$x_{ij} = \frac{\Pi_j - P_j r}{r\sigma^2 \rho_i} \tag{21}$$

The stock price P_j for $j \in \{A, Z\}$ equates the sum of individual investor demands from equation (21) to one to yield

$$P_j = \frac{\Pi_j}{r} - \frac{\sigma^2}{w}. \tag{22}$$

Put simply, when investors only care about future cash flows, the firm that generates higher profits using its tax optimal avoidance strategy has a higher stock price. We have seen in Section 3 that either Firm A or Firm Z might be the more profitable firm. Panel A of Figure 6 illustrates how prices vary in σ^2 when Firm A is more profitable.

Chaim and Parchomovsky (2024) lament the failure of ESG raters to incorporate tax considerations into their ESG scores. They assert that "companies that avoid taxes obstruct the government's ability to provide essential services… crucial for achieving a sustainable, well-ordered society." This suggests that firms' tax practices must be considered, and funds ignoring corporate tax avoidance should not call themselves ESG funds.

To see how market prices are affected when ESG investors consider tax practices, we expand the model to incorporate two types of investors. Socially responsible investors want to hold shares of some firm in every industry for diversification purposes, but within that industry they only invest in the firm that engages in the lowest level of tax avoidance. With these lexicographic preferences, socially responsible investors will only hold shares of Firm Z and hold no shares of Firm A. For expositional convenience, we refer to these investors as Green investors and refer to the other investors as Brown investors.

We define $w_B = \sum_{i=1}^{M} \frac{1}{\rho_i}$, which is the measure of the aggregate tolerance for risk for the *M* Brown investors. We assume

$$w_B > \frac{r\sigma^2}{\Pi_j} \ \forall j, \tag{23}$$

which ensures that the aggregate risk tolerance of Brown investors is sufficiently high that both stock prices will always be positive. Similarly, we define $w_G = \sum_{i=M+1}^{N} \frac{1}{\rho_i}$, which is the measure

of the aggregate tolerance for risk for the $N - M$ Green investors. A Green investor's utility from owning all of Firm Z is

$$\frac{\Pi_Z}{r} - \frac{\rho_i \sigma^2}{2}. \tag{24}$$

We solve for the current stock price P_j that equalizes supply and demand for firm j's stock. Outstanding shares of firm j are normalized to one. An equilibrium is defined as a portfolio for each investor that maximizes that investor's expected utility given market prices, and a stock price at which all markets clear. Each Brown investor $i \in \{1, \ldots M\}$ buys x_{ij}^B shares of firm j at a price of P_j per share to solve the following maximization problem.

$$\max_{x_{ij}^B \geq 0} \left\{ \frac{x_{ij}^B \Pi_j}{r} - \frac{(x_{ij}^B)^2 \sigma^2 \rho_i}{2} - P_j x_{ij}^B \right\} \tag{25}$$

Differentiating expression (25) with respect to x_{ij}^B yields the following first-order condition for each Brown investor.

$$x_{ij}^B = \frac{\Pi_j - P_j r}{r \sigma^2 \rho_i} \tag{26}$$

Each Green investor $i \in \{M + 1, \ldots N\}$ buys x_{iZ}^G shares of Firm Z at a price of P_Z per share to solve the following maximization problem.

$$\max_{x_{iZ}^G \geq 0} \left\{ \frac{x_{iZ}^G \Pi_Z}{r} - \frac{\left(x_{iZ}^G\right)^2 \sigma^2 \rho_i}{2} - P_Z x_{iZ}^G \right\} \tag{27}$$

Differentiating expression (27) with respect to x_{iZ}^G yields the following first-order condition for each Green investor.

$$x_{iZ}^G = \frac{\Pi_Z - P_Z r}{r \sigma^2 \rho_i} \tag{28}$$

Because only Brown investors buy the stock of Firm A, the stock price P_A equates the sum of individual investor demands from equation (26) to one to yield

$$P_A = \frac{\Pi_A}{r} - \frac{\sigma^2}{w_B}. \quad (29)$$

Both Brown and Green investors hold the stock of Firm Z. Summing up the individual demands from equations (26) and (28) yields

$$\frac{w_B(\Pi_Z - rP_Z)}{r\sigma^2} + \frac{w_G(\Pi_Z - rP_Z)}{r\sigma^2}. \quad (30)$$

Setting expression (30) equal to one yields the stock price for Firm Z.

$$P_Z = \frac{\Pi_Z}{r} - \frac{\sigma^2}{w_B + w_G}. \quad (31)$$

Using equations (26), (28), and (31) shows that the fraction of shares of Firm Z held by Green investors is

$$\frac{w_G}{w_B + w_G}. \quad (32)$$

We illustrate how P_A and P_Z change as σ^2 increases when Green investors refrain from purchasing shares in high tax avoiding firms in Panel B of Figure 6. For the parameter values in Figure 6, Firm A has the higher stock price when σ^2 is sufficiently low, but Firm Z has the higher stock price when σ^2 is sufficiently high. For a higher value of δ, (e.g., $\delta = 3.5$) however, P_Z would exceed P_A for all σ^2 in Figure 6. Therefore, when ESG investors care about firms' tax-avoidance strategies, the stock price of Firm Z might exceed the stock price of Firm A even if Firm A is more profitable.

[PLEASE INSERT FIGURE 6 ABOUT HERE]

Using equations (11), (12), (29), and (31) allows us to rank the prices of the two firms. We define Δ to be the price difference between the conservative and aggressive firm; this difference could be positive or negative.

$$P_Z - P_A = \Delta = \frac{(1-\omega)\delta\tau(3-4T_Z)}{9r} - \frac{(1-\omega)rk^2\tau T_Z}{9\delta(1-T_Z)^2} - \frac{(1-\omega)2k\tau(3-2T_Z)}{9(1-T_Z)} + \frac{\sigma^2 w_G}{w_B(w_B+w_G)} \quad (33)$$

The price difference Δ is increasing in the sensitivity parameter δ because higher consumer sensitivity allows the conservative firm to command a higher price premium. In addition, Δ is increasing in σ^2 because the risk of owning stock Z is borne by both Brown and Green investors, whereas the risk of owning stock A is borne entirely by Brown investors. On the other hand, the price difference Δ is decreasing in the non-deductible cost parameters *r* and *k* because the level of non-deductible costs is more costly to the high-tax firm. The price difference is also decreasing in the ratio of Brown investors to Green investors. A slowdown in ESG fund launches suggests the tide may be turning away from ESG investing (Marsh, 2024) decreasing the price difference, although greater attention to taxes as a component of ESG would have the opposite effect.

6. Conclusions

Tax-planning strategies are one of the many ESG activities that have drawn attention from consumers, investosr and regulators. Like any corporate decision, firms must determine how to trade off the costs and benefits of tax avoidance. In this paper, we examine a duopoly with customers who vary in their distaste for tax avoidance and investors who may be unwilling to hold the stocks of firms that engage in aggressive tax avoidance.

We find that *ex ante* identical firms choose different tax-avoidance strategies, in which one firm chooses the most aggressive tax position and the other forgoes some or all of their possible tax savings. The firm that chooses the more conservative tax policy can charge a higher price than the aggressive firm. This in turn allows the more aggressive firm to charge a price that exceeds its marginal cost, allowing both firms to earn positive economic profits. Whether the more aggressive or more conservative firm is more profitable or has the higher stock price

depends on several other parameters, including the sensitivity of consumers to aggressive tax avoidance.

We characterize the firms' costs and benefits from enhanced disclosure requirements that reduce the opportunity for firms to hide details about their tax strategies. There are settings in which both the conservative and aggressive firm benefit from greater information transparency that makes consumers more sensitive to aggressive tax avoidance.

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FIGURE 1
Sequence of events

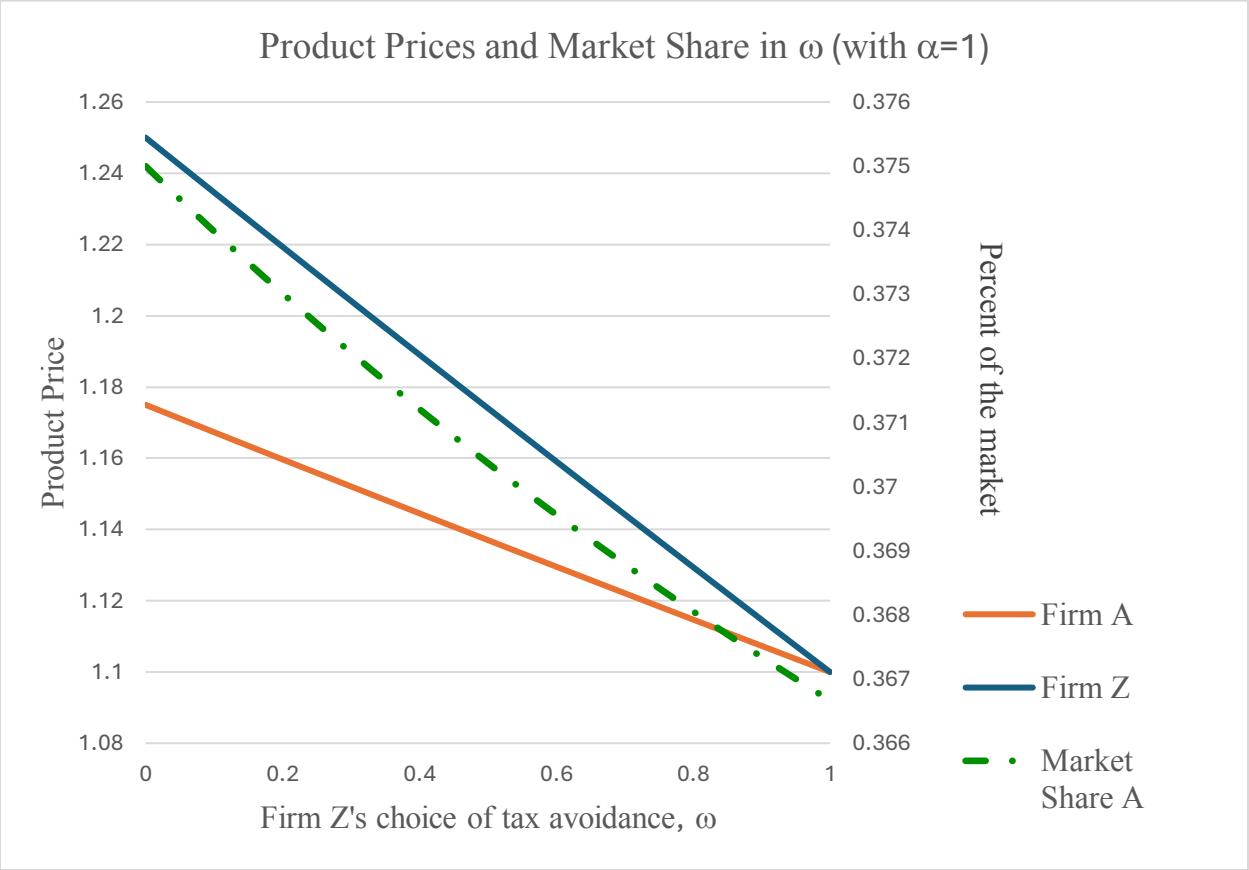
At time zero, Firms A and Z choose their tax avoidance strategies α and ω, respectively, to maximize their respective stock prices.

Investors choose their portfolios. Market prices P_A and P_Z equate supply and demand for each stock.

On dates 1, 2, 3…firms A and Z choose their output prices p_A and p_Z in price competition to maximize their after-tax economic profits each period.

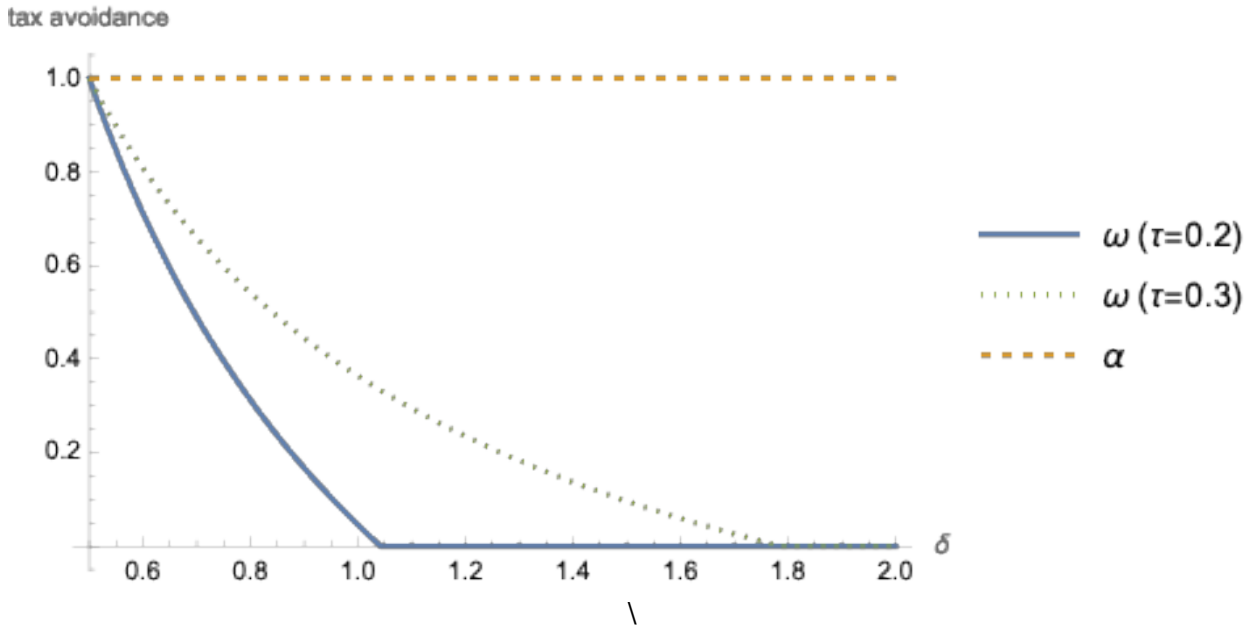
FIGURE 2

Output prices and Firm A's market share as a function of ω when $\alpha = 1$



Notes: $\tau = 20\%$ *and* $r = 10\%, k = 1, c = 1, \delta = 1,\ \alpha = 1$. *In Figure 2,* $\alpha = 1$, *and thus maximal differentiation in tax strategy is at* $\omega = 0$. *When tax strategies are maximally differentiated, output prices and Firm A's market share are highest. Both output prices and Firm A's market share decline as the firms' tax strategies become more similar, i.e., as* ω *increases.*

FIGURE 3
Firms' optimal tax-avoidance strategies



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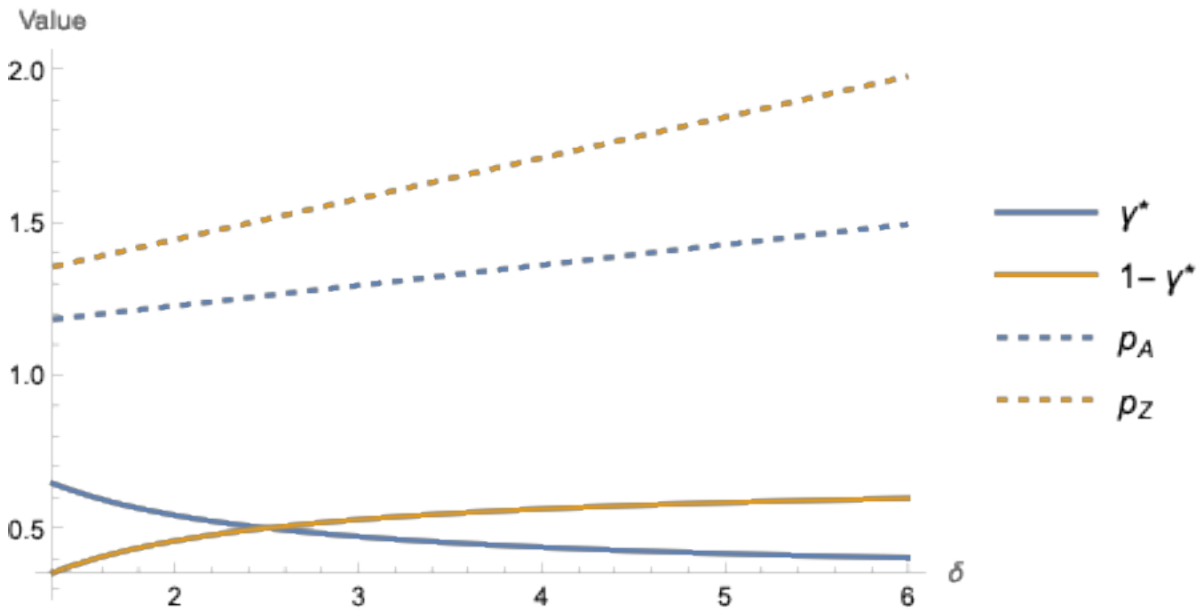
Parameters: $\tau = 20\%$ *or* $\tau = 30\%$ *and* $rk = 1$. *The parameter* δ *is on the x-axis and tax avoidance is on the y-axis. Assume* $\tau = 20\%$ *and* $\delta > 1/2$. *As* δ *increases from 1/2 to 25/24,* ω *falls from* $\omega = 1$ *to* $\omega = 0$ *and stays there for all values of* $\delta > 25/24$. *When tax rate is higher* ($\tau = 30\%$), *the region over which* ω *takes on intermediate values increases.*

FIGURE 4

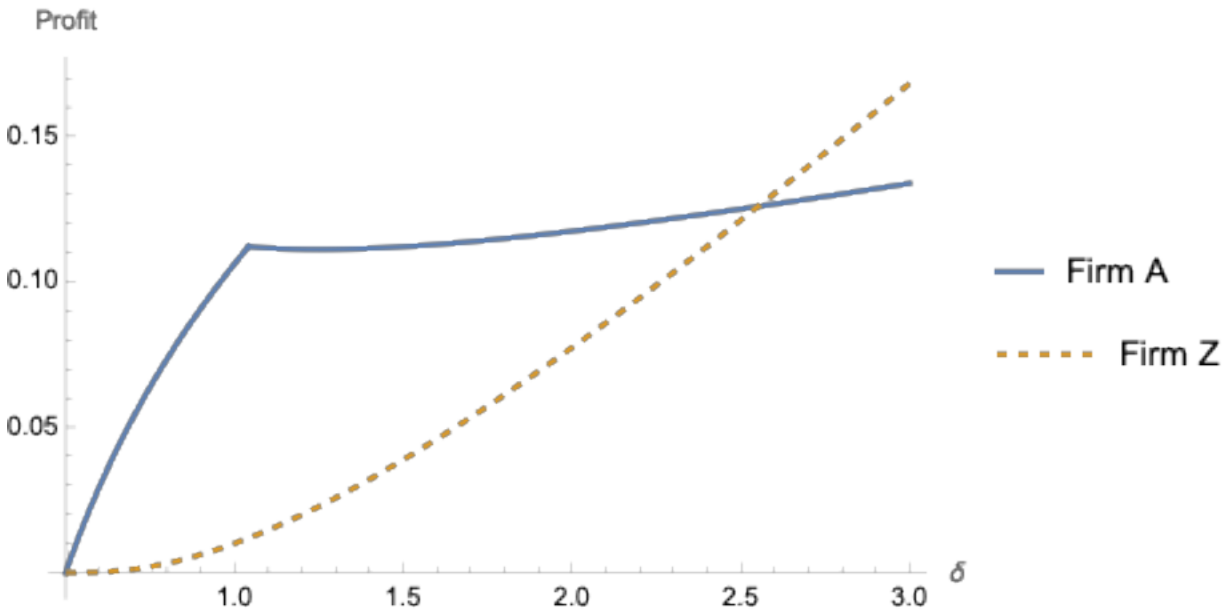
Output prices and market shares as a function of consumer sensitivity, δ



Notes: In Figure 4, $\tau = 20\%$ and $r = 10\%$, $k = 10$, and $c = 0.01$. As δ increases, both output prices increase. Firm A's market share decreases and Firm Z's market share increases.

FIGURE 5

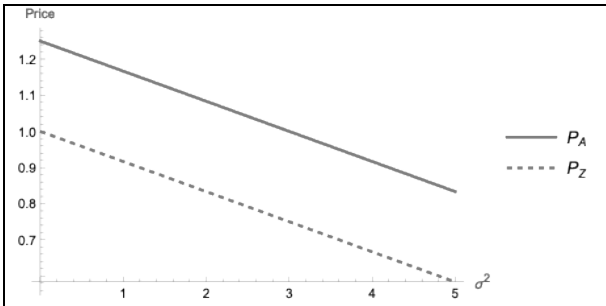
Firm economic profits as a function of consumer sensitivity, δ



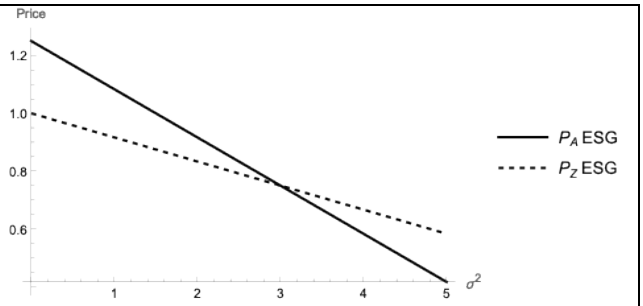
Notes: In Figure 5, $\tau = 20\%$ *and* $rk = 1$. *The parameter* δ *is on the x-axis and Firm economic profits,* Π_A and Π_Z, *are on the y-axis. Firm A always chooses* $\alpha = 1$. *The minimum value of* δ *is 1/2. As* δ *increases from 1/2 to 25/24,* ω *falls from* $\omega = 1$ *to* $\omega = 0$. *As the firms' tax strategies diverge, both firms' economic profits increase. When* $\delta > 25/24$, Π_A *declines until* $\delta = 5/4$ *and increases thereafter, whereas Firm Z's economic profits always increase. The two firms have equal economic profits at* $\delta \approx 2.55$.

FIGURE 6

Firm stock price as a function of σ^2



Panel A: ESG investors ignore taxes



Panel B: ESG investors exclude the higher tax-avoiding firm from their portfolio

Notes: In Figure 6, $\tau = 20\%$ *and* $r = 10\%, k = 10, \delta = 2.5,$ *and* $w_B = w_G = 6.$ *The price volatility parameter* σ^2 *is on the x-axis and Firm stock prices,* P_A and P_Z, *are on the y-axis. Firm A always chooses* $\alpha = 1$ *and Firm Z always chooses* $\omega = 0$ *for these parameter values. Both stock prices are declining in* σ^2, *but* P_A *is declining at a faster rate in Panel B, due to the increased importance of risk-sharing as* σ^2 *increases.*