An Economic View of Corporate Social Impact

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Abstract

The growing discussions of impact investing and stakeholder capitalism have increased interest in measuring companies' social impact. We conceptualize corporate social impact as the welfare loss that would be caused by a firm's exit. To illustrate, we quantify the social impacts of 74 firms in 12 industries using a new survey measuring consumer and worker substitution patterns combined with models of product and labor markets. We find that consumer surplus is the primary component of social impact (dwarfing profits, worker surplus, and externalities), suggesting that consumer impacts deserve more attention from impact investors. Existing ESG and social impact ratings are essentially unrelated to our economically grounded measures.

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There is growing focus on companies' social impact, in addition to their profitability. Many mutual funds and institutional investors have corporate social responsibility requirements for inclusion in their portfolios. One-eighth of U.S. assets under management—$8.4 trillion in total—materially consider environmental, social, and governance (ESG) issues, and this has increased steadily over the past three decades (SIF Foundation 2022). The Business Roundtable (2019), a group of CEOs, says that their companies' objectives extend beyond generating shareholder value to include multiple stakeholders and "promoting an economy that serves all Americans." A group of academics and business stakeholders commissioned by the The British Academy (2018) similarly argues that profits "is not the corporate purpose," and that in some cases, "corporate purposes should include public purposes that relate to the firm's wider contribution to public interests and societal goals." Alongside this is an active academic debate about what companies should maximize,[1] why investors and firms embrace social goals,[2] the market returns and equilibrium implications of impact investing,[3] and how impact investors should allocate capital.[4]

A key challenge in this discussion is uncertainty and disagreement about how to actually measure a company's social impact.[5] There are third-party rating systems that score companies on dimensions of social impact—product quality, worker treatment, environmental performance, etc.—and then combine these measures to generate a company's overall score. However, most systems do not have a theoretically grounded economic definition of what they want to measure or an objective way to combine across dimensions to calculate the overall score. Perhaps as a result, there is substantial disagreement between different third-party ratings of the same companies (Chatterji et al. 2015; Berg, Koelbel, and Rigobon 2022; Christensen, Serafeim, and Sikochi 2022).

Our paper begins from the observation that economics offers a set of useful frameworks for conceptualizing and quantifying some of the objects that many impact investors care about: social welfare, consumer and worker surplus, and externalities. We conceptualize a firm's social impact as the social welfare loss that would be caused by a firm's exit. Using new survey data and standard economic approaches, we then estimate social impact for 74 large companies in the upstream oil industry and 11 differentiated product industries: automobiles, airlines, six consumer packaged

[1]See, for example, Friedman (1970), Reinhardt, Stavins, and Vietor (2008), Stout (2012), Magill, Quinzii, and Rochet (2015), Hart and Zingales (2017a, 2017b), Mayer (2018), Edmans (2021), and Fama (2021).

[2]See, for example, Besley and Ghatak (2005), Heal (2005), Bénabou and Tirole (2010), Hong, Kubik, and Scheinkman (2012), Kitzmueller and Shimshack (2012), Riedl and Smeets (2017), Hong et al. (2019), Morgan and Tumlinson (2019), and Cheng, Hong, and Shue (2020).

[3]See, for example, Heinkel, Kraus, and Zechner (2001), Hong and Kacperczyk (2009), Margolis, Elfenbein, and Walsh (2009), Chava (2014), Bialkowski and Starks (2016), Khan, Serafeim, and Yoon (2016), Broccardo, Hart, and Zingales (2020), Barber, Morse, and Yasuda (2021), Pástor, Stambaugh, and Taylor (2020), Berchicci and King (2022), Pedersen, Fitzgibbons, and Pomorski (2021), and Bolton and Kacperczyk (2021).

[4]See, for example, Brest and Born (2013), Brest, Gilson, and Wolfson (2016), Chowdhry, Davies, and Waters (2019), Landier and Lovo (2020), Green and Roth (2020), Oehmke and Opp (2020), Hong, Wang, and Yang (2021), and Roth (2021).

[5]For example, The Economist magazine (2019) writes that "the scoring systems sometimes measure the wrong things and rely on patchy, out-of-date figures."

goods (beer, cereal, cigarettes, soda, toothpaste, and yogurt), grocery retail, smartphones, and chain restaurants.

Figure 1 presents a stylized illustration of our framework, which will feel very familiar. On our surveys, we ask consumers to report whether they would keep buying from each differentiated product firm in our sample if they raised prices, and we use this to estimate each firm's demand slope. Using that estimate plus estimates of initial revenues, markups, externalities, and consumer "internalities," we then compute the reductions in consumer surplus, profit, and externalities that would result from each firm's exit, as illustrated in Panel (a). On our surveys, we also ask workers to report whether they would leave their job if they faced a salary cut, and we use that to estimate each firm's labor supply slope. Using that estimate, we then compute the reduction in worker surplus that would result from each firm's exit, as illustrated in Panel (b).

Our full calculations follow this intuition but are more involved. In our model, people with heterogeneous income-earning ability choose numeraire good consumption, what products to buy in each market, and what firm to work for. Some products (e.g., oil) impose consumption externalities, and some products (e.g., cigarettes and soda) also involve "internalities," meaning that consumers' choices do not maximize their own long-run utility. Firms' profits are redistributed unequally across people. Social welfare is the Pareto-weighted sum of utility across people.

We define a firm's *individual impact* as the social welfare loss from its exit if all competing firms remain in the market. However, many impact investors allocate assets at the industry level (for example, by excluding all cigarette or oil companies), and if consumers substitute easily across competing firms, a firm's individual impact could be small even if it is part of a highly impactful industry. We thus define a second metric, the *share of industry impact*, where we apportion the welfare loss from the entire industry's exit across firms using Shapley values. In our framework, firms and industries have larger social impact if (i) their consumers and workers are less willing to substitute away, (ii) they serve lower-income consumers or employ workers with lower income-earning ability, and (iii) their products generate less negative externalities and internalities.

To illustrate how the framework can be usefully deployed, we then carry out a back-of-the-envelope quantification of corporate social impact for each of our 74 firms. We make five assumptions for empirical implementation: (i) the social marginal welfare weight applied to each person is inversely proportional to income, following a common rule of thumb in the optimal taxation literature (e.g., Saez 2002); (ii) utility is additively separable in components of consumption and labor supply; (iii) intermediate inputs are produced at constant marginal cost in perfectly competitive markets with no externalities other than CO_2 emissions; (iv) each firm is only a small part of the labor market, so its exit does not affect wages offered by other firms; and (v) firms produce one representative product with exogenous characteristics and cost function. Assumptions (ii), (iii), and (iv) simplify the analysis substantially by allowing us to consider product markets and labor markets in independent partial equilibria, while assumption (v) simplifies our data collection and counterfactual simulations.

To measure consumers' and workers' income levels and willingness to substitute to competing firms, we fielded a new 3,500-person survey. For each of our 11 differentiated product markets, the survey elicited consumption frequency, brand last purchased, customer satisfaction, firm-level price response (whether people would still buy from the same firm if the price increased by 25 percent), and aggregate price response (the extent to which people would reduce consumption if the price of all products in the market doubled). The survey also asked a parallel question about labor supply response (whether people would find a new job if their employer had to cut salaries by 10 percent).

We model the 11 differentiated product markets using a standard framework from the industrial organization literature (e.g., Berry, Levinsohn, and Pakes 1995). We use the survey data to estimate a discrete choice demand system for each market, and we infer marginal costs and simulate counterfactual prices assuming that firms set prices to maximize profits in Nash equilibrium. We model oil as an undifferentiated product and assume that firms are price takers in the global market. For automobiles, airline travel, and oil, we include climate change externalities from carbon dioxide emissions valued at the U.S. government's current social cost of carbon. For beer, cigarettes and soda, we include health cost externalities and internalities using estimates from the literature.

We model labor markets in the spirit of the differentiated firms framework from the labor economics literature (e.g., Card et al. 2018). Because we assume that each firm is only a small part of the labor market, we can estimate each firm's contribution to worker surplus by integrating under its residual labor supply function. Since our survey is not large enough to include many workers at each specific firm in our sample, we use regressions to predict labor supply response as a function of salary, education, occupation, employer size, and local labor market size, and we fit those predictions onto the distribution of workers at each firm, which we derive from census data.

There are four key results. First, our corporate social impact ratings are highly correlated with firm size: naturally, larger firms that serve more consumers and employ more workers have more social impact. Second, consumer surplus is the most important component of corporate social impact, dwarfing profits, worker surplus, and externalities. Profits matter little in our model, both because most profits are business stealing (a firm's exit benefits the remaining firms) and because they overwhelmingly accrue to high-income people who have low social marginal welfare weights. The firm with by far the most social impact in our sample is Walmart's grocery business, which generates $150 billion dollars per year of positive social impact by selling groceries to a large group of Americans who are disproportionately lower-income and report on our surveys that it would be relatively difficult for them to substitute to a competitor.[6]

Third, at mainstream estimates of externalities and internalities, cigarette companies have

[6] Similarly, Hausman and Leibtag (2007) estimate that Walmart provides substantial consumer surplus. See Basker (2005), Neumark, Zhang, and Ciccarella (2008), Basker and Noel (2009), Courtemanche and Carden (2011), Borrescio-Higa (2015), and Pope and Pope (2015) for evidence of Walmart's effects on labor markets, health, house prices, and other outcomes; see also Furman (2005) and Holmes (2011).

negative corporate social impact: in our estimates, society would be better off if they exited. The firm with the most negative social impact in our sample is Philip Morris, which reduces social welfare by $17 billion per year. Strikingly, auto companies, oil companies, and most airlines still generate so much consumer surplus that this outweighs their negative climate change externalities, although the average oil company has negative social impact when we double the social cost of carbon.

Fourth, the company-level scores from several prominent ESG rating systems are essentially unrelated to our estimates of corporate social impact. Part of this may be because ESG rating systems are trying to measure something different than a firm's impact on social welfare, and part of this may be from measurement error in our estimates. But this lack of correlation also suggests that the current discussion of ESG investing and impact measurement might benefit from considering our economically grounded framework and measurement approaches.

Our corporate social impact framework can be directly useful for firms that want to measure their impact and for investors, workers, and consumers who want to associate their investments with high-impact firms. However, a firm's social impact is generally not the same as the additional social impact of investing in the firm (Brest and Born 2013). For example, investing in a high-social impact firm could in equilibrium displace other investors motivated only by profits, who might instead invest in other firms with low social impact (Green and Roth 2020). Bonnefon et al. (2022) find that most investors prefer to associate their investments with high-impact firms, with less regard for the additional impact of their investment. Corporate social impact estimates are still useful for impact-seeking investors because social impact is one key ingredient for optimal impact investing strategies in many models (e.g. Chowdhry, Davies, and Waters 2019; Green and Roth 2020; Oehmke and Opp 2020; Roth 2021).

Our analysis has three important limitations. First, our theoretical framework (including the underlying welfarist moral philosophy and the conceptualization of a firm's social impact as the causal effect of its exit) may not capture all corporate characteristics that stakeholders want to consider. For example, our framework may not capture the full importance of diversity and inclusion or the costs and benefits of business practices such as political lobbying and good governance. Second, we make restrictive static partial equilibrium assumptions to empirically implement the framework. For example, we ignore how a firm's exit would affect the worker surplus at its suppliers or innovation spillovers to competitors. Furthermore, we ignore how competitors might respond to a firm's exit by eventually stepping in to offer the same products. Third, our empirical implementation uses surveys to identify price elasticities, requires strong functional form assumptions for marginal costs and consumer surplus (Hausman 1996; Petrin 2002), requires controversial assumptions about the magnitudes of externalities and internalities, and ignores plausible channels of social welfare effects that cannot be easily quantified in dollar units.

For these reasons, our estimates should not be viewed as final and fully comprehensive measures of corporate social impact. Our paper is simply a proof of concept that key parts of social impact can be quantified in dollar units using economic tools. Section VII describes how our approach can be used to address significant limitations in existing corporate social impact and ESG measurement systems. We think of this paper as a cousin of Hendren and Sprung-Keyser (2020): while they provide a framework for a unified welfare analysis of many U.S. government policies, we provide a framework for a unified welfare analysis of many large firms.

Sections I–V present the theoretical framework, data, product market estimates, and labor market estimates, respectively. Sections VI and VII present our corporate social impact estimates and compare them to other metrics. Section VIII concludes.

I Theoretical Framework

One of the most provocative parts of our analysis may be the initial question of how to conceptualize a company's social impact. What moral philosophy do we adopt? What notion of "impact" do we consider? This section lays out our formal economic model, adopting a welfarist framework that compares market equilibria with vs. without a firm.

I.A Setup

There are N people indexed by i with income-earning ability θ_i. There are many product markets (automobiles, airline travel, beer, etc.) indexed by m. Within each product market, a set of $\mathcal{J}_m$ products indexed by j are available at prices p_j on a set of $\mathcal{T}_m$ choice occasions indexed by t. The products are made by a set of firms $\mathcal{F}$ indexed by f, each of which makes products $\mathcal{J}_f$. There are many local labor markets indexed by l. Within each labor market, a set of firms offers wages $w_{fl}(\theta)$. $\boldsymbol{p}$ and $\boldsymbol{w}(\theta)$ are the vectors of prices and wages across all products and employers.

People choose numeraire good consumption, which product to buy in each market on each choice occasion, and the firm and local labor market where they work. y_{ijt} and y_{ifl} are binary indicators for buying j at time t and working at f in labor market l, and n is the quantity of numeraire consumption. $\boldsymbol{y} := \{y_{ift}, y_{ifl}\}$ is the vector of all choices. u_{ijt} and u_{ifl} are the utilities from buying j at t and working at f in l.

Each person i receives amount π_i of redistributed profits. Person i's income is thus $z_i = \pi_i + \sum_{fl} w_{fl}(\theta_i) y_{ifl}$, so the budget constraint is $n + \sum_m \sum_{t\in\mathcal{T}_m} \sum_{j\in\mathcal{J}_m} p_j y_{ijt} \leq z_i$. Φ is a negative externality, such as climate change or second-hand cigarette smoke.

We assume that people have quasilinear utility that is additively separable in consumption, labor, and the externality: $U_i = U_i\left(\sum_m \sum_{t\in\mathcal{T}_m} \sum_{j\in\mathcal{J}_m} u_{ijt} y_{ijt} + n + \sum_{fl} u_{ifl} y_{ifl} - \Phi\right)$, with $U_i' > 0$. Substituting in the budget constraint gives

$$U_i\left(\boldsymbol{y};\boldsymbol{p},\boldsymbol{w}(\theta_i)\right) = U_i\left(\sum_m \sum_{t\in\mathcal{T}_m}\sum_{j\in\mathcal{J}_m}(u_{ijt}-p_j)y_{ijt}+\pi_i+\sum_{fl}(u_{ifl}+w_{ifl}(\theta_i))y_{ifl}-\Phi\right), \quad (1)$$

Standard economic models assume that people choose $\boldsymbol{y}$ to maximize equation (1). We relax the utility maximization assumption in two product markets where consumer choice is sometimes argued to be affected by behavioral biases: cigarettes (e.g., Gruber and Kőszegi 2001) and soda (e.g., Allcott, Lockwood, and Taubinsky 2019a, 2019b). In those markets, we assume that consumers misperceive u_{ijt} by amount γ_j. They thus maximize "perceived utility" $\tilde{U}_i$, which is the same as equation (1) except with $\tilde{u}_{ijt} := u_{ijt} + \gamma_j$ in place of u_{ift}. Following Herrnstein et al. (1993) and the behavioral economics literature, we refer to γ_f as a negative "internality." We set $\gamma_f = 0$ for markets other than cigarettes and soda. Consumer choice is determined by

$$\boldsymbol{y}^* = \arg\max \tilde{U}_i\left(\boldsymbol{y};\boldsymbol{p},\boldsymbol{w}(\theta_i)\right). \quad (2)$$

Consumers ignore their contribution to profits π_i and externalities Φ when choosing.

Indirect utility is then $V_i\left(\boldsymbol{p},\boldsymbol{w}(\theta_i)\right) = U_i\left(\boldsymbol{y}^*;\boldsymbol{p},\boldsymbol{w}(\theta_i)\right)$. Aggregate consumption of product j in market m is $q_j(\boldsymbol{p}) = \sum_{t\in\mathcal{T}_m}\sum_i y^*_{ijt}$.

To close the model, we distribute profits and externalities to people. We define $C_j(q_j)$ as product j's total production cost. Firm f's profits are

$$\Pi_f(\boldsymbol{p}) = \sum_{j\in\mathcal{J}_f}\left[p_j q_j(\boldsymbol{p}) - C_j(q_j)\right]. \quad (3)$$

Profits may be distributed unequally across people, but the total profits equal the total amount redistributed: $\sum_f \Pi_f(\boldsymbol{p}) = \sum_i \pi_i$.

Production and consumption of product j impose a negative externality ϕ_j on other people. We assume that externalities are distributed equally across people, so the per-person externality is

$$\Phi = \frac{1}{N}\sum_m\sum_{j\in\mathcal{J}_m} q_j(\boldsymbol{p})\phi_j. \quad (4)$$

Social welfare is the sum of utility, weighted by Pareto weights $\omega_i \geq 0$:

$$W(\boldsymbol{p},\boldsymbol{w}) = \sum_i \omega_i V_i\left(\boldsymbol{p},\boldsymbol{w}(\theta_i)\right). \quad (5)$$

There is an active debate on the correlations between income and internalities (Allcott, Lockwood, and Taubinsky 2019a) or externality damages (Hsiang, Oliva, and Walker 2019). To the extent that negative internalities or externalities accrue more (or less) to lower-income people, this would increase (or decrease) the Pareto-weighted internality or externality. Our empirical analysis speaks to these possibilities by presenting results under alternative internality and externality assumptions.

I.B Corporate Social Impact

We define $\boldsymbol{p}^{\mathcal{X}}$ and $\boldsymbol{w}^{\mathcal{X}}$ as equilibrium prices and wage functions with some set of firms $\mathcal{X}$ in the market. The welfare loss from firm f's exit conditional on initial set of firms $\mathcal{X}_0$ is

$$\Delta W_f(\mathcal{X}) := W\left(\boldsymbol{p}^{\mathcal{X}_0}, \boldsymbol{w}^{\mathcal{X}_0}\right) - W\left(\boldsymbol{p}^{\mathcal{X}_0\backslash f}, \boldsymbol{w}^{\mathcal{X}_0\backslash f}\right), \tag{6}$$

where $\mathcal{X}_0\backslash f$ is all initial firms other than f.

We consider two notions of corporate social impact. Firm f's *individual impact* is the welfare loss from a firm's exit if all other firms remain in the market:

$$\Delta W_f^{Individual} = \Delta W_f(\mathcal{F}). \tag{7}$$

Firm f's *share of industry impact* is the firm's Shapley value for the social welfare loss if all firms in the industry were to exit the market. To calculate this, we define $\mathcal{R}_m$ as the set of all orderings of firms in market m, we define $\mathcal{P}_f^R$ as the union of f with the set of firms that precede f in ordering R, and we define F_m as the number of firms in the market. The Shapley value is the average welfare loss from removing f over all permutations of other firms:

$$\Delta W_f^{Shapley} = \frac{1}{F_m!}\sum_{R_m} \Delta W_f\left(\mathcal{P}_f^R\right). \tag{8}$$

For a mathematical example of the distinction between individual impact and share of industry impact, consider a simple Bertrand oligopoly. There are two identical firms $f \in \{1,2\}$ selling fully undifferentiated products with constant marginal cost, and total welfare is unaffected if one firm exits but drops by $\$X$ if both firms exit. Each firm's individual impact is $\Delta W_f^{Individual} = 0$. The set of orderings of the firms is $\mathcal{R}_m = \{(1,2),(2,1)\}$, and the Shapley value is $\Delta W_f^{Shapley} = \frac{1}{2}(X+0) = \frac{1}{2}X$: the two identical firms have equal shares of the $\$X$ industry impact.

For an intuitive example, consider the cigarette industry. The industry as a whole might have very negative industry impact due to the externalities and internalities from smoking, but a single cigarette company (even one with large market share) might have *positive* individual impact if aggregate demand is fully inelastic, because a firm's exit reduces consumer surplus but does not reduce externalities and internalities.

The Shapley value is not the only way to allocate total industry impact to individual firms—for example, we could allocate based on share of sales. However, the Shapley value is the only map from total industry impact to shares of industry impact that satisfies four intuitive properties:

linearity, null player, efficiency, and symmetry (Shapley 1953). Linearity means that the results are homogeneous of degree one, and null player means that a firm with $\Delta W_f(\mathcal{X}) = 0, \forall \mathcal{X}$ has zero Shapley value. Efficiency means that the Shapley values sum to the total industry impact. Symmetry means that firms that always contribute the same $\Delta W_f(\mathcal{X})$ have the same Shapley value. Allocating industry impact to firms based on share of sales would violate symmetry if firms that have the same sales generate different consumer surplus, for example because consumers are less willing to substitute away from certain firms.[7]

I.C Assumptions for Empirical Implementation

Distributional preferences. Following the public economics literature, we define $g_i \coloneqq \omega_i U_i'$ as the social marginal welfare weight: the social value of increasing person i's consumption by \$1. We define $a(z_i)$ as income after taxes and government transfers, as a function of pre-tax income z_i. We parameterize distributional preferences by ρ:

$$g_i = \kappa a(z_i)^{-\rho}. \tag{9}$$

We set $\kappa = N/\left[\sum_i a(z_i)^{-\rho}\right]$, so that the average welfare weight is $\bar{g}(z) = 1$. We calculate after-tax income $a(z)$ from pre-tax income z using the distributional national accounts data from Piketty, Saez, and Zucman (2020).

In our empirical implementation, we consider two cases. First, we consider $\rho = 0$, so all people are weighted equally: $g_i = 1, \forall z$. In this case, W is just total surplus. Second, we consider $\rho = 1$, so $g_i \propto 1/a(z_i)$, which approximately corresponds to log utility. In this case, we refer to consumer surplus, corporate social impact, and other objects as "weighted." While ρ is a normative parameter with no objectively correct value, Saez (2002), Piketty and Saez (2013), Allcott, Lockwood, and Taubinsky (2019a), and other optimal taxation papers use $\rho = 1$ as a benchmark, and Chetty (2006) shows that this is consistent with observed labor supply behavior in the U.S. See Appendix Figure A1 for the distributions of after-tax income and resulting social marginal welfare weights.

Partial equilibrium assumptions. We impose two additional assumptions that allow us to analyze product and labor markets in partial equilibrium. First, we assume that intermediate inputs are produced at constant marginal cost in perfectly competitive markets with no externalities other than CO2 emissions (which we discuss in Section IV.F), so there are no general equilibrium effects up the supply chain.[8] Second, we assume that each individual firm is a small share of the

[7] Both the individual impact and the share of industry impact still ignore interactions *across* industries. For example, an oil company's exit would affect airlines' input prices, which would in turn affect airline prices and corporate social impacts.

[8] In reality, third-party suppliers may generate profits, worker surplus, and other externalities, and the magnitudes might be affected by factors such as labor practices in developing countries. Our conceptualization of a firm's social impact does not include these components of surplus generated by third-party suppliers.

labor market, so its exit doesn't affect wages at other firms or the outside options of its employees.[9] With these assumptions plus our additively separable quasilinear utility specification in equation (1), we can model product and labor markets in separate partial equilibria.

Representative product. We assume that each firm sells one representative product in one market. The representative product has initial price $p_f = 1$ (which will change endogenously in counterfactual scenarios), total cost function $C_f(q_f)$, externality ϕ_f, and internality γ_f. The representative product assumption simplifies our product market model relative to considering, for example, many specific airplane flight routes or restaurant locations. Appendix F shows that this simplification makes little difference in a case study of the auto industry.

The short-run equilibrium framework—endogenous price but exogenous cost and characteristics—is crucial. In the very short run, a firm's sudden exit would cause large disruptions for its customers and employees. In the very long run, a firm's social impact might be very small because competitors could step in to make the same products. A dynamic product entry model could attempt to capture the time path of these effects. Our static model provides a rough (but much simpler) approximation to the effects over the first few years after exit.

Our view is that this short-run equilibrium framework is most appropriate for quantifying the concept of "enterprise impact" introduced in Brest and Born (2013), because the large effects from sudden exit and the negligible effects from exit over the very long run are both so trivial as to be uninteresting.

As highlighted in the introduction, these are strong assumptions, but they are very useful in simplifying our illustrative quantifications in the rest of the paper. To estimate corporate social impact, we still need (i) the distribution of utilities u_{ift} and u_{ifl}, (ii) cost functions $C_f(q_f)$, (iii) externalities ϕ_f and internalities γ_f, and (iv) equilibrium assumptions to simulate counterfactual prices $\boldsymbol{p}$. The next three sections present the data and estimation strategies for those objects.

II Data

II.A Survey

In our model, a firm delivers more social impact if it would be more difficult for its consumers and workers to find substitute products and employers if the firm were to exit. That social impact is weighted more heavily if it accrues to people with higher social marginal welfare weights. Thus, the key goal of our survey is to measure consumer and worker substitution patterns and incomes.

Survey instrument. We fielded the survey in two rounds, July and November 2021, on Lucid and Cint, two standard online survey panels. The survey begins by looping through our 11

[9] This is reasonable because even our largest firm (Walmart's grocery business) is less than one percent of the U.S. labor market. Blanchard and Katz (1992) find that a one percent employment decrease reduces local real wages by at most 0.2 percent.

differentiated product markets: autos, airline travel, consumer packaged goods (cereal, cigarettes, carbonated soft drinks, beer, yogurt, and toothpaste), grocery retail, chain restaurants, and smartphones.[10] Using the auto market and the Chevrolet brand as an example, the survey questions are as follows.

> *Consumption*: Do you currently own or lease a vehicle?
>
> Yes | No
>
> *Brand*: What brand is your vehicle?
>
> Acura | Chevrolet | Ford | ...
>
> *Customer satisfaction*: Overall, how satisfied are you with [Chevrolet]?
>
> 0 (not at all satisfied) | ... | 10 (extremely satisfied)
>
> *Price response*: Imagine that the price of all [Chevrolet] vehicles and all other vehicles made by [General Motors] were **25%** higher. Would you still have chosen a [Chevrolet], or some other vehicle made by [General Motors], even at the higher price?
>
> Yes | No
>
> *Aggregate price response*: Now imagine that the price of all vehicles doubled. Would you still have a vehicle?
>
> Yes | No

The questions and response options varied somewhat by industry. In the block of auto market questions, the survey also asked people to report their vehicle's model name (for example, "Honda Civic" or "Ford Excursion") and asked a *model-level price response* question: whether they would still have bought their model if the price were 25 percent higher. For most industries, the *consumption* question was continuous, asking "How many dollars would you say you spent on [product] in an **average month** before the pandemic?" and the *brand* question was "What kind of [product] did you buy most recently?" The brand lists included all major brands in each market. For all industries other than autos and smartphones, *aggregate price response* was phrased more continuously, asking "how much less" people would buy if all prices doubled.

In the November survey round, we randomized the magnitude of the hypothetical price increase in the *price response* question: 90 percent of respondents were asked about a 25 percent price increase (as in the July survey round), while the remaining 10 percent were asked about 50 or 75 percent price increases. We use only the 25 percent group for the demand estimation described in Section IV.B; we use the 50 and 75 percent groups for an additional analysis described in Section IV.C.

[10] The survey is available from https://mit.co1.qualtrics.com/jfe/form/SV_4OrCsEDx2rnmWMu.

After the product market questions, the survey asked questions about people's "primary employment," including whether they are currently employed more than 20 hours per week, their employer's size and industry, their occupation, annual earnings, and *worker satisfaction*: "Overall, how satisfied are you with your primary employer?" The survey then asked an analogue to the *price response* question:

> *Worker price response*: Imagine your primary employer faced major new competition and had to permanently cut everyone's salary by **10%**. Would you keep working there, even at the lower salary?
>
> Yes | No (I'd get a new job or stop working)

Data preparation and weights. To ensure high-quality data, the survey included two attention check questions and re-elicited monthly grocery and cereal spending at the end. We dropped any respondents who (i) failed either attention check; (ii) reported grocery or cereal spending that differed by more than 35 percent, if that difference was more than 10 percent of the sample average spending; (iii) reported unusually high or low spending in more than two product markets; or (iv) responded with more than 100 characters of text when asked their vehicle's model name. This screening dropped 23 percent of respondents, leaving 3,544 valid responses. Within the valid responses, we also winsorize spending in each product market at reasonable levels.

In all figures and tables, we weight the valid respondents for national representativeness on four household income bins, share male, share white, share age 45 and over, and share with a college degree. To avoid too much precision loss, we winsorize the weights at 1/3 and 3 times the sample average.

Descriptive statistics. Panel (a) of Table 1 presents demographics of the unweighted and weighted samples. The sample weights up-weight men, non-white people, non-college graduates, and higher-income people. Panel (b) presents descriptive statistics on our key survey questions. The *price response* mean indicates that 63 percent of people reported that they would still buy from the same firm if the price rose by 25 percent, the *aggregate price response* mean indicates that 57 percent of aggregate demand would be retained if all prices doubled, and the *worker price response* mean indicates that 55 percent of workers would still keep working at their primary employer even if the employer had to cut everyone's salary by 10 percent.

II.B Other Data

We define firms f at the level of the stock ticker (for publicly traded firms) or holding company (for private firms), using 2019 firm ownership. Only one firm, General Mills, operates in multiple product markets in our data. For simplicity, we report separate estimates by market: "General Mills" in the cereal market and "Yoplait" in the yogurt market.

We collect total 2019 revenues for each firm in the 11 differentiated product markets. Airline revenues are from the U.S. Department of Transportation (2021) DB1B dataset, auto revenues are from data we purchased from Wards, consumer packaged goods revenues are from NielsenIQ Homescan and Statista Consumer Market Outlook, grocery revenues are from Winsight (2019), restaurant revenues are from Technomic (2021), and smartphone revenues are from Statista and Statcounter (2021). Note that by attributing all retail revenues to the original manufacturers in the auto and consumer packaged goods markets, we attribute the consumer surplus from distribution and retail to the manufacturers.

For the labor market estimation, we define a local labor market as a county. We collect the employment count by occupation and county from the 2010–2019 American Community Surveys (ACS). We collect employment counts by firm and county from InfoUSA, and we rescale those counts to represent only the employment corresponding to the product market we study.[11]

III Descriptive Results

Before presenting the formal models, we present descriptive survey results that build confidence in the data and provide intuition for our eventual corporate social impact estimates.

Figure 2 presents the aggregate price elasticity of demand for each differentiated product industry in the survey, calculated from the *aggregate price response* question as (-1)×ln(share who would still buy if the price of all products doubled) / ln(2). Toothpaste, groceries, and smartphones have the most inelastic demand, airlines and restaurants have the most elastic demand, and all other industries are clustered around an aggregate elasticity of 1. Industries toward the left will tend to have larger differences between individual impact and share of industry impact, because inelastic aggregate demand implies large industry impact.

Figure 3 presents the two statistics that are key to a firm's social impact in our model. Each point on the scatterplot is a firm, and each industry has a different marker style. The x-axis has the average income of the firm's consumers. Firms toward the left generate more welfare-weighted consumer surplus, and thus more weighted corporate social impact, because their consumers have lower income and thus higher social marginal welfare weights. The y-axis has the firm's own-price elasticity, calculated from the *price response* question as (-1)×ln(share of consumers who would still buy from the firm after a 25 percent price increase) / ln(1.25). Firms toward the bottom generate more consumer surplus, and thus more social impact, because consumers can't easily substitute

[11] For example, Apple sells more than just smartphones, but we want to consider only the employment that corresponds to Apple's smartphone business. To do this, define N_f^* and R_f^* as employment and revenue from Compustat, define R_f^p as revenue in the U.S. product market we study, and define N_f^{IU} as U.S. employment count from InfoUSA. The employee count that corresponds to the product market we study is $R_f^p \cdot N_f^* / R_f^*$, so we multiply all InfoUSA establishment-level employment counts by $\left(R_f^p \cdot N_f^* / R_f^*\right) / N_f^{IU}$. This approach assumes that all workers are in the United States.

away from their products. Appendix Tables A1 and A2 present the statistics from Figures 2 and 3 in tabular form.

We label all auto companies and the firms with outlying own-price elasticity or customer income. The firms with the highest customer income at the right of the figure include BMW and Mercedes, Alaska Airlines, Amazon groceries (Whole Foods and Amazon Fresh), Chobani yogurt, and Starbucks coffee. The firms with the lowest customer income at the left include Kia, Google and LG smartphones, Reynolds cigarettes, Walmart, Winco (a discount grocer), and Yoplait yogurt. The firms with most elastic demand at the top of the figure include Hyundai, Frontier and Spirit Airlines, and several other auto companies. The firms with the most inelastic demand at the bottom include BMW, Winco, ALDI (another discount grocer), Apple and Google smartphones, and Glaxo toothpaste (the Sensodyne brand).

Discussion and validation. A natural concern with our approach to estimating firm-level price responses is that it relies on hypothetical stated preference survey questions instead of market behavior. We initially considered more traditional demand estimation with market data and price instruments, but we decided on the survey approach for two reasons. First, there are not plausible instruments for firm-level or market-level prices in some of the markets that we wanted to cover. Second, the surveys allow us to take a consistent approach across markets, and it is easy to envision how one could extend such surveys to cover many more markets.

The survey and its role in the estimation strategy described below were inspired by the auto market survey in Berry, Levinsohn, and Pakes (2004). The survey asked people to report the car they would have bought if their current car was not available; the responses are used to identify the distribution of random coefficients. Our approach is comparable, except that our price response question may be more cognitively challenging than their second choice question.

We check and validate the survey responses in three ways. First, we compare firms' market shares and average customer income in the survey data to external sources—the National Household Transportation Survey (for autos), the DB1B data (for airlines), and Nielsen (for consumer packaged goods). The firm-level correlations are 0.83 for market shares and 0.96 for income. Second, we show that as expected, *price response* is correlated with *customer satisfaction*, and *worker price response* is correlated with *worker satisfaction*. See Appendix B.B for figures illustrating these correlations.

Third, we compare the product demand and labor supply elasticities implied by our survey responses to outside estimates. The automobile model-level price elasticity is 3.76, which is in the range of estimates reported in Berry, Levinsohn, and Pakes (1995) and moderately smaller than the average of 5.36 estimated by Grieco, Murry, and Yurukoglu (2023) for 2015, the most recent year reported. The aggregate elasticity of auto demand is 0.92, which is close to the value of 1.0 suggested in Berry, Levinsohn, and Pakes (2004) and moderately smaller than the value of 1.29 estimated by Grieco, Murry, and Yurukoglu (2023) for 2015. The soda aggregate elasticity (1.02) lines up well with empirical estimates using market data (Allcott, Lockwood, and Taubinsky 2019b).

The cigarette aggregate elasticity (1.04) is higher than early estimates reported in Chaloupka and Warner (2000) and Gallet and List (2003), but some recent estimates are closer (Cotti et al. 2020; Allcott and Rafkin 2021). The labor supply arc elasticity (4.6) is higher than estimates of the wage elasticity of separation surveyed in Manning (2011); Card et al. (2018) write that 4 is a "reasonable near-competitive benchmark." Labor supply may have been unusually elastic given the tight labor market at the time of the survey in summer and fall 2021, and we will show that our qualitative conclusions change little if we assume more inelastic labor supply.

IV Product Market Estimation

In this section, we specify equilibrium assumptions and functional forms for utility in order to estimate counterfactual prices, consumer surplus, profits, and externalities.

IV.A Differentiated Product Markets: Supply and Demand System

Our differentiated product market model and estimation follow a standard approach in the industrial organization literature (e.g. Berry, Levinsohn, and Pakes 1995). We assume that firms in our differentiated product markets set prices to maximize profits Π_f in a static Nash-Bertrand equilibrium with constant marginal costs C'_f.[12] Firm $f's$ first-order condition for the price of its representative product is

$$p_f - C'_f = \frac{q_f}{-\partial q_f(\boldsymbol{p})/\partial p_f}. \tag{10}$$

We assume that any fixed costs are sunk, so they cannot be recovered when a firm exits. This assumption causes us to attribute higher social impact to firms with high-fixed cost production technologies.

The demand system is a standard random coefficient logit model. We separate consumers into groups with household income above vs. below \$60,000 per year, indexed $z \in \{A, B\}$ with population shares μ_z, and we define A_i and B_i as indicators for household income above and below \$60,000. To estimate the model, we make the standard assumption of additively separable utility:

$$\tilde{u}_{ift} = \left(\underbrace{\xi_f}_{\substack{\text{unobserved}\\ \text{characteristic}}} + \underbrace{\gamma_f}_{\text{internality}} + \underbrace{A_i\zeta_f}_{\substack{\text{income-firm}\\ \text{effect}}} + \underbrace{\sigma_f\nu_{if}}_{\text{firm RC}} + \underbrace{\sigma_n\nu_{in}}_{\text{inside good RC}} + \underbrace{\epsilon_{ift}}_{\substack{\text{extreme value}\\ \text{utility shock}}} \right) / \eta. \tag{11}$$

[12]We note that this firm-level profit maximization assumption embeds two ways in which managers might not maximize investor objectives. First, this assumes that common ownership does not influence pricing; this is consistent with the results of Backus, Conlon, and Sinkinson (2021). Second, this assumes that firms maximize profits even if some of their investors might care about other social impacts.

The sum of the unobserved characteristic and the internality $\xi_f + \gamma_f$ controls each firm's overall market share. The income-firm effect ζ_f controls differences in preferences for firm f for higher- vs. lower-income consumers. The standard deviation σ_f of firm-specific random coefficients controls the demand elasticity (and thus consumer surplus) by firm. The standard deviation σ_n of the inside good random coefficient controls the market's aggregate price elasticity. We let $\boldsymbol{\nu}_i := \{\nu_{if}, \nu_{in}\}$ denote the vector of random coefficients, and we assume that ν_{if} and ν_{in} take independent standard normal distributions. To use the logit model, we assume that the taste shock ϵ_{ift} is distributed type 1 extreme value. η is a market-specific scaling factor that maintains ϵ_{ift} at the type 1 extreme value variance $(\pi^2/6)$, while maintaining $\tilde{u}_{ift}$ in units of dollars.[13]

We define "representative utility" as the re-normalized net benefit from a product minus the extreme value utility shock, conditional on a realization of random coefficients $\boldsymbol{\nu}_i$. Income group z's representative utility for firm f's product is

$$V_{zf}(p_f, \boldsymbol{\nu}_i) = \eta(-p_f + u_{ift}) - \epsilon_{ift} = -\eta p_f + \xi_f + \gamma_f + A_i\zeta_f + \sigma_f\nu_{if} + \sigma_n\nu_{in}. \tag{12}$$

We index the outside option (not buying any product in the market) as $f = 0$, and we normalize $V_{z0} = 0$.

Income group z's choice probability (over the distribution of $\boldsymbol{\nu}_i$) is

$$P_{zf}(\boldsymbol{p}) = \mathbb{E}_{\boldsymbol{\nu}}\left[\frac{e^{V_{zf}(p_f,\boldsymbol{\nu}_i)}}{1 + \sum_{k\in\mathcal{F}_m} e^{V_{zk}(p_k,\boldsymbol{\nu}_i)}}\right], \tag{13}$$

where k also indexes firms and $\mathcal{F}_m$ is the set of firms in market m. Aggregating across income groups, firm f's choice probability is $P_f(\boldsymbol{p}) = \sum_z \mu_z P_{zf}(\boldsymbol{p})$, and firm f's total quantity sold is $q_f(\boldsymbol{p}) = NT_m P_f(\boldsymbol{p})$.

Following Small and Rosen (1981), income group z's perceived consumer surplus per choice occasion in market m is

$$\widetilde{CS}_{zm}(\boldsymbol{p}) := \mathbb{E}_{\boldsymbol{\nu}}\left[\frac{1}{\eta}\ln\left(1 + \sum_{f\in\mathcal{F}_m} e^{V_{zf}(p_f,\boldsymbol{\nu}_i)}\right)\right] + K, \tag{14}$$

where K is some constant. Perceived consumer surplus differs from (actual) consumer surplus due to internalities γ_f. Accounting for internalities using the approach of Allcott (2013), the consumer surplus loss from firm f's exit conditional on a set of firms $\mathcal{X}_0$ initially in the market is

[13] An alternative approach would be to infer firm-level demand elasticities from accounting data on markups using the inverse elasticity markup rule from equation (10). This would allow us to study all firms with publicly available cost and revenue data, but strong assumptions would be required to use accounting data in this way (De Loecker, Eeckhout, and Unger 2020).

$$\Delta CS_f(\mathcal{X}_0) = N \sum_z \mu_z g(z) \cdot T_m \left[\widetilde{CS}_{zm}(\boldsymbol{p}^{\mathcal{X}_0}) - \widetilde{CS}_{zm}(\boldsymbol{p}^{\mathcal{X}_0 \setminus f}) - \sum_f \gamma_f \left(P_{zf}(\boldsymbol{p}^{\mathcal{X}_0}) - P_{zf}(\boldsymbol{p}^{\mathcal{X}_0 \setminus f}) \right) \right]. \tag{15}$$

IV.B Differentiated Product Markets: Estimation Strategy and Counterfactuals

Our estimation strategy for differentiated product markets broadly follows Berry, Levinsohn, and Pakes (2004), except that the price response parameter η is identified using microdata. We use survey data to identify ζ_f, η, σ_f, and σ_n, setting the residuals $\delta_f := \xi_f + \gamma_f$ to match aggregate market shares. We then assume that firms maximize profits in Nash-Bertrand equilibrium and infer each firm's marginal cost from its first-order condition.

The estimation includes all firms in the survey data that had at least 25 respondents as customers. All other firms in the product market are combined into an "other" firm $f = o$, which we assume always has $p_o = C'_o = 1$. We estimate the "other" firm's ζ_{Ao} and δ_o but fix its σ_o to the average σ_f of the non-"other" firms.

We define s_f as firm f's observed revenue share. In each market, we set the number of choice occasions equal to twice industry revenues, so the outside option share is initially $s_0 = 0.5$.[14]

Define $\boldsymbol{p}^0$ as baseline prices, $\boldsymbol{p}'_f$ as the price vector after firm f increases prices by 25 percent, and $\boldsymbol{p}'$ as the price vector after all prices double. F_{if} is an indicator for whether respondent i bought from firm f. H_{if} is an indicator for whether respondent i bought from firm f and would still buy from f at higher price $\boldsymbol{p}'_f$ (from the *price response* survey question), while $O_i \in [0, 1]$ is the share of inside good consumption that respondent i would maintain if all prices doubled (from the *aggregate price response* question).

We approximate income group z's choice probability $P_{zf}(\boldsymbol{p})$ by simulation over random coefficients. Firm f's overall choice probability is $P_f(\boldsymbol{p}) = \sum_z \mu_z P_{zf}(\boldsymbol{p})$. ω_i is respondent i's nationally representative sample weight. $\chi_{im} \in \{1, 0\}$ is an indicator for whether respondent i consumes an inside good in market m. Thus, $\omega_i \chi_{im}$ is consumer i's overall sample weight for inside good purchases in market m, and that term appears as a weight in the moment conditions below.

We can now specify the moments in our method of simulated moments estimator. The "income-firm moments" are informative about ζ_f by matching the difference in share of purchases by high- vs. low-income consumers for each firm f:

[14] Because our model includes a random coefficient ν_{in} on the inside goods, the initial outside option share theoretically should not affect the predicted substitution patterns and corporate social impact estimates. Appendix Table A3 confirms this numerically.

$$g_f^{inc} = \left(\sum_i \omega_i \chi_{im}\right)^{-1} \sum_i \omega_i \chi_{im} \left((A_i F_{if} - B_i F_{if}) - \frac{\mu_A P_{Af}(\boldsymbol{p}^0) - \mu_B P_{Bf}(\boldsymbol{p}^0)}{1 - P_0(\boldsymbol{p}^0)} \right). \tag{16}$$

The "substitution moments" are informative about the scaling factor η and firm random coefficient standard deviations σ_f by matching the predicted and actual responses to a 25 percent price increase for each firm f:

$$g_f^{sub} = \left(\sum_i \omega_i \chi_{im} F_{if}\right)^{-1} \sum_i \omega_i \chi_{im} F_{if} \left(H_{if} - \frac{P_f(\boldsymbol{p}'_f)}{P_f(\boldsymbol{p}^0)} \right). \tag{17}$$

The "outside moments" are informative about the inside good standard deviation σ_n by matching predicted and actual response of the inside goods' market share to a doubling of all prices:

$$g^{out} = \left(\sum_i \omega_i \chi_{im}\right)^{-1} \sum_i \omega_i \chi_{im} \left(O_i - \frac{1 - P_0(\boldsymbol{p}')}{1 - P_0(\boldsymbol{p}^0)} \right). \tag{18}$$

We fix $\sigma_f = 0$ for one firm in each market, after which we have the same number of moments as free parameters. We estimate the parameters using a method of simulated moments (MSM) estimation procedure analogous to Berry, Levinsohn, and Pakes (1995, 2004).[15] After estimating the demand parameters, we back out marginal costs C'_f by plugging baseline price vector $\boldsymbol{p}^0 = \mathbf{1}$, baseline quantities, and the simulated demand response $\partial q_f \left(\boldsymbol{p}^0\right) / \partial p_f$ into the Nash-Bertrand first-order condition from equation (10).

Having estimated all structural parameters, we can simulate counterfactual Nash-Bertrand equilibrium prices $\boldsymbol{p}^{\mathcal{X}}$ for any configuration of firms $\mathcal{X}$. To find the counterfactual prices, we iterate to a fixed point following Conlon and Gortmaker (2020) and Morrow and Skerlos (2011).

IV.C Differentiated Product Markets: Estimation Results

Tables 2 and 3 present the full set of parameter estimates. Although there is not a one-to-one correspondence because all parameters are jointly identified, firms with more inelastic demand in the survey data tend to have larger σ_f, and firms with a larger share of higher-income consumers in the survey data tend to have higher ζ_f. Using the auto industry as an example, BMW has a relatively low share of purchases by consumers with household income below \$60,000 and a high share of purchases retained after a 25 percent price increase, and it correspondingly has relatively high estimated ζ_f and σ_f. Kia and Hyundai have relatively high shares of purchases by consumers

[15] More specifically, we define the bold-faced $\boldsymbol{\zeta}$ and $\boldsymbol{\sigma}_f$ as the vectors of ζ_f and σ_f parameters, and we define $\boldsymbol{g}^{inc}$ and $\boldsymbol{g}^{sub}$ as the vectors of income-firm and substitution moments. We define $\boldsymbol{\Theta}^m := \{\eta, \boldsymbol{\zeta}, \boldsymbol{\sigma}_f, \sigma_n\}$ as the vector of parameters identified by microdata, and we define $\boldsymbol{G}^m\left(\boldsymbol{\Theta}^m\right) := \{\boldsymbol{g}^{inc}, \boldsymbol{g}^{sub}, g^{out}\}$ as the column vector of stacked micro-moments. We minimize $\boldsymbol{G}^m\left(\boldsymbol{\Theta}^m\right)' \boldsymbol{G}^m\left(\boldsymbol{\Theta}^m\right)$. In every iteration of the optimization routine, we use the Berry (1994) contraction mapping to find the values of $\delta_f := \xi_f + \gamma_f$ that match simulated and actual aggregate market shares.

with household income below $60,000 and low shares of purchases retained after a 25 percent price increase, and they correspondingly have relatively low estimated ζ_f and σ_f.

Dividing by η normalizes the parameters into dollar units. Again using the auto industry as an example, we have $\eta \approx 5.2$. Relative to lower-income consumers, consumers with household income above $60,000 are willing to pay $\zeta_{BMW}/\eta \approx 2.72/5.2 \approx \$0.52$ more per dollar of representative product from BMW. Those higher-income consumers are willing to pay $-\zeta_{Kia}/\eta \approx 6.48/5.2 \approx \$1.25$ *less* per dollar of representative product from Kia. Relative to Hyundai, whose σ_f is fixed to zero, the standard deviation of consumers' idiosyncratic preferences is an additional $\sigma_{BMW}/\eta \approx 9.85/5.2 \approx \$1.89$ per dollar of representative product for BMW, but only $\sigma_{Kia}/\eta \approx 1.86/5.2 \approx \$0.36$ for Kia.

One natural concern when calculating consumer surplus is that while the estimation moments match the modeled and survey-based price responses to 25 a percent price increase, the shape of inframarginal demand at higher prices (and thus the magnitude of consumer surplus) depends on functional form assumptions for ϵ and σ (Hausman 1996). However, we find that the shape of the modeled demand function is roughly consistent with the raw survey data from the subset of respondents where we randomized higher hypothetical price increases of 50 and 75 percent; see Appendix Figure A7.

Our estimated firm-level profits line up well (although not perfectly) with profits implied by accounting profit margins; see Appendix Figure A8. The distributions of simulated counterfactual prices after exit are generally close to 1 (see Appendix Figure A12), implying that in our model, a firm's exit does not materially increase competitors' market power.

IV.D Oil Market

There are two important differences between oil and our differentiated product markets. First, there is limited product differentiation. Second, it would be especially unrealistic to assume that the marginal costs of oil production are constant and can be inferred from a static Nash-Bertrand equilibrium.

We thus take a different approach in the oil market. We first simulate the removal of firm f from the global oil market and compute the resulting changes in global consumer surplus, profits, and externalities. To make these estimates consistent with the differentiated product industries, which are specific to the U.S., we then assign 20 percent of the global quantities to the United States, corresponding to the country's share of global oil consumption. We evaluate the largest seven publicly traded oil companies, or "supermajors": BP, Chevron, ConocoPhillips, Eni, Exxon, Shell, and Total. Given the substantial production of state-owned companies such as SinoPec, PetroChina, and Saudi Aramco, the supermajors still account for a relatively small share of global oil supply.

To model the global oil market, we assume that oil is an undifferentiated product sold at price p, and that all consumers and firms are price takers. Global oil demand is $D(p) = \sum_i \sum_{t \in \mathcal{T}_m} \mathbf{1}[u_{it} > p]$, where $\mathbf{1}[\cdot]$ is the indicator function. Firm f's equilibrium supply $q_f(p)$ is such that $C'_f(q_f(p)) = p$, and global oil supply with set of firms $\mathcal{X}$ in the market is $S(p; \mathcal{X}) = \sum_{f \in \mathcal{X}} q_f(p)$.

We construct the *inframarginal* portions of the cost functions $C_f(q_f)$ for our seven firms using data from Rystad on oil production and operating expenses for all oil fields in the world in 2018, following Asker, Collard-Wexler, and De Loecker (2019). Appendix Figure A10 presents the marginal cost curves.

We define p^0 and q^0 as 2018 price and global quantity: \$72 per barrel of Brent crude and 77 million barrels per day of crude oil. We assume that a competitive fringe of other firms produces the remaining oil. We assume that extramarginal aggregate supply is linear with slope such that the supply elasticity at (p^0, q^0) equals 0.10, the estimate from Caldara, Cavallo, and Iacoviello (2019). We assume that aggregate demand $D(p)$ is globally linear with slope such that the elasticity at (p^0, q^0) equals -0.14, the estimate from Caldara, Cavallo, and Iacoviello (2019).

Under those assumptions, we can calculate the market-clearing price $p^{\mathcal{X}}$ with any set of firms $\mathcal{X}$ in the market:

$$D\left(p^{\mathcal{X}}\right) = S(p^{\mathcal{X}}; \mathcal{F}). \tag{19}$$

The global consumer surplus loss from firm f's exit conditional on a set of firms $\mathcal{X}_0$ initially in the market is the triangle under the linear demand curve:

$$\Delta CS_f(\mathcal{X}_0) = \frac{1}{2}\left(D\left(p^{\mathcal{X}_0 \backslash f}\right) + D\left(p^{\mathcal{X}_0}\right)\right) \times \left(p^{\mathcal{X}_0 \backslash f} - p^{\mathcal{X}_0}\right). \tag{20}$$

We calculate each firm's global profits by inserting $p^{\mathcal{X}}$ into equation (3), and we calculate global externalities by inserting $q_f\left(p^{\mathcal{X}}\right)$ into equation (4).

To construct weighted consumer surplus within the U.S., we take 20 percent of global consumer surplus and allocate that across incomes using the U.S. distribution of gasoline consumption by income, as implied by vehicle miles traveled and fuel economy in the 2017 National Household Travel Survey. Higher-income people consume more gasoline (see Appendix Figure A11), so the welfare weight on consumer surplus is less than one, specifically 0.66.

IV.E Profits

Define $r_i = \{1, 2, ..., 100\}$ as the income percentile of person i, and define z_r as the mean pretax income of taxpayers in percentile r. We assume that profits are distributed such that people at income percentile r receive share $\lambda(r)$ of profits, so

$$\pi_i = \Pi\lambda(r_i). \tag{21}$$

We calculate $\lambda(r)$ using data on C-corporation ownership at each income percentile in the distributional national accounts data from Piketty, Saez, and Zucman (2020); see Appendix Figure A12. When social marginal welfare weights $g(z)$ are set with curvature $\rho = 1$, the welfare weight applied to corporate profits is then $\sum_{r=1}^{100} g(a(z_r)) \cdot \lambda(r) \approx 0.12$. If $\rho = 0$, meaning that transfers to all income groups receive the same welfare weight, or if corporate profits were distributed equally among all people, this weight would equal one. The weight is much less than one because the highest-income people receive most of corporate profits and have low social marginal welfare weights.

IV.F Externalities and Internalities

We estimate production externalities, consumption externalities, and internalities for all industries where quantitative estimates are available. The total externality ϕ_f is the sum of production and consumption externalities.

We assume that production externalities equal the social cost of the CO2 emissions from the industry's inputs. We collect these supply chain CO2 emission factors from the U.S. Environmental Protection Agency (Ingwersen and Li 2020). We assume that the social cost of carbon is \$190 per metric ton of CO2, adopting the U.S. government's value for 2020 at a two percent discount rate (U.S. Environmental Protection Agency 2022).

For autos and oil, we also include consumption externalities from the CO2 emitted when consumers use those goods. For each auto firm, we calculate the lifetime carbon emissions for its average vehicle sold, discounted at three percent per year.

For beer, we assume that the average externality from alcohol consumption is \$33.60 per liter of pure alcohol in 2019 dollars, following Herrnstadt, Parry, and Siikamaki (2015). This estimate includes factors such as health system cost externalities and injury risks to others from drunk driving. We assume a five percent alcohol content and an average price of \$1 per 12-ounce container. We are not aware of existing quantitative estimates of internalities associated with beer consumption.

For cigarettes, we assume a consumption externality of \$0.64 per pack, following DeCicca, Kenkel, and Lovenheim (2020), and the internality is $(1-\beta) \times H^c = (1-0.67) \times \$44.40 \approx \$14.65$ per pack, where the present focus parameter β is from Chaloupka, Levy, and White (2019) and the health cost of smoking H^c is from Gruber and Kőszegi (2001). For soda, we assume a consumption externality of 0.85 cents per ounce from health system costs and an internality of 0.93 cents per ounce from self-control problems and imperfect information, following Allcott, Lockwood, and Taubinsky (2019a).

Table 4 presents the resulting average ϕ_f and γ_f by industry per dollar of retail sales. In most industries, externalities and internalities are relatively small, but the beer and oil consumption externalities and especially the cigarette internality are very large: \$0.61, \$1.26, and \$2.77 per dollar of sales. In all markets, we assume for simplicity that the outside option involves zero internality or externality.

V Labor Market Estimation

V.A Supply and Demand System

In this section, we estimate the worker surplus loss from firm f's exit. We leverage a key simplifying assumption introduced in Section I: each firm is only a small part of the labor market, so its exit doesn't affect other firms' wage offers. Under that assumption, a firm's contribution to worker surplus is simply the area above its current employees' labor supply function. We estimate that area using the *worker price response* survey question assuming that the firm's residual labor supply is globally linear. Panel (b) of Figure 1 provides a simple graphical illustration of the calculation.

Specifically, we define w_{i0} and u_{i0} as the wage and utility at worker i's outside option: their next-best employment after current firm and local labor market choice fl. We assume that current workers' surplus from working at fl instead of their outside options (as a percent of current earnings) is distributed uniformly with dispersion that depends on observable characteristics $\boldsymbol{x}_{ifl}$:

$$\frac{(u_{ifl} + w_{ifl}) - (u_{i0} + w_{i0})}{w_{ifl}} = \frac{\epsilon_{ifl}}{\boldsymbol{\alpha x}_{ifl}}, \tag{22}$$

with $\epsilon_{ifl} \sim U(0,1)$ and ϵ independent of $\boldsymbol{x}$.

Expected worker surplus (over the distribution of ϵ) is

$$\mathbb{E}_{\epsilon}\left[WS_{ifl}\right] = \int_0^1 \frac{w_{ifl}\epsilon}{\boldsymbol{\alpha x}_{ifl}} d\epsilon = \frac{w_{ifl}}{2\boldsymbol{\alpha x}_{ifl}}. \tag{23}$$

The change in worker surplus from firm f's exit is the sum of equation (23) over all workers in all local labor markets $\mathcal{L}_f$ where firm f has establishments:

$$\Delta WS_f = \sum_{l \in \mathcal{L}_f} \sum_{i \in fl} \frac{w_{ifl}}{2\boldsymbol{\alpha x}_{ifl}}. \tag{24}$$

V.B Estimation Strategy

For the 1,302 survey respondents who reported being employed but not self-employed, the survey elicited whether they would leave their current employer if the employer had to permanently cut salaries by 10 percent. We define the response as $L_i \in \{1,0\}$. In the model, L_i is

$$L_i = \mathbf{1}\left[u_{ifl} + 0.9w_{ifl} \leq u_{i0} + w_{i0}\right] \tag{25}$$

$$= \mathbf{1}\left[\epsilon_{ifl} \leq (0.1\boldsymbol{\alpha})\boldsymbol{x}_{ifl}\right] \tag{26}$$

Since $\epsilon_{ifl} \sim U[0,1]$, we can estimate $(0.1\boldsymbol{\alpha})$ using the following linear probability model:

$$\Pr(L_i = 1) = (0.1\boldsymbol{\alpha})\boldsymbol{x}_{ifl}. \quad (27)$$

We define $\boldsymbol{x}_{ifl}$ to include observable factors that might predict workers' labor supply responses: annual earnings w_{ifl} from the primary employer, education (a college graduate indicator), occupation (a vector of major occupation indicators defined in the U.S. census), and the natural log of the employer's total employment in the county, all of which we collected in our survey, as well as the natural log of labor market size (the employment count in i's occupation in local labor market l, from the ACS) and a constant. Wages should represent total compensation, so we divide earnings reported on our survey and on the ACS by 0.69 to reflect the fact that wages and salaries average 69 percent of total compensation for civilian workers nationwide (U.S. Department of Labor 2023).

V.C Estimation Results

Table 5 presents the estimates of $(0.1\boldsymbol{\alpha})$. Column 1 includes only total compensation and education, column 2 adds the occupation indicators, and column 3 includes the firm's local employment count and labor market size. The estimates in column 3 suggest that in response to a 10 percent salary cut, workers with \$10,000 higher total compensation are 1.4 percentage points less likely to leave, workers with a college degree are 7.8 percentage points less likely to leave, and workers at firms that employ one percent more people in the county are 2.5 percentage points more likely to leave.

For intuition on how we compute worker surplus under our linear labor supply assumption, consider the case where $\boldsymbol{x}_{ifl}$ includes just a constant. In that case, $\boldsymbol{\alpha}$ is the arc elasticity of labor supply faced by the average firm. About 46 percent of workers would leave their current employer after a 10 percent salary cut, so if $\boldsymbol{x}_{ifl}$ is a constant, $(0.1\boldsymbol{\alpha}) \approx 0.46$ and thus $\boldsymbol{\alpha} \approx 4.6$. The average annual earnings from the primary employer reported on the survey are about \$67,900, so using equation (23), the expected worker surplus per worker is $\mathbb{E}_\epsilon[WS_{ifl}] \approx \frac{\$67{,}900/0.69}{2\times(4.6)\times 1} \approx \$10{,}685$.

We use the estimates of $\boldsymbol{\alpha}$ from column 3 of Table 5 to predict the worker surplus across all of firm f's workers. To simulate the distribution of $\boldsymbol{x}_{ifl}$ at each firm, we assume that all firms in an industry have the same distribution of worker earnings, education, and occupations in all counties where they operate; we compute those industry-level nationwide distributions from the ACS. The InfoUSA data give each firm's county-level employment counts, and the ACS data give the local labor market size for each county and occupation. We use equation (23) to compute the worker surplus for each $\boldsymbol{x}_{ifl}$ in those simulated distributions, winsorizing at $\hat{\boldsymbol{\alpha}}\boldsymbol{x}_{ifl} \geq 1$, which corresponds to an assumption that people will not work for zero pay, regardless of their ϵ. We then use equation (24) to sum across counties to firm f's total worker surplus.

VI Corporate Social Impact Estimates

VI.A Examples: Autos and Cigarettes

As an initial illustration, Figure 4 presents the components of individual impact for each firm in the automobile and cigarette industries. Within each firm, the left bar presents unweighted estimates (i.e., equal social marginal welfare weights across income levels), while the right bar presents weighted estimates (i.e., social marginal welfare weights with curvature $\rho = 1$). The bars that extend below the y-axis reflect welfare reductions (e.g., negative externalities and reductions in competitors' profits). Corporate social impact (plotted as diamonds) is the sum of all positive and negative bars.

Both panels illustrate two results that hold across all industries and will be discussed further below. First, the largest firms (in the auto industry, Fiat Chrysler, Ford, GM, Honda, and Toyota) have the most social impact. Second, consumer surplus is by far the largest component of weighted corporate social impact.

The auto industry results in Panel (a) flow directly from the descriptive survey results described in Section III. BMW has the most inelastic demand in the survey data, and it correspondingly has a relatively high ratio of consumer surplus to profits and competitors' profits. BMW also has the highest average customer income in the survey data, and its consumer surplus thus decreases in the weighted compared to unweighted calculation. By contrast, Kia has the lowest average customer income in the survey data, and its consumer surplus increases by a relatively large proportion in the weighted estimates.

The cigarette results in Panel (b) are different for one key reason: the \$2.77 internality per dollar of revenue, as described in Section IV.F. While cigarettes deliver positive *perceived* consumer surplus, the *actual* (internality-adjusted) consumer surplus is negative in our model. Cigarette companies thus have negative social impact in our model: social welfare would be higher if they ceased to exist.

VI.B Key Drivers of Corporate Social Impact

In our estimates, there are three key drivers of corporate social impact.

The first key driver is size: unsurprisingly, larger firms have more impact. Figure 5 plots unweighted individual impact against revenue, using a log scale to accommodate the diversity of firm sizes. The figure excludes firms with negative impacts: the two cigarette companies plus Frontier and Spirit Airlines, which have especially elastic demand in combination with the relatively high airline production externality. The R^2 of this relationship is 0.92. Some of this high correlation may be due to limitations in our ability to quantify all channels of social impact, but much of this strong correlation might remain even with more extensive quantification.

For many of the remaining results, we adjust for size by considering the ratio of corporate social impact to revenue. The key driver of size-adjusted impact is product differentiation, as measured by the residual demand elasticity. Figure 6 presents unweighted impact/revenue against the own-price elasticity from the survey data, for all differentiated product firms with positive weighted impact. The figure shows that there is meaningful variation in unweighted impact/revenue, ranging from about 0.2 to over 1.0, and much of this variation is explained by the own-price elasticity from the survey data.

Appendix Figures A13 and A14 present versions of Figures 5 and 6 with *weighted* corporate social impact. Two things change with the weighting. First, profits receive much less weight. Second, consumer surplus receives more weight for firms with more lower-income consumers.

Our covariates predict little heterogeneity across firms in worker surplus per employee. Thus, a firm's worker surplus in our model is largely determined by its employee count; see Appendix Figure A15.

These results imply a simple but powerful takeaway: with the exception of cigarette companies, the most socially impactful firms are large firms that sell more highly differentiated products to lower-income consumers.

VI.C Average Corporate Social Impact by Industry

Figure 7 presents the components of social impact per dollar of revenues, at the industry level. Within each industry, the first and second bars presents unweighted and weighted individual impacts, summed across firms and then divided by the sum of revenues. The third bar presents the analogous sum of shares of unweighted industry impact calculated using Shapley values from equation (8), divided by the sum of revenues. Because the Shapley values sum to total industry impact, this third bar is equivalent to total industry impact per dollar of revenues.

There are three key results. First, consumer surplus is by far the most important component of corporate social impact. Profits are small for two reasons: (i) firms' profits are mostly offset by the reduction that the firm causes in its competitors' profits, and (ii) profits shrink markedly in the weighted estimates, as they are multiplied by a welfare weight of 0.12 calculated in Section IV.E. Worker surplus is small because for the average firm in our sample, estimated total compensation is only about 21 percent of revenues. Thus, firms have more opportunity to create surplus in the product market than in the labor market. Finally, externalities are relatively small (except perhaps in the beer industry) given the standard parameter values described in Section IV.F, even when considering share of industry impact.

Second, shares of industry impact are considerably larger than individual impacts. Consumer surplus is larger because the cost of an entire industry's exit is much larger than the cost of one firm's exit. For example, when BMW exits, its customers can switch to another firm, but if all auto companies exit, people need to find entirely different forms of transportation. This is especially true in the industries with the most inelastic aggregate demand from Figure 2 (toothpaste, groceries, and smartphones), where survey responses indicate that it would be especially difficult for consumers to substitute away. Negative externalities also increase when we consider share of industry impact, but this is not large enough to outweigh the consumer surplus increase.

Third, oil is different than our differentiated product industries. Because global oil supply and demand are so inelastic, when any oil company exits, the price rises substantially, generating a large transfer from consumers to the remaining firms as well as a moderate reduction in externalities. As a result, even though oil is an undifferentiated product, oil companies generate large consumer surplus in our model by keeping prices low. The often-discussed negative effects on consumers from the oil price shocks in 2022 and earlier decades reinforce this result (e.g., Jayanti (2022)). Weighted corporate social impact is significantly larger than unweighted impact because competitors' profits receive a low welfare weight.

VI.D Highest- and Lowest-Impact Firms

Appendix Table A5 presents the components of corporate social impact for all firms in our sample. As a summary, Table 6 presents the top 10 most and least impactful firms as measured by weighted individual impact and weighted individual impact per dollar of revenue.

The left side of Panel (a) shows that by far, the most impactful firm in our sample is Walmart. This is a natural implication of the key drivers discussed above: Walmart is large, its low prices mean that many of its customers would still shop there even if prices increased, and it disproportionately serves middle- and lower-income consumers with higher social marginal welfare weights. The rest of the top 10 is primarily comprised of large companies in the auto, grocery, and smartphone industries. The right side of Panel (a) shows that the most harmful firm in our sample is Philip Morris. The bottom 10 is primarily comprised of cigarette companies (due to their large negative internalities), Frontier and Spirit Airlines (due to their especially elastic demand in combination with the relatively high airline production externality), and small companies with small but positive impacts.

The left side of Panel (b) shows that by far, the most impactful firms in our sample per dollar of revenue are the large oil companies. As discussed above, due to the tightness of the global oil market, oil companies deliver tremendous value to consumers by keeping prices low, and this value outweighs climate change externalities valued at a $190 social cost of carbon. The right side of Panel (b) shows that cigarette companies are again the most harmful companies per dollar of revenues. Reynolds jumps into the bottom slot because it has more lower-income consumers than Philip Morris, so its consumer harms receive more weight. The rest of the bottom 10 is auto companies and airlines whose customers report that they can easily substitute to competitors.

VI.E Robustness

Figure 8 presents robustness checks with alternative parameter values. Each of the six panels presents components of corporate social impact for the average firm in the industry listed at the top of the panel. The left three panels show that estimates in the airline, auto, and oil industries decrease moderately but do not become negative when we double the social cost of carbon to $380 per ton. Thus, at least at the time horizon assumed by our model, firms in these industries deliver so much value to consumers that the consumer surplus far outweighs the environmental harms. This underscores the importance of the time horizon of our counterfactuals: at a longer time horizon, oil substitutes would likely develop and lessen the effect of an oil company's exit.

The fourth panel shows that cutting the assumed cigarette internality in half could make the weighted individual impact of cigarette companies slightly positive. The fifth panel shows that doubling the soda internality would have limited effect. Finally, the sixth panel shows that consumer surplus still dramatically outweighs worker surplus, even assuming more inelastic labor supply.

A key simplifying assumption of our framework is that each firm produces one representative product. In reality, many firms in the differentiated products industries we study sell multiple products. To give a sense of whether our simplification affects our results, Appendix F presents a model of the auto market where the choice set is all vehicle models instead of all firms. The estimation uses market data on prices and quantities of each vehicle model along with the *model-level price response* survey question for identification. The corporate social impact estimates are very similar to those from the baseline "representative product" model, suggesting that the aggregation to a firm-level representative product does not materially affect our results.

VII Comparisons to Existing Social Impact Metrics

This section describes how our methodology and firm-level ratings compare to existing systems for rating corporate social impact or ESG performance. ESG rating systems, such as those from MSCI (2023), Refinitiv (2023), S&P Global (2023), and CSRHub (2023), are typically designed to serve two audiences: investors focused purely on financial returns who want to minimize ESG-related profit risks, and impact investors who want to invest in companies with high ESG performance.[16] These ratings combine many specific metrics from company reports, media articles, pollution inventories, and other sources into company-level scores. The metrics are in different units (e.g., number of product recalls, average employee salary, tons of CO2 emissions), so the analyst must decide how to weight and combine them. Each rater has different approach to choosing and combining metrics, generally without a clear conceptual justification.[17] This contributes to significant differences in

[16] For example, Refinativ's website discusses "driving positive outcomes at both a financial and social level," and S&P claims to help investors "balance risk adjusted financial returns with sustainability benefits."

[17] Just Capital is one exception: they define their conceptual goal as rating companies "on the issues Americans prioritize," and they use opinion polls to determine the weight that Americans place on each metric.

ratings of the same company across different rating systems (Chatterji et al. 2015; Berg, Koelbel, and Rigobon 2022; Christensen, Serafeim, and Sikochi 2022). This highlights one contribution of our paper: laying out a welfarist conceptual framework that delivers a clear notion of corporate social impact that can then be quantified in consistent units (dollars).

The Harvard Business School Impact Weighted Accounts project (Serafeim, Zochowski, and Downing 2019) has made a fundamental and important advance by quantifying firms' social impact in dollar units. Conceptually, they quantify the same key objects that we do: consumer surplus (Serafeim, Trinh, and Zochowski 2020), worker surplus (Freiberg et al. 2021a), and environmental externalities (Freiberg et al. 2021b). However, we use economic approaches for this quantification, while they use accounting techniques. For example, consider the consumer surplus delivered by an auto manufacturer. The Serafeim, Trinh, and Zochowski (2020, Section 6) accounting approach involves identifying and then quantifying each major way that the manufacturer's products benefit or harm consumers: vehicles' annual user cost (price, fuel, and maintenance), the number of crashes and safety recalls monetized with an estimated cost per crash, customer satisfaction monetized through an assumed relationship between WTP and satisfaction, and the monetized time savings from commuting via car. Each of these calculations requires a series of decisions and assumptions. By contrast, our economic framework clarifies that an auto manufacturer's consumer surplus is simply the area under their demand curve, and our surveys then measure that object directly (under a different set of decisions and assumptions).[18]

Do these other rating systems produce results that line up with our estimates of corporate social impact? Figure 9 compares our estimates of weighted individual impact per dollar of revenue to ratings from two prominent third parties: CSRHub and Just Capital. The figure shows that these existing ratings have little relationship to our economically grounded impact measure.[19] Appendix Table A7 presents a larger set of correlations between components of corporate social impact and ESG ratings and subscores from Just Capital, Refinativ, and S&P. The other systems are not closely correlated with each other or with our estimates.

There are two classes of explanations for these low correlations. First, the different rating systems may not be trying to measure the same object: the effect of a firm's exit on social welfare is related to but distinct from a firm's environmental, social, and governance performance and profit risks. For example, diversity and inclusion efforts or good corporate governance may matter to stakeholders in ways that are not reflected in notions of social welfare. Second, to the extent that different systems are trying to measure the same object, each may do so with measurement error. As described above, ESG raters disagree on how to measure and combine different metrics.

[18]Similarly, Freiberg et al. (2021a) compute labor surplus by identifying and monetizing each major way that firms benefit workers (e.g., wages, career advancement, health and wellbeing, etc.) using a series of detailed calculations. By contrast, our framework clarifies that a firm's contribution to worker surplus is simply the area over their labor supply curve, which our surveys also measure directly.

[19]Appendix Figure A17 presents a parallel figure that does not normalize corporate social impact by revenue.

Similarly, our model makes strong assumptions, our surveys have sampling error, and there may be externalities, internalities, and other components of social impact that we cannot measure.

If we assume that other systems effectively incorporate our measure of weighted individual impact plus other factors that we are unable to measure, we can back out how large those other factors might be. For example, Walmart and Starbucks receive very similar ratings from Just Capital. In our estimation, Walmart generates 0.56 dollars of social impact per dollar of revenue ($150 billion per year), while Starbucks generates only 0.42 dollars of social impact per dollar of revenue ($9 billion per year), primarily because Walmart's consumers have much lower incomes (and Walmart is much larger). Thus, Starbucks must generate many billions of dollars of unmeasured social benefits if it has the same social impact as Walmart.

The two cigarette companies at the left of the figure are particularly striking examples of the differences between systems. While the internality assumptions described in Section IV.F are very uncertain, in our model these assumptions imply that cigarette companies reduce social welfare by billions of dollars each year. By contrast, the existing rating systems give fairly average scores to these cigarette companies, comparable to a typical restaurant chain or toothpaste maker. In January 2022, Just Capital changed its ratings to require that cigarette companies rate in the bottom quartile of companies (Just Capital 2022, page 52). This keeps their ratings closer to ours, but via an *ad hoc* judgment instead of an economic quantification of harms.

VIII Conclusion

The growing discussions of impact investing and stakeholder capitalism have generated interest in measuring companies' social impact, not just their profits. In this paper, we have laid out an economically grounded definition of corporate social impact and have quantified the social impact of 74 large companies in 12 industries across the U.S. economy. As we have described throughout the paper, there are many caveats and limitations related to the welfarist moral philosophy, our static partial equilibrium assumptions, and our empirical implementation. These limitations mean that there may be important factors of social impact that we have not measured and incorporated. Despite the many limitations, we hope that our work can be a useful step forward in developing a framework that flows in an internally consistent way from a welfarist moral value system to an empirical quantification.

A central takeaway from our analysis is that consumer surplus is the primary driver of corporate social impact. This suggests that impact investors should consider devoting more attention to firms that deliver more consumer surplus, especially for low-income people. This also connects to the long discussion, dating at least to Friedman (1970), of what firms should try to maximize. Our estimates suggest that the key to social impact is to do what many firms are already trying to do as they maximize profits: make more differentiated products that more consumers want to buy.

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Table 1: **Survey Demographics and Descriptive Statistics**

(a) **Demographics of Unweighted and Weighted Samples**

	(1) Unweighted sample	(2) Weighted sample	(3) U.S. adults
Male	0.40	0.49	0.49
White	0.80	0.73	0.72
College	0.51	0.43	0.42
Age over 45	0.54	0.54	0.54
Income 0 to $39,999	0.42	0.31	0.31
Income $40,000 to $59,999	0.18	0.16	0.15
Income $60,000 to $99,999	0.24	0.23	0.23
Income $100,000 or more	0.16	0.30	0.31

(b) **Descriptive Statistics**

	Mean	Std. dev.	Minimum	Maximum
Customer satisfaction	8.51	1.72	1	10
Price response	0.63	0.48	0	1
Aggregate price response	0.57	0.39	0	1
Worker satisfaction	7.37	2.33	1	10
Worker price response	0.55	0.50	0	1

Notes: In Panel (a), Column 1 presents mean demographics from our survey respondents, column 2 presents the weighted mean demographics from our survey respondents, and column 3 presents average demographics of American adults using data from the 2019 American Community Survey. The sample weights are initially calculated to weight the survey respondents to be nationally representative, normalized to have a mean of 1, and then winsorized at $[1/3, 3]$ to reduce precision loss. Statistics in Panel (b) are sample-weighted.

Table 2: **Product Market Parameter Estimates by Firm**

Industry	Firm	ζ	(1) σ	(2) δ ($:= \xi + \gamma$)	(3) Marginal cost
Airline	Alaska	4.77	5	-6.36	0.71
	Allegiant	2.6	10.34	-21.64	0.69
	American	4.15	1.38	0.31	0.74
	Delta	4.16	2.43	-0.37	0.72
	Frontier	3.58	0	-1.86	0.79
	JetBlue	3.13	7.63	-9.58	0.68
	Southwest	4.46	2.07	-0.72	0.73
	Spirit	3.13	1.9	-2.69	0.77
	United	3.42	1.46	0.4	0.74
	Other	0.68	3.58	-4.3	1
Auto	BMW	2.72	9.85	-17.45	0.7
	Fiat Chrysler	-1.49	1.5	2.79	0.76
	Ford	-1.47	2.84	1.97	0.74
	GM	-1.81	2.48	2.73	0.74
	Honda	0.92	3.79	-1.95	0.74
	Hyundai	-3.08	0	2.24	0.8
	Kia	-6.48	1.86	1.1	0.78
	Mazda	-0.67	1.96	-1.2	0.8
	Mercedes	0.1	3.8	-3.28	0.74
	Nissan	-2.47	1.37	2.47	0.78
	Subaru	0.53	2.22	-1.3	0.78
	Toyota	-1.06	2.54	1.47	0.75
	Volkswagen	-0.13	4.66	-4.04	0.73
	Other	-1.48	2.99	-0.4	1
Beer	Anheuser-Busch	0.72	0	1.17	0.49
	Molson Coors	0.45	1.29	1.28	0.47
	Sazerac	5.46	2.54	-8.84	0.52
	Other	42.22	1.28	-41.86	1
Cereal	General Mills	-19.22	44.14	35.84	0.97
	Kellogg	-15.56	0	56.72	0.97
	Post	31.13	150.87	-287.39	0.97
	Quaker	45.24	150	-309.77	0.97
	Other	73.03	86.25	-155.18	1
Cigarette	Philip Morris	-1.53	0	3.91	0.62
	Reynolds	-1.75	1.95	2.8	0.64
	Other	-22.8	0.97	2.17	1
Grocery	ALDI	0.59	6.38	-10.51	0.5
	Ahold	-1.22	3.33	-2.95	0.58
	Albertsons	0.3	1.49	-0.76	0.62
	Amazon	0.63	2.81	-3.39	0.59
	Costco	0.22	3.24	-2.16	0.56
	Kroger	0	2.32	-0.58	0.58
	Meijer	1.75	3.56	-8.01	0.59
	Publix	2.89	5.74	-9.74	0.52
	Wakefern	0.13	4.81	-7.07	0.53
	Walmart	-0.31	0	1.95	0.57
	Other	-0.3	3.37	-0.67	1
Smartphone	Apple	0.63	0	1.4	0.4
	Google	-0.54	3.69	-5.1	0.44
	LG	-0.72	0.69	-0.35	0.53
	Lenovo	0.71	0.13	-4.45	0.56
	Samsung	0.29	1.39	0.44	0.45
	Other	-0.39	1.18	-4.67	1
Restaurant	Burger King	-0.11	1.94	-1.33	0.54
	Chick-fil-A	1.48	3.25	-4.53	0.49
	Chipotle	0.78	5.01	-8.61	0.48
	Domino's	-0.18	1.95	-2.09	0.56
	Inspire Brands	-0.05	1.43	-0.59	0.56
	JAB	1.87	5.28	-9.52	0.44
	McDonald's	0.03	0.79	0.82	0.54
	Starbucks	0.63	0.62	-0.1	0.57
	Subway	0.42	2.01	-1.81	0.54
	Wendy's	0.45	0	-0.76	0.6
	Yum! Brands	-0.46	1.99	-0.6	0.53
	Other	1.57	2.21	-4.32	1
Soda	Coca-Cola	0.06	0.85	0.58	0.43
	Dr Pepper 7 Up	-0.16	0	1.08	0.43
	Pepsi	0.07	1.04	0.44	0.42
	Other	-0.46	0.63	-0.84	1
Toothpaste	Church & Dwight	-1.34	2.04	0.38	0.47
	Colgate	-1.08	1.48	1.32	0.46
	Glaxo	-0.57	3.71	-1.41	0.42
	Procter & Gamble	-0.68	0	1.33	0.49
	Other	-0.03	1.81	-3.09	1
Yogurt	Chobani	3.84	0.59	-3.11	0.51
	Danone	0.95	0.35	0.41	0.5
	Yoplait	0.64	0	0.71	0.49
	Other	0.98	0.31	0.54	1

Notes: This table presents the demand parameter estimates for each firm in the differentiated product industries in our sample.

Table 3: **Industry-Level Product Market Parameter Estimates**

Industry	(1) η	(2) σ_n
Airline	4.92	6.3
Auto	5.19	8
Beer	2.51	3.69
Cereal	58.41	85.62
Cigarette	3.75	4.57
Grocery	3.01	6.73
Restaurant	2.54	2.66
Smartphone	2.26	4.59
Soda	2.06	2.46
Toothpaste	2.46	8.81
Yogurt	2.24	3.04

Notes: This table presents the industry-level parameter estimates for each differentiated product industry in our sample.

Table 4: **Average Externality and Internality per Dollar of Sales by Industry**

Industry	(1) Production externality ($/$ sales)	(2) Consumption externality ($/$ sales)	(3) Internality ($/$ sales)
Airline	0.18	0	0
Auto	0.04	0.03	0
Beer	0.06	0.61	0
Cereal	0.06	0	0
Cigarette	0.06	0.12	2.77
Grocery	0.04	0	0
Oil	0.08	1.26	0
Restaurant	0.04	0	0
Smartphone	0.01	0	0
Soda	0.06	0.19	0.21
Toothpaste	0.04	0	0
Yogurt	0.06	0	0

Notes: This table presents the averages across firms of externalities and internalities per dollar of sales, by industry. The production externality in column 1 is the social cost of the CO_2 emissions from producing the good or service. The consumption externality in column 2 is the negative externality imposed when a consumer consumes the product.

Table 5: **Predictors of Worker Response to a 10 Percent Salary Reduction**

	(1)	(2)	(3)
Constant	0.613***	0.597***	0.448***
	(0.023)	(0.033)	(0.079)
Total compensation ($10,000)	−0.013***	−0.012***	−0.014***
	(0.002)	(0.002)	(0.002)
College degree	−0.064**	−0.064**	−0.078**
	(0.030)	(0.032)	(0.032)
Occupation: service		0.067	0.077
		(0.050)	(0.050)
Occupation: sales and office		0.028	0.030
		(0.035)	(0.035)
Occupation: natural resources, construction, maintenance		−0.071	−0.036
		(0.051)	(0.053)
Occupation: production, transportation, material moving		0.014	0.017
		(0.053)	(0.054)
ln(firm's total employees in county)			0.025***
			(0.006)
ln(labor market size)			0.007
			(0.008)
Observations	1,302	1,302	1,302
R^2	0.048	0.052	0.064

Notes: This table provides estimates of equation (27), a regression of *worker price response* (whether respondents would leave their job if their primary employer had to permanently cut salaries by 10 percent) on individual, employer, and labor market covariates. The omitted occupation category is management, business, science, and arts. *Labor market size* is the number of workers in the 2010–2019 American Community Surveys (ACS) who worked in the same county and occupation. Standard errors are in parentheses. *, **, ***: statistically significant with 10%, 5%, and 1% confidence, respectively.

Table 6: **Weighted Individual Corporate Social Impact: Top and Bottom 10 Firms**

(a) **Corporate Social Impact (billion $/year)**

Rank	Firm	Industry	Impact	Rank	Firm	Industry	Impact
1	Walmart	Grocery	150.46	65	Church & Dwight	Toothpaste	0.46
2	Kroger	Grocery	60.31	66	Glaxo	Toothpaste	0.42
3	GM	Auto	40.62	67	Chobani	Yogurt	0.38
4	Costco	Grocery	39.01	68	Post	Cereal	0.34
5	Apple	Smartphone	35.08	69	Lenovo	Smartphone	0.09
6	Ford	Auto	29.41	70	Quaker	Cereal	0.09
7	Ahold	Grocery	28.72	71	Frontier	Airline	-0.38
8	Molson Coors	Beer	28.13	72	Spirit	Airline	-0.62
9	Albertsons	Grocery	27.54	73	Reynolds	Cigarette	-13.72
10	ALDI	Grocery	26.76	74	Philip Morris	Cigarette	-16.78

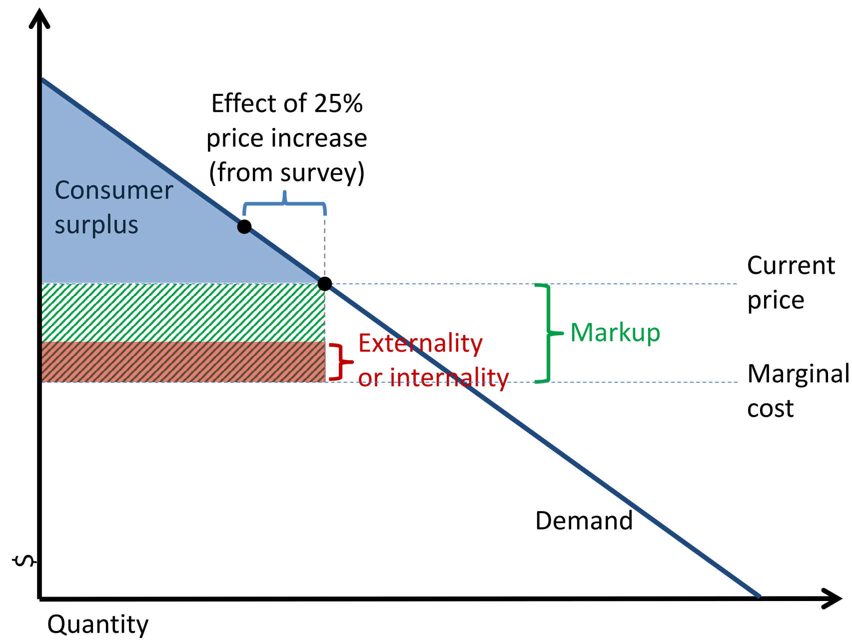
(b) **Corporate Social Impact/Revenue**

Rank	Firm	Industry	Impact/revenue	Rank	Firm	Industry	Impact/revenue
1	Conoco	Oil	1.51	65	Honda	Auto	0.25
2	Eni	Oil	1.51	66	Sazerac	Beer	0.23
3	Total	Oil	1.51	67	Alaska	Airline	0.22
4	Shell	Oil	1.51	68	Mazda	Auto	0.19
5	Chevron	Oil	1.5	69	Southwest	Airline	0.18
6	BP	Oil	1.5	70	Subaru	Auto	0.16
7	Exxon	Oil	1.5	71	Frontier	Airline	-0.23
8	ALDI	Grocery	0.97	72	Spirit	Airline	-0.25
9	Google	Smartphone	0.83	73	Philip Morris	Cigarette	-0.36
10	Glaxo	Toothpaste	0.8	74	Reynolds	Cigarette	-0.5

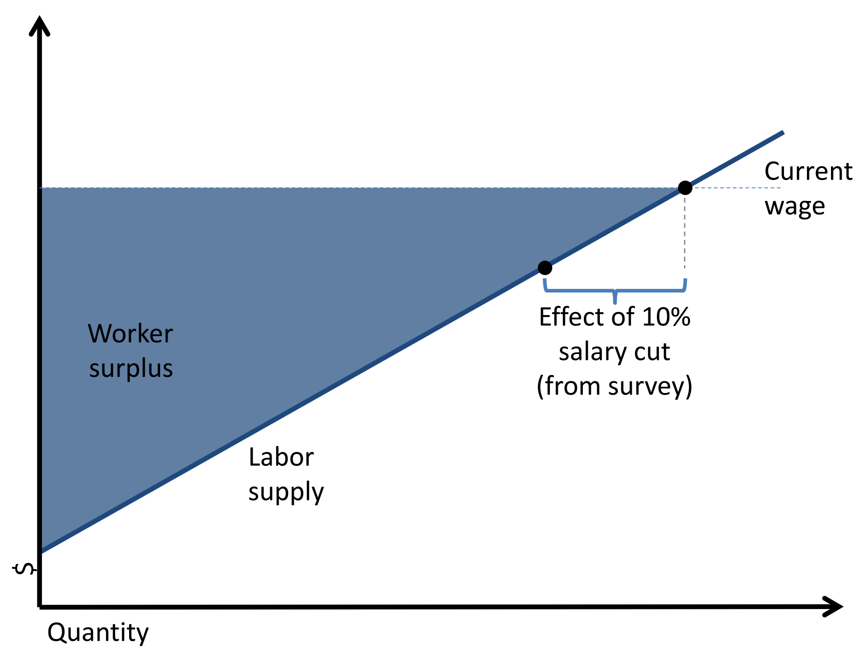
Notes: Panel (a) presents the top and bottom 10 firms for weighted individual corporate social impact. Panel (b) presents the top and bottom 10 firms for weighted individual corporate social impact per dollar of revenue.

Figure 1: **Stylized Illustration of Corporate Social Impact Estimation**

(a) **Consumer Surplus**

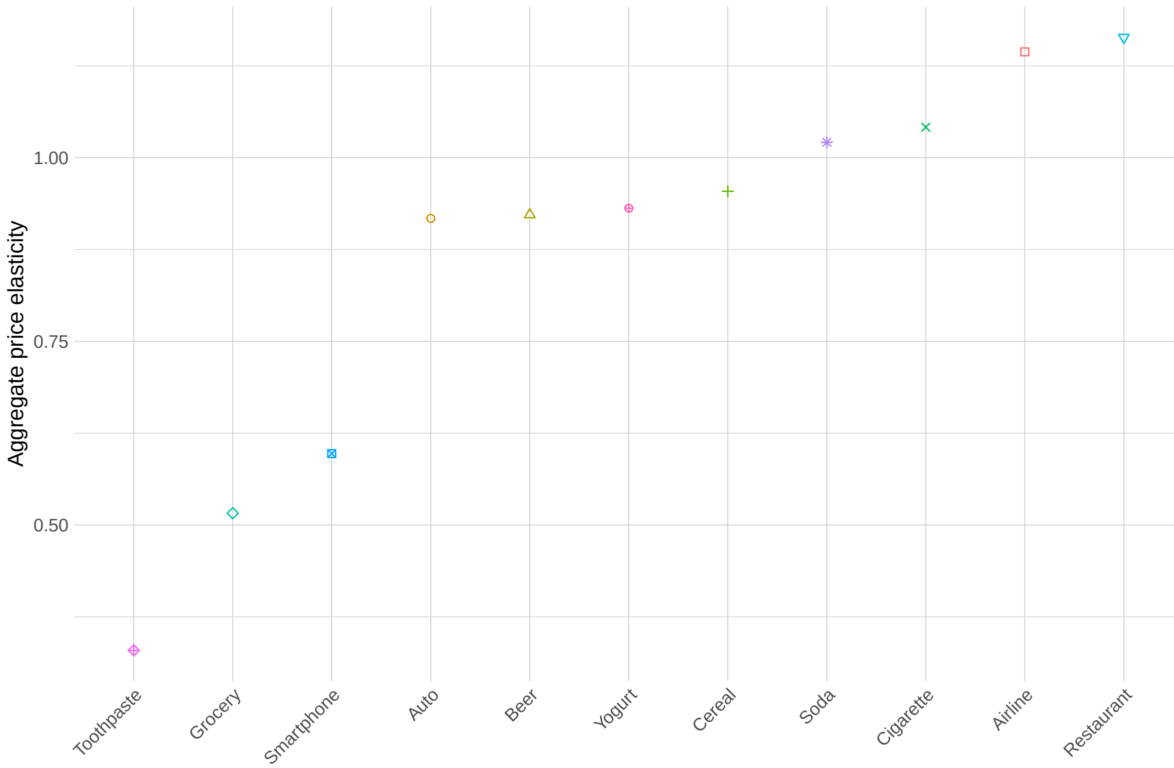


(b) **Worker Surplus**



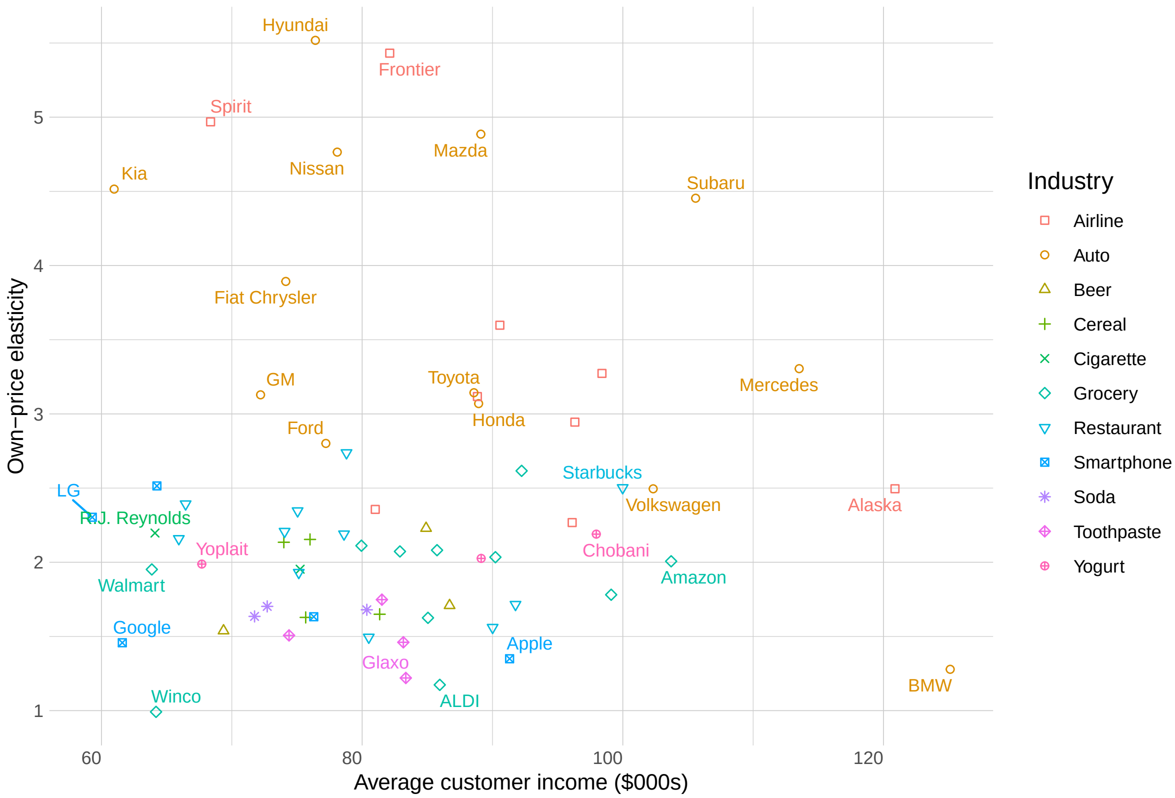
Notes: This figure illustrates our strategy for estimating corporate social impact. Panel (a) presents the firm's demand curve and the reductions in consumer surplus, profit, and externalities if the firm exits and other firms do not respond in equilibrium. In our actual estimates, we allow competing firms to respond to exit by adjusting prices. Panel (b) presents the firm's labor supply curve and the reductions in worker suplus if the firm exits. In our actual estimates, we assume each firm is a small share of the labor market, so other firms' wages do not change. We estimate the slopes of each firm's product demand and labor supply using survey questions.

Figure 2: **Aggregate Price Elasticity by Industry**



Notes: This figure presents the aggregate price elasticity for each of the differentiated product industries in our sample. Aggregate price elasticity is calculated from responses to the *aggregate price response* survey question: (-1)×ln(share who would still buy if the price of all products doubled) / ln(2).

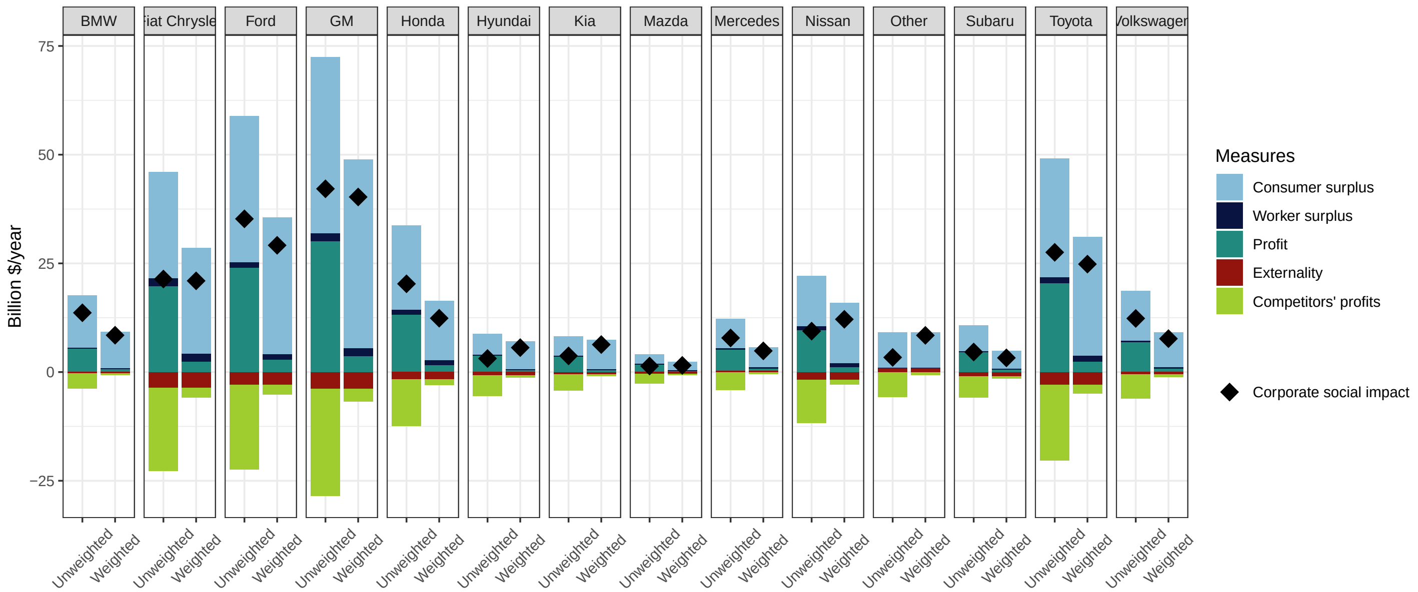
Figure 3: **Average Customer Income and Price Response by Firm**



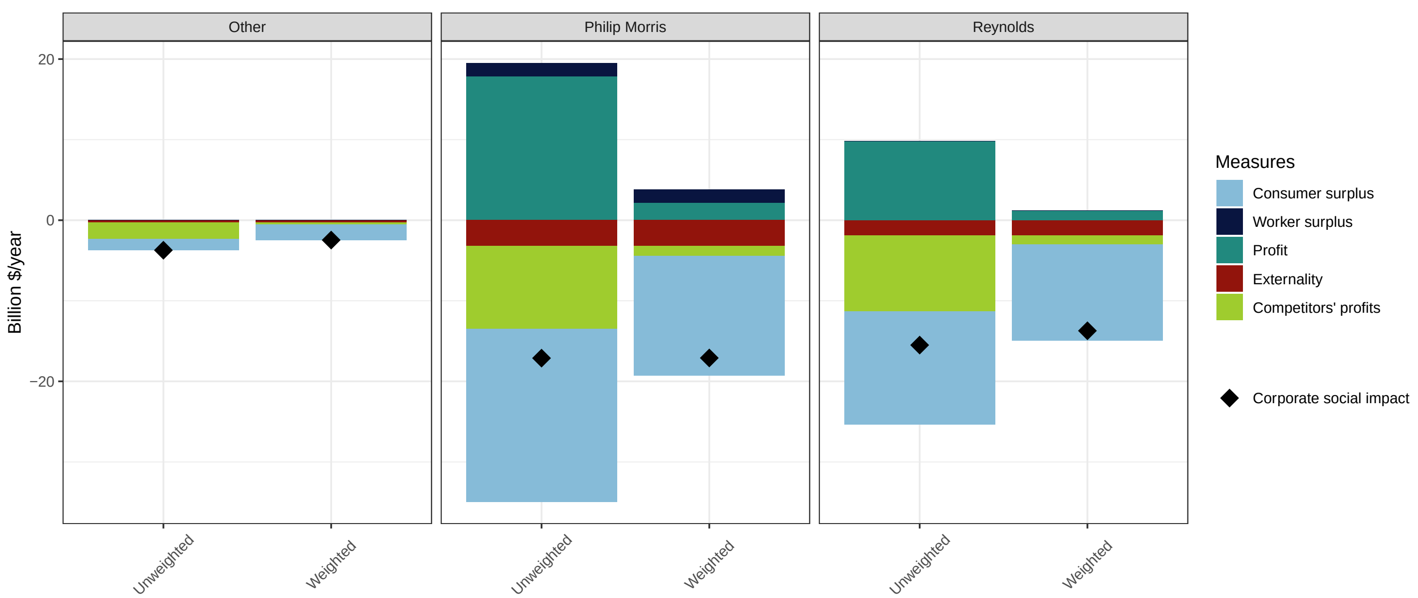
Notes: This figure presents average customer income against own-price elasticity for each firm in the differentiated product industries in our sample. Own-price elasticity is calculated from responses to the *price response* survey question: (-1)×ln(share who would still buy from the firm after a 25 percent price increase) / ln(1.25).

Figure 4: **Components of Social Impact by Firm**

(a) **Automobile Industry**

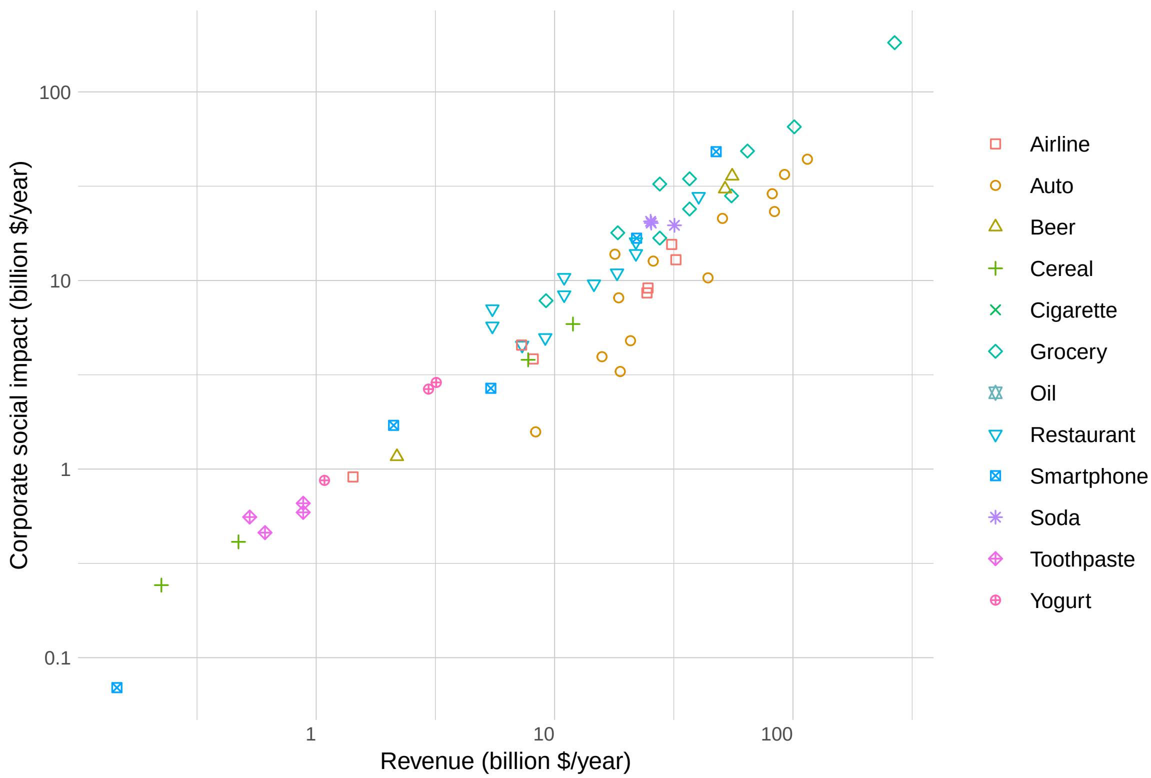


(b) **Cigarette Industry**



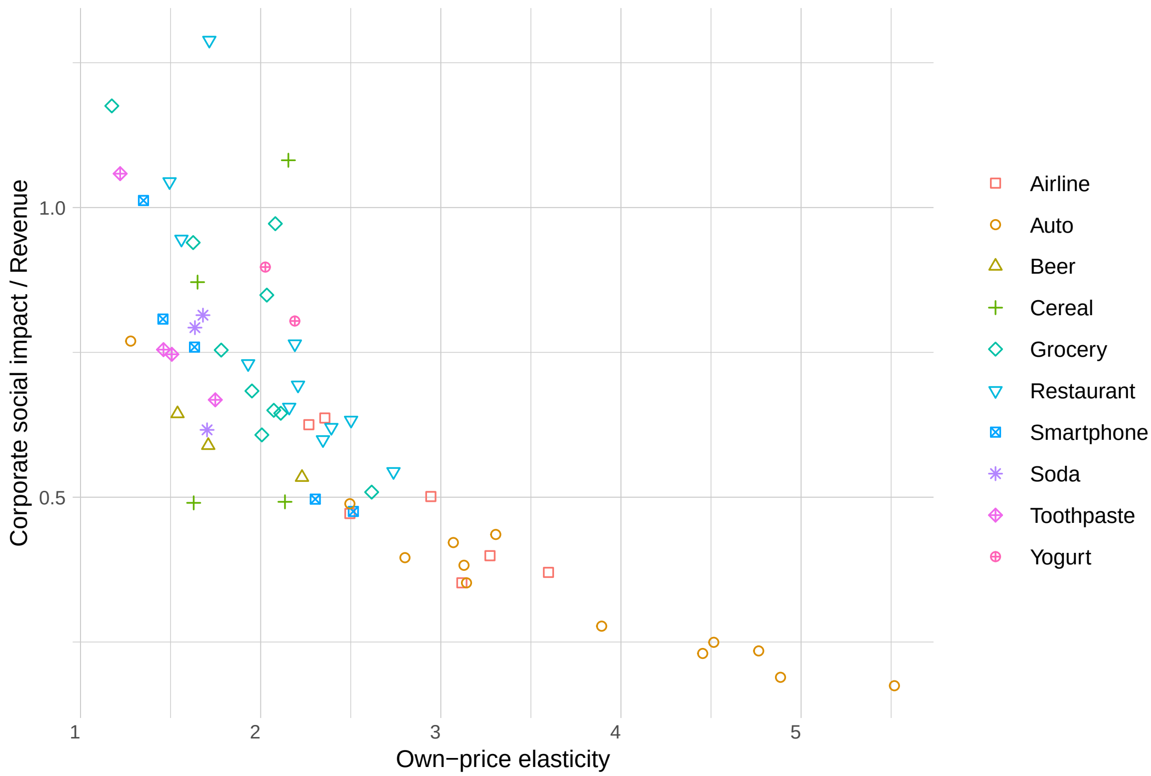
Notes: Panels (a) and (b) present the components of individual impact by firm in the automobile and cigarette industries. The first bar in each pair presents the firm's individual impact with equal social marginal welfare weights across income groups ($\rho = 0$). The second bar presents the firm's individual impact with a curvature of $\rho = 1$ on social marginal welfare weights, which approximately corresponds to log utility.

Figure 5: **Unweighted Corporate Social Impact versus Revenue**



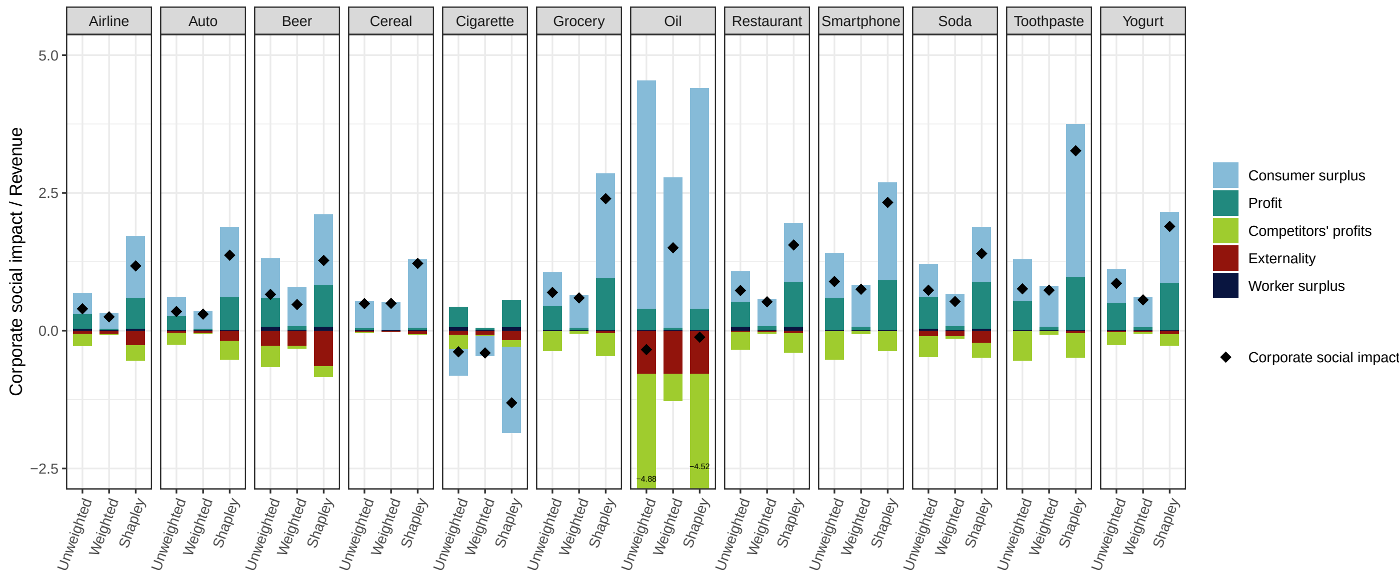
Notes: This figure presents unweighted individual impact against revenue for each firm in our sample. This figure excludes firms with negative corporate social impact.

Figure 6: **Unweighted Corporate Social Impact per Dollar of Revenue versus Own-Price Elasticity**



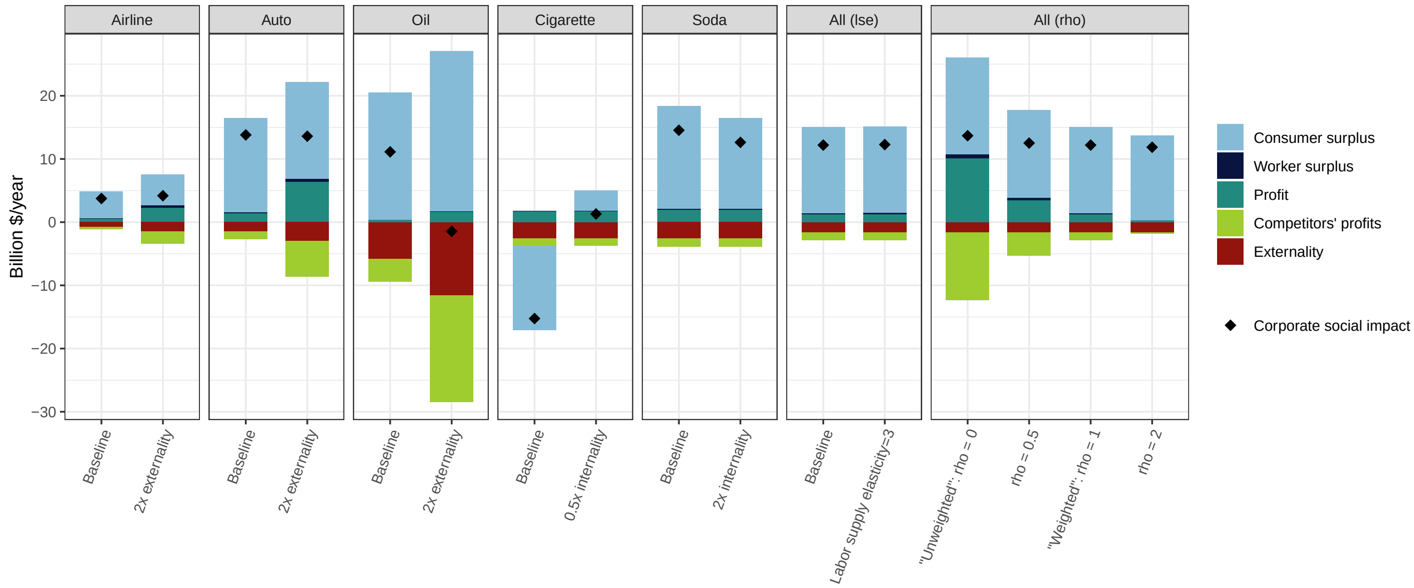
Notes: This figure presents unweighted individual impact per dollar of revenue against own-price elasticity for each firm in the differentiated product industries in our sample. Own-price elasticity is calculated from responses to the *price response* survey question: (-1)×ln(share who would still buy from the firm after a 25 percent price increase) / ln(1.25). This figure excludes firms with negative corporate social impact.

Figure 7: **Corporate Social Impact per Dollar of Revenue by Industry**



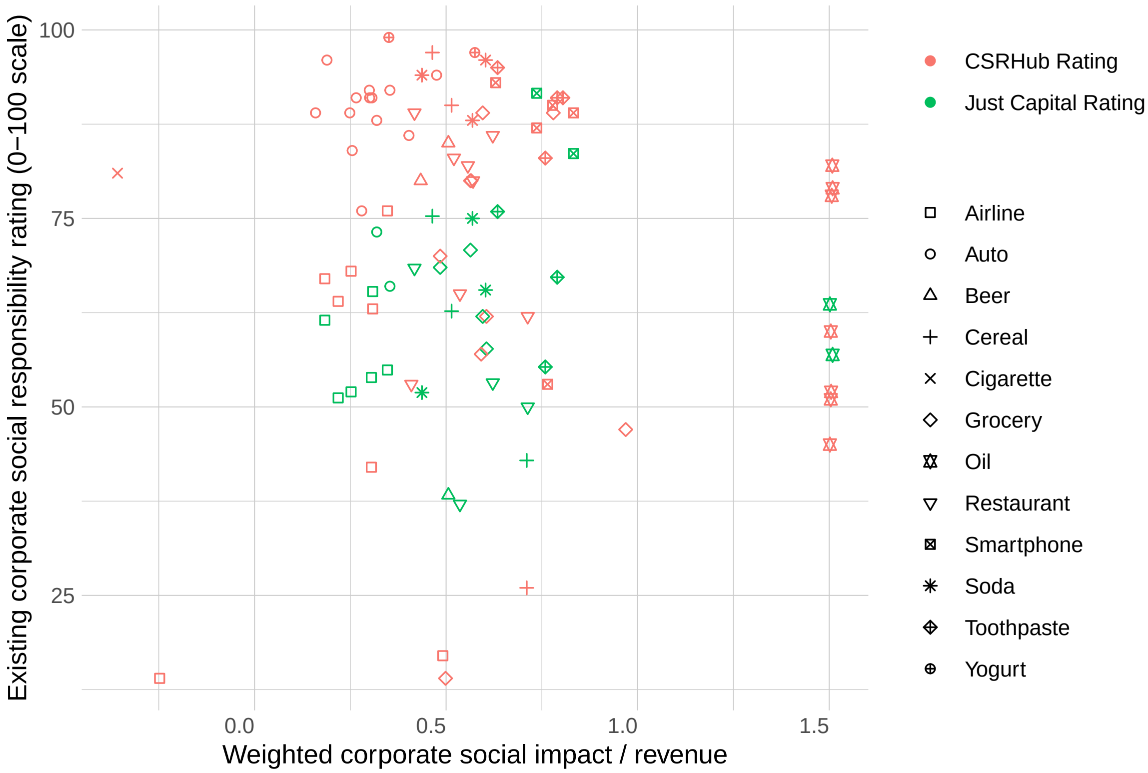
Notes: This figure presents the components of corporate social impact per dollar of revenue, by industry. We sum each component across firms within an industry and divide by the sum of revenues within the industry. The first bar in each group presents components of individual impact, with equal social marginal welfare weights across income groups ($\rho = 0$). The second bar presents components of weighted individual impact, with a curvature of $\rho = 1$ on social marginal welfare weights). The third bar presents components of total industry impact, with equal social marginal welfare weights ($\rho = 0$).

Figure 8: **Weighted Corporate Social Impact Under Alternative Assumptions**



Notes: This figure presents the components of weighted individual impact for the average firm in the industries listed at the top of each panel, under the alternative assumptions listed under each panel.

Figure 9: **Weighted Corporate Social Impact versus ESG Metrics**



Notes: This figure presents our estimate of weighted individual impact per dollar of revenue against ESG ratings from CSRHub (2023) and Just Capital (2023), for all firms in our sample for which data are available.

Internet Appendix

An Economic View of Corporate Social Impact

Hunt Allcott, Giovanni Montanari, Bora Ozaltun, and Brandon Tan

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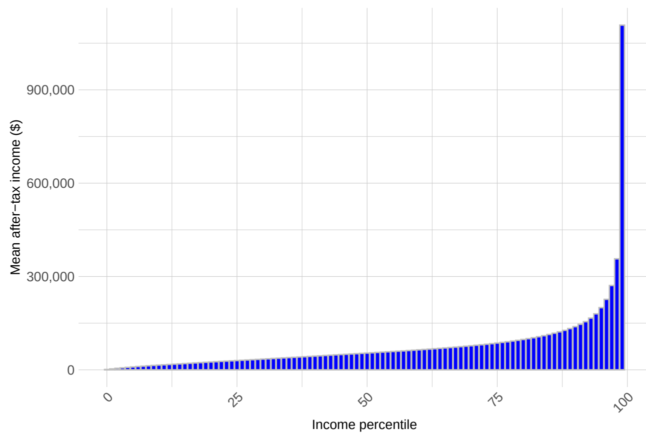
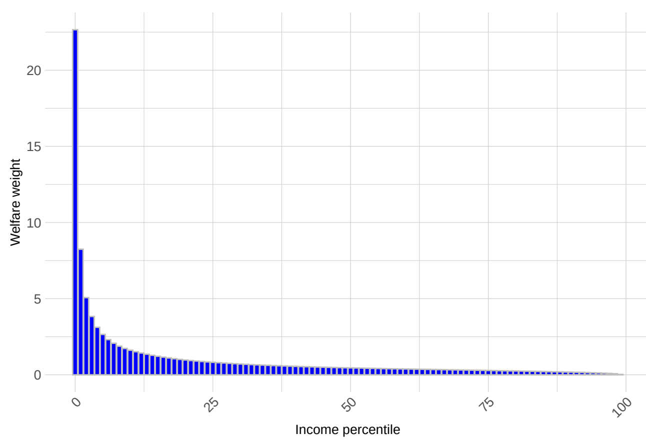
A Welfare Weights

Figure A1: **After-Tax Income and Welfare Weights by Income Percentile**

(a) **Mean Income After Tax and Transfers by Percentile**



(b) **Welfare Weight by Income Percentile**



Notes: Panel (a) presents the mean income after taxes and government transfers by percentile, using the *poinc* variable from the Distributional National Accounts data (Piketty, Saez, and Zucman 2020). Panel (b) presents the resulting social marginal welfare weight by percentile, assuming that welfare weights are proportional to the inverse of income after taxes and government transfers.

B Descriptive Results Appendix

B.A Product Market Statistics by Firm and Industry

Table A1: **Product Market Statistics by Firm**

Industry	Firm	(1) Market share	(2) Share of purchases by consumers with income < $60,000	(3) Share of purchases retained after 25% price increase	(4) Own-price elasticity
Airline	Alaska	0.03	0.24	0.57	2.5
	Allegiant	0.01	0.4	0.59	2.36
	American	0.12	0.28	0.48	3.27
	Delta	0.11	0.31	0.52	2.94
	Frontier	0.01	0.42	0.3	5.43
	JetBlue	0.03	0.3	0.6	2.27
	Southwest	0.09	0.36	0.5	3.12
	Spirit	0.01	0.51	0.33	4.97
	United	0.09	0.38	0.45	3.6
	Other	0.01	0.48		
Auto	BMW	0.01	0.2	0.75	1.28
	Fiat Chrysler	0.07	0.44	0.42	3.89
	Ford	0.07	0.45	0.54	2.8
	GM	0.09	0.5	0.5	3.13
	Honda	0.04	0.37	0.5	3.07
	Hyundai	0.02	0.42	0.29	5.52
	Kia	0.01	0.59	0.37	4.52
	Mazda	0.01	0.32	0.34	4.89
	Mercedes	0.01	0.26	0.48	3.31
	Nissan	0.04	0.48	0.35	4.76
	Subaru	0.02	0.34	0.37	4.45
	Toyota	0.07	0.37	0.5	3.14
	Volkswagen	0.02	0.27	0.57	2.5
	Other	0.02	0.55		
Beer	Anheuser-Busch	0.22	0.43	0.68	1.71
	Molson Coors	0.23	0.55	0.71	1.54
	Sazerac	0.01	0.4	0.61	2.23
	Other	0.04	0.35		
Cereal	General Mills	0.18	0.48	0.7	1.63
	Kellogg	0.28	0.49	0.62	2.13
	Post	0.01	0.41	0.69	1.65
	Quaker	0.01	0.4	0.62	2.15
	Other	0.02	0.44		
Cigarette	Philip Morris	0.3	0.52	0.65	1.95
	Reynolds	0.17	0.57	0.61	2.2
	Other	0.03	0.74		
Grocery	ALDI	0.02	0.41	0.77	1.17
	Ahold	0.02	0.46	0.63	2.07
	Albertsons	0.03	0.36	0.56	2.62
	Amazon	0.02	0.36	0.64	2.01
	Costco	0.04	0.3	0.67	1.78
	Kroger	0.06	0.43	0.62	2.11
	Meijer	0.01	0.36	0.64	2.03
	Publix	0.02	0.42	0.7	1.63
	Wakefern	0.01	0.45	0.63	2.08
	Walmart	0.17	0.56	0.65	1.95
	Other	0.09	0.48		
Smartphone	Apple	0.31	0.35	0.74	1.35
	Google	0.01	0.58	0.72	1.46
	LG	0.03	0.67	0.6	2.3
	Lenovo	0	0.54	0.57	2.51
	Samsung	0.14	0.47	0.69	1.63
	Other	0	0.71		
Restaurant	Burger King	0.04	0.52	0.62	2.16
	Chick-fil-A	0.03	0.38	0.71	1.56
	Chipotle	0.02	0.41	0.72	1.49
	Domino's	0.02	0.54	0.59	2.39
	Inspire Brands	0.05	0.5	0.59	2.35
	JAB	0.02	0.31	0.68	1.72
	McDonald's	0.12	0.51	0.61	2.21
	Starbucks	0.06	0.31	0.57	2.5
	Subway	0.03	0.44	0.61	2.19
	Wendy's	0.03	0.41	0.54	2.74
	Yum! Brands	0.06	0.51	0.65	1.93
	Other	0.01	0.43		
Soda	Coca-Cola	0.14	0.46	0.69	1.68
	Dr Pepper 7 Up	0.18	0.48	0.68	1.7
	Pepsi	0.15	0.49	0.69	1.64
	Other	0.03	0.53		
Toothpaste	Church & Dwight	0.1	0.41	0.72	1.46
	Colgate	0.15	0.49	0.71	1.51
	Glaxo	0.09	0.42	0.76	1.22
	Procter & Gamble	0.15	0.44	0.68	1.75
	Other	0.01	0.47		
Yogurt	Chobani	0.05	0.31	0.61	2.19
	Danone	0.14	0.37	0.64	2.03
	Yoplait	0.15	0.53	0.64	1.99
	Other	0.16	0.45		

Notes: This table presents the statistics used for demand estimation for each firm in the differentiated product industries in our sample. Own-price elasticity is calculated from responses to the *price response* survey question: (-1)×ln(share who would still buy from the firm after a 25 percent price increase) / ln(1.25).

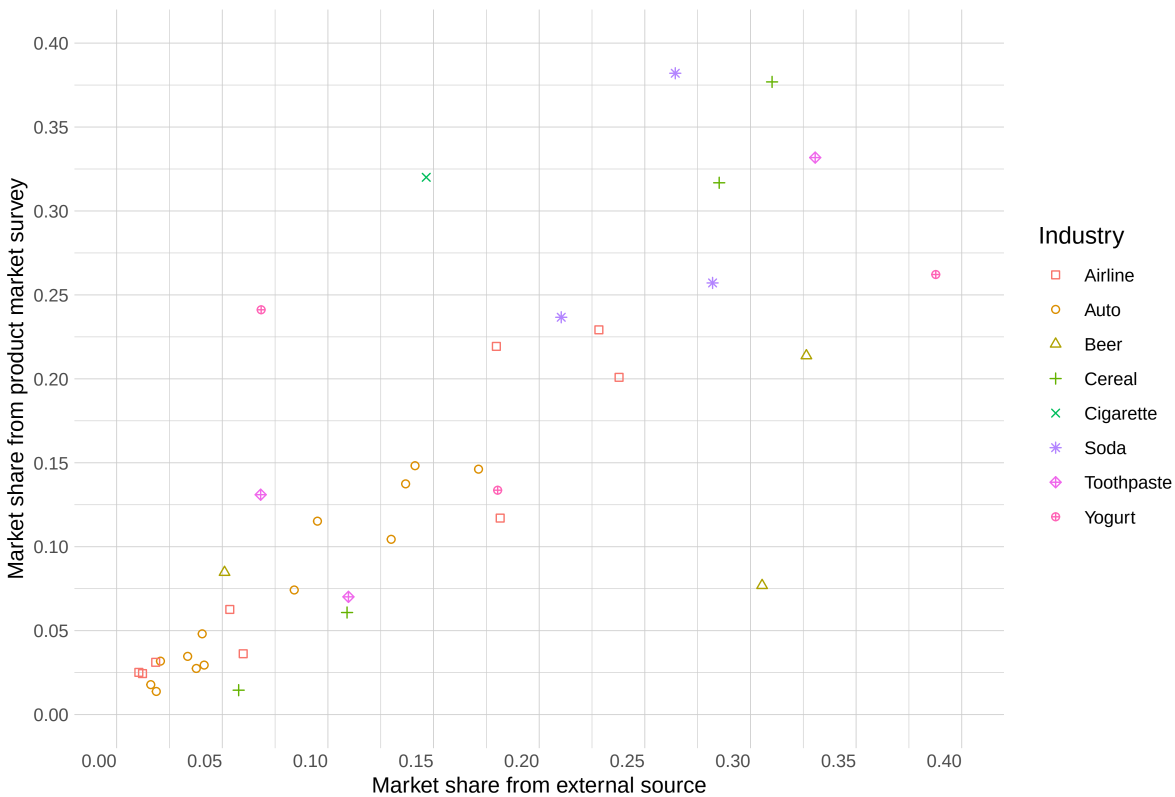
Table A2: **Industry-Level Product Market Statistics**

Industry	Aggregate price elasticity
Toothpaste	0.33
Grocery	0.52
Smartphone	0.60
Auto	0.92
Beer	0.92
Yogurt	0.93
Cereal	0.95
Soda	1.02
Cigarette	1.04
Airline	1.14
Restaurant	1.16

Notes: This table presents the industry-level aggregate price elasticity for each differentiated product industry in our sample. Aggregate price elasticity is calculated from responses to the *aggregate price response* survey question: (-1)×ln(share who would still buy if the price of all products doubled) / ln(2).

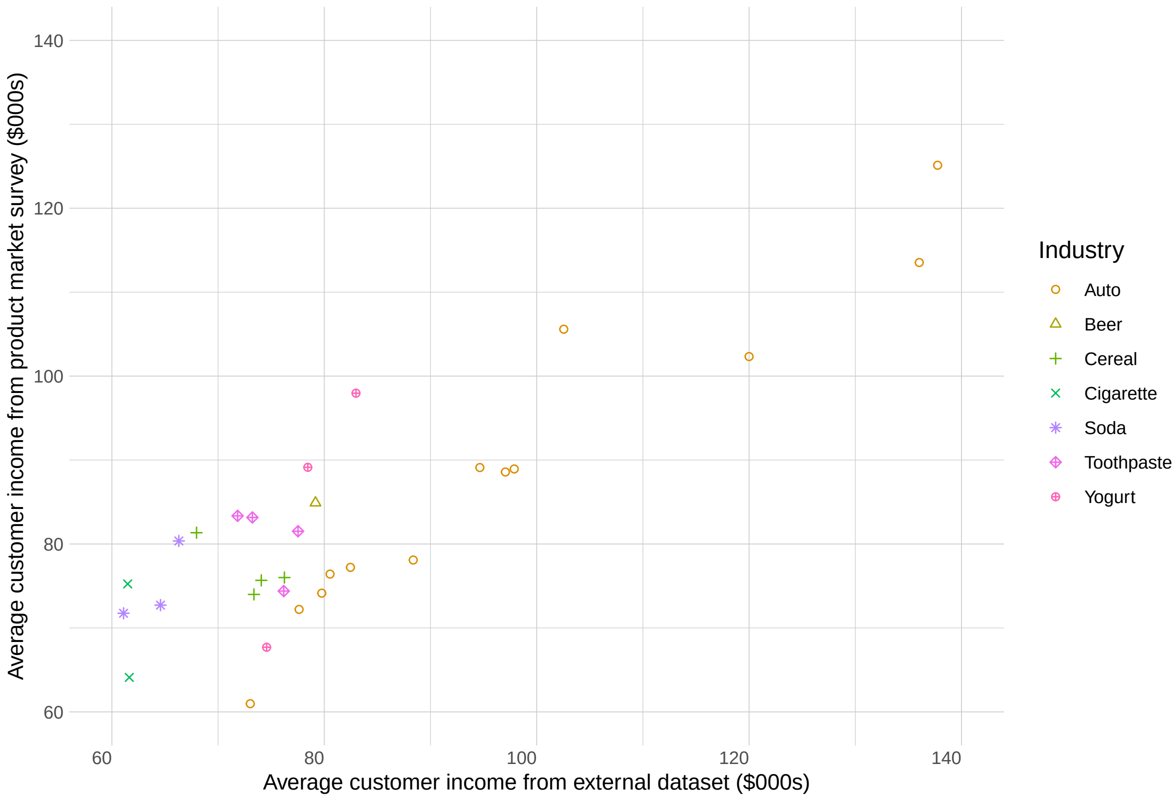
B.B Survey Validation

Figure A2: **Survey vs. External Market Shares**



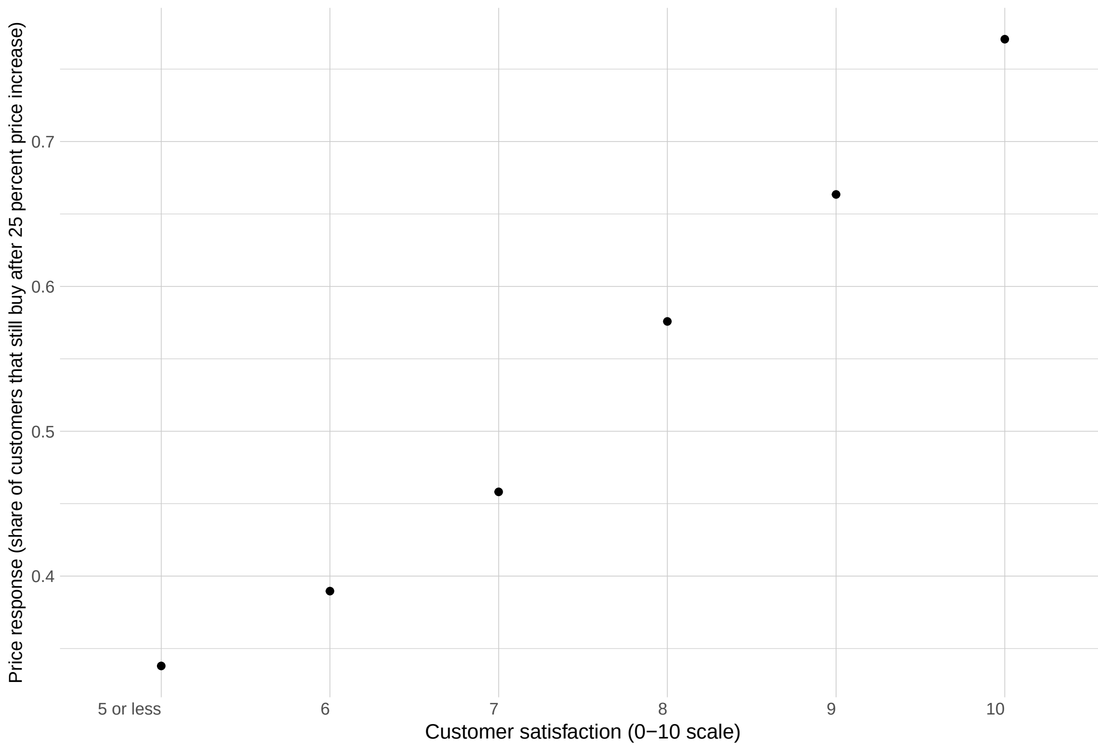
Notes: This figure presents market share from our survey against market share from an external source for firms in eight differentiated product industries in our sample. The external sources are the DB1B dataset (for airlines), Wards (for autos), and NielsenIQ (for beer, cereal, cigarettes, soda, toothpaste, and yogurt).

Figure A3: **Survey vs. External Customer Income**



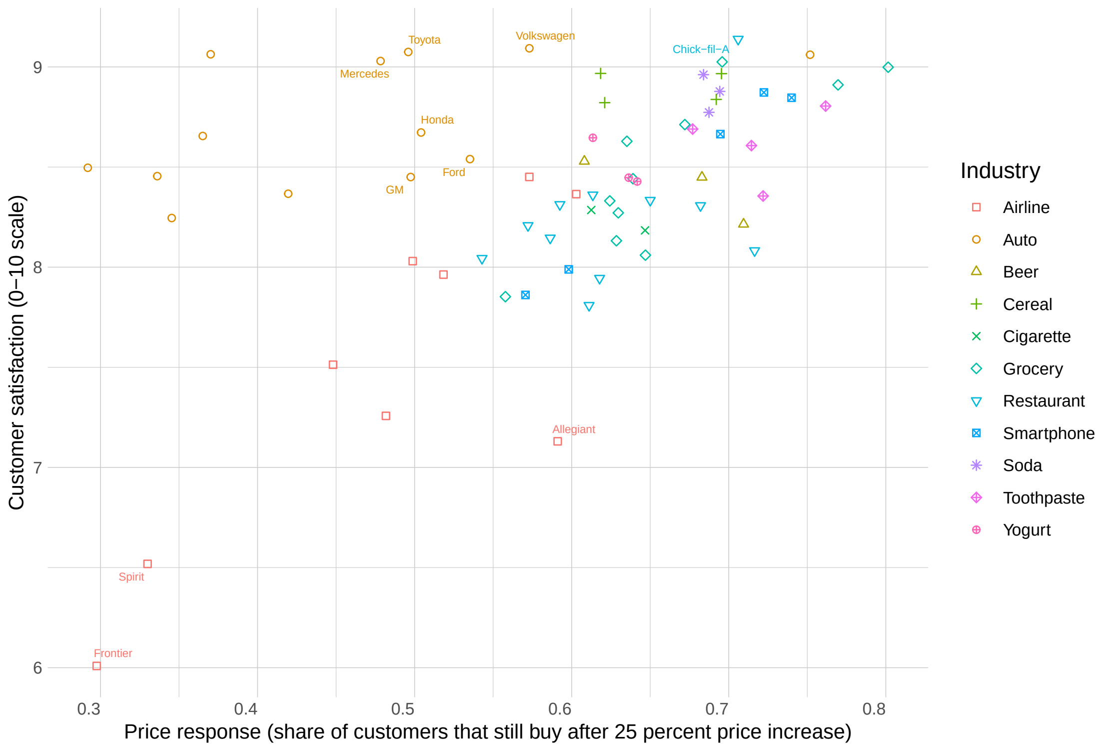
Notes: This figure presents average customer income from our survey against average income from an external source for firms in eight differentiated product industries in our sample. The external sources are the National Household Travel Survey (for autos) and NielsenIQ (for beer, cereal, cigarettes, soda, toothpaste, and yogurt).

Figure A4: **Customer Satisfaction and Price Response**



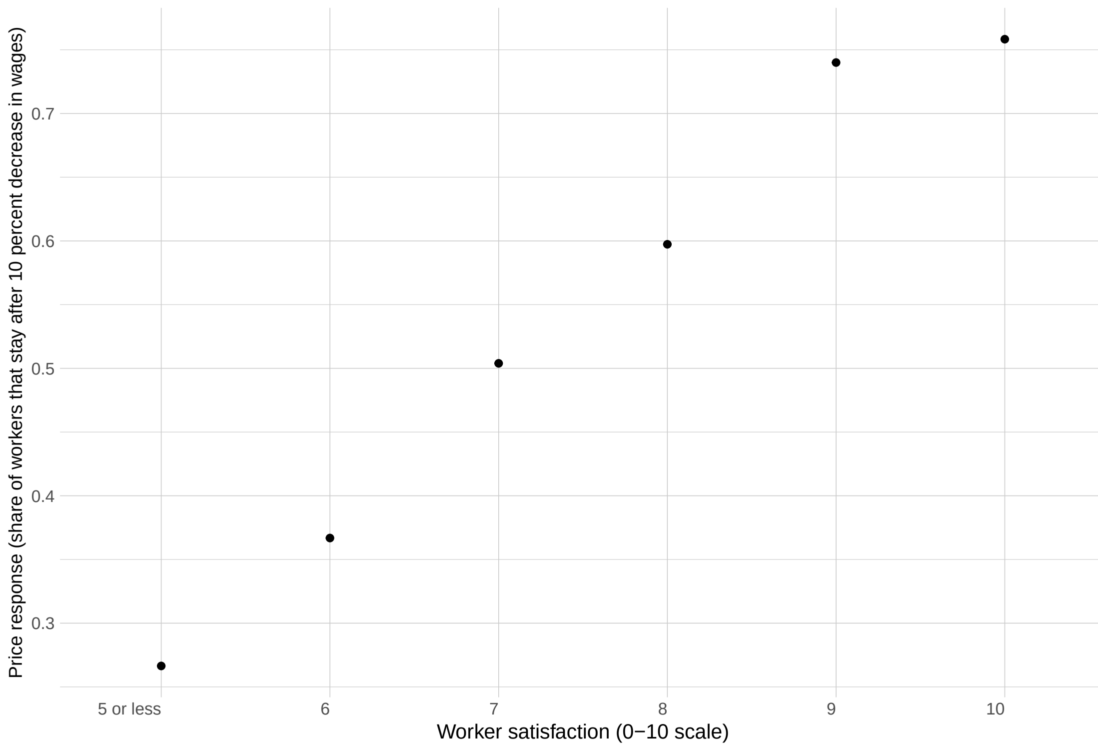
Notes: This figure presents the average *price response* (the share of customers that still buy from the same firm after a 25 percent price increase) for each value of *customer satisfaction*, using all responses in our survey.

Figure A5: **Customer Satisfaction and Price Response by Firm**



Notes: This figure presents *price response* (the share of customers that still buy from the same firm after a 25 percent price increase) vs. *customer satisfaction*, for all firms in our survey.

Figure A6: **Worker Satisfaction and Worker Price Response**



Notes: This figure presents the average *worker price response* (the share of workers that would stay at their current employer after a 10 percent salary decrease) for each value of *worker satisfaction*, using all responses in our survey.

C Product Market Estimation Appendix

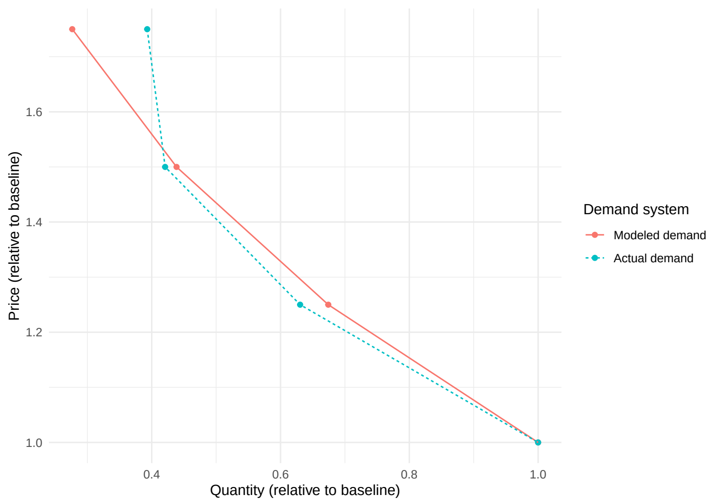
C.A Differentiated Product Markets

Table A3: **Unweighted Corporate Social Impact by Outside Good Share (billion $/year)**

Industry	Firm	(1) 40%	(2) 50%	(3) 75%
Airline	Alaska	3.45	3.84	4.4
	Allegiant	0.65	0.91	0.74
	American	12.07	12.88	13.23
	Delta	13.61	15.53	13.76
	Frontier	-0.33	-0.34	0.22
	JetBlue	3.77	4.55	4.63
	Southwest	8.01	8.6	10.11
	Spirit	-0.52	-0.5	0.39
	United	8.27	9.13	9.24
Auto	BMW	10.23	13.78	16.57
	Fiat Chrysler	23.13	23.2	25.3
	Ford	30.4	36.48	33.43
	GM	39.69	43.97	43.04
	Honda	23.8	21.34	25.1
	Hyundai	4.41	3.29	5.23
	Kia	5.37	3.94	5.37
	Mazda	2.04	1.58	2.37
	Mercedes	4.7	8.09	5.07
	Nissan	11.57	10.33	12.94
	Subaru	5.92	4.79	6.62
	Toyota	31.27	28.83	33.25
	Volkswagen	11.91	12.67	12.22
Beer	Anheuser-Busch	36.25	30.59	38.82
	Molson Coors	40.47	35.81	43.39
	Sazerac	1.54	1.17	1.69
Cereal	General Mills	4.24	3.8	4.63
	Kellogg	5.44	5.88	6.53
	Post	0.24	0.41	0.36
	Quaker	0.07	0.24	0.14
Cigarette	Philip Morris	-14.29	-15.46	-14.51
	Reynolds		-15.5	
Grocery	ALDI	32.53	32.46	37.01
	Ahold	23.27	23.94	23.33
	Albertsons	27.58	28.1	28.82
	Amazon	16.52	16.78	18.85
	Costco	46.32	48.59	48.26
	Kroger	63.94	65.31	65.43
	Meijer	7.64	7.81	7.04
	Publix	32.76	34.6	35.28
	Wakefern	17.35	17.9	16.82
	Walmart	176.72	182.44	187.17
Oil	BP	-2.97	-2.97	-2.97
	Chevron	-2.87	-2.87	-2.87
	Conoco	-1.41	-1.41	-1.41
	Eni	-1.82	-1.82	-1.82
	Exxon	-3.56	-3.56	-3.56
	Shell	-2.62	-2.62	-2.62
	Total	-2.36	-2.36	-2.36
Restaurant	Burger King	9.03	9.58	9.19
	Chick-fil-A	9.68	10.37	9.82
	Chipotle	5.5	5.73	5.29
	Domino's	4.21	4.54	4.22
	Inspire Brands	10.32	10.95	10.49
	JAB	6.2	7.07	5.59
	McDonald's	26.68	27.89	27.19
	Starbucks	13.25	13.88	13.58
	Subway	7.96	8.39	7.99
	Wendy's	4.73	4.97	4.83
	Yum! Brands	15.71	16.02	16.4
Smartphone	Apple	46.59	48.2	48.21
	Google	1.75	1.71	1.69
	LG	2.53	2.68	2.61
	Lenovo	0.07	0.07	0.07
	Samsung	16.12	16.76	16.24
Soda	Coca-Cola	20.38	20.59	21.46
	Dr Pepper 7 Up	19.32	19.62	20.36
	Pepsi	19.87	20.17	20.75
Toothpaste	Church & Dwight	0.45	0.46	0.46
	Colgate	0.64	0.66	0.67
	Glaxo	0.52	0.56	0.5
	Procter & Gamble	0.56	0.59	0.58
Yogurt	Chobani	0.84	0.87	0.86
	Danone	2.56	2.66	2.66
	Yoplait	2.77	2.88	2.91

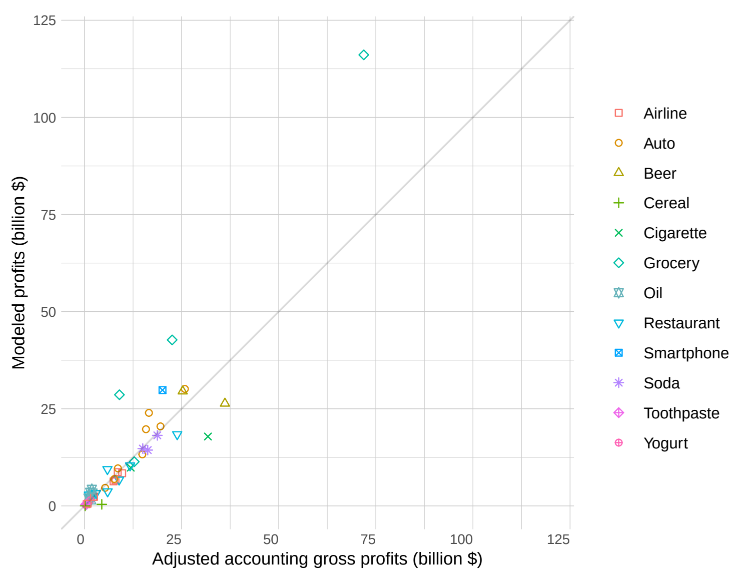
Notes: This table presents unweighted corporate social impact estimates by firm under different assumptions for the initial outside good share.

Figure A7: **Modeled Demand Function vs. Survey Data**



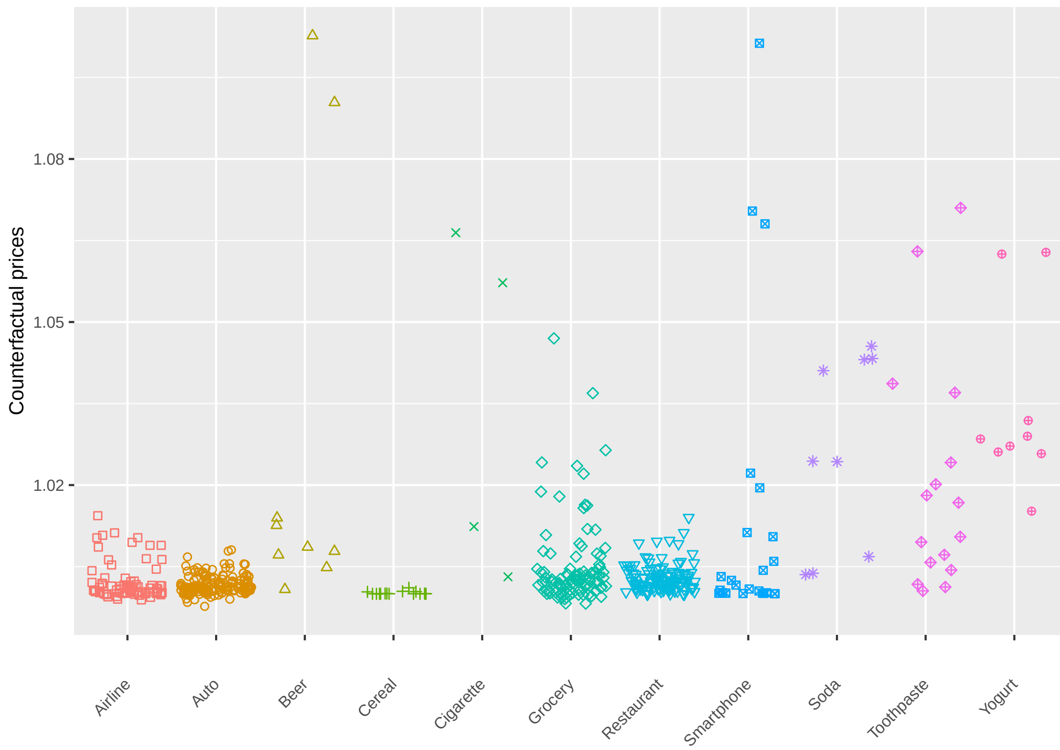
Notes: This figure compares the modeled demand function (given the functional form assumptions described in Section IV) to the "actual" demand function as self-reported in survey data, with randomly varied hypothetical price increases.

Figure A8: **Profits from Model Estimates vs. Accounting Profits**



Notes: This figure compares firm-level profits as from our model estimates to 2019 adjusted accounting gross profits. Adjusted accounting gross profits equal the firm's reported accounting profits per dollar of reported revenue (reported in Compustat) multiplied by the firm's revenue in the market we consider.

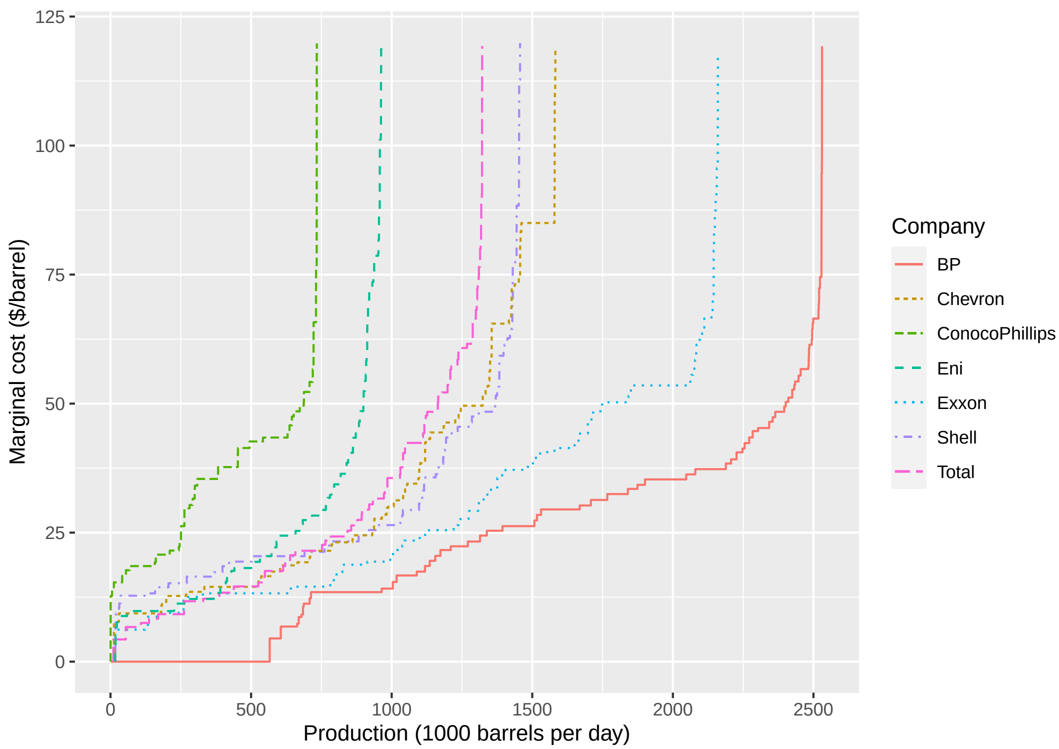
Figure A9: **Counterfactual Equilibrium Prices in Response to Individual Firm Exit**



Notes: This figure presents all counterfactual equilibrium prices in response to the exit of each individual firm in each differentiated product industry in our sample. Each firm is assumed to sell a representative good with baseline price of $1.

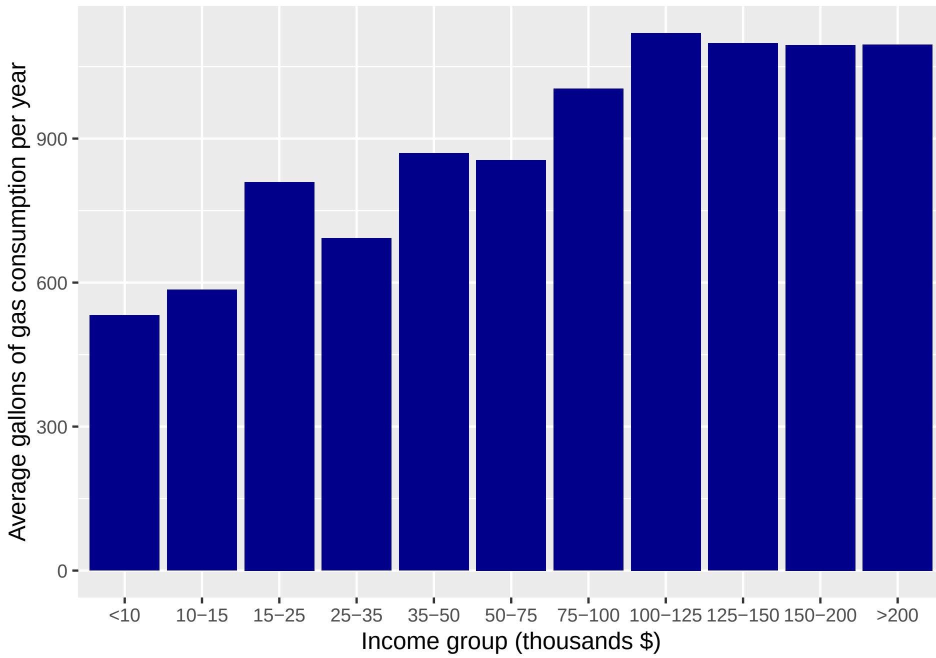
C.B Oil Market Appendix

Figure A10: **Marginal Cost Curves by Firm**



Notes: This figure presents the marginal cost curves for each oil company in our sample. These are calculated by aggregating over field-level marginal costs using data from Rystad.

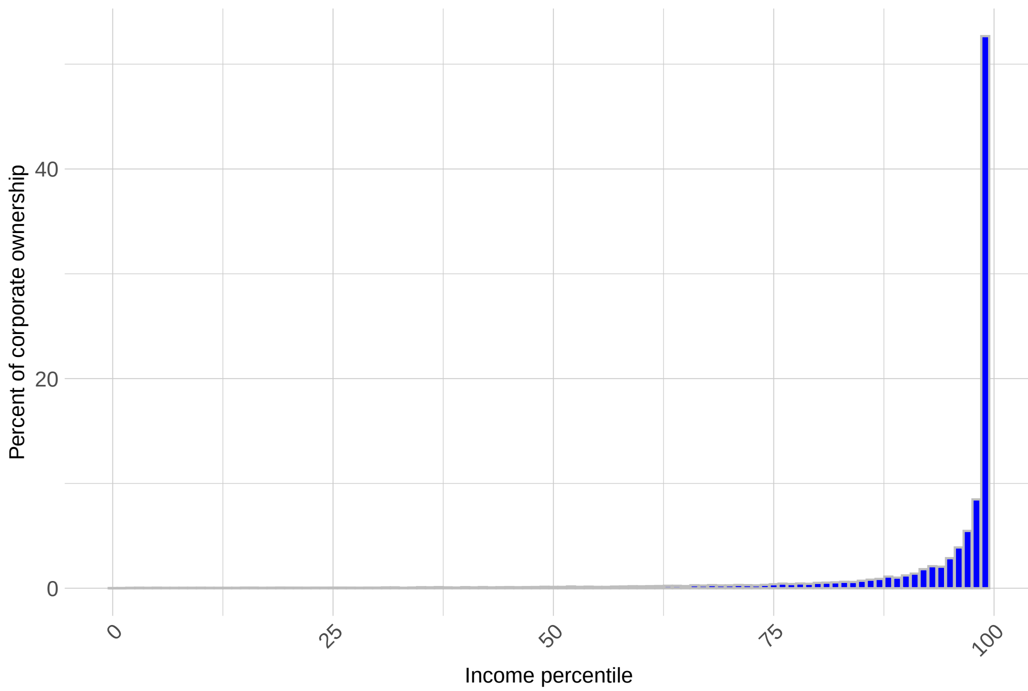
Figure A11: **Gasoline Consumption by Income**



Notes: This figure presents average gasoline consumption by income group, using microdata on vehicle miles traveled and fuel economy from the National Household Travel Survey.

C.C Profit Calculation

Figure A12: **Percent of C-corp Equity Owned by Income Percentile**



Notes: This figure presents the percent of C-corp equity owned by each income percentile, using the *fkequ_c* variable from the Distributional National Accounts data (Piketty, Saez, and Zucman 2020).

D Labor Market Estimation Appendix

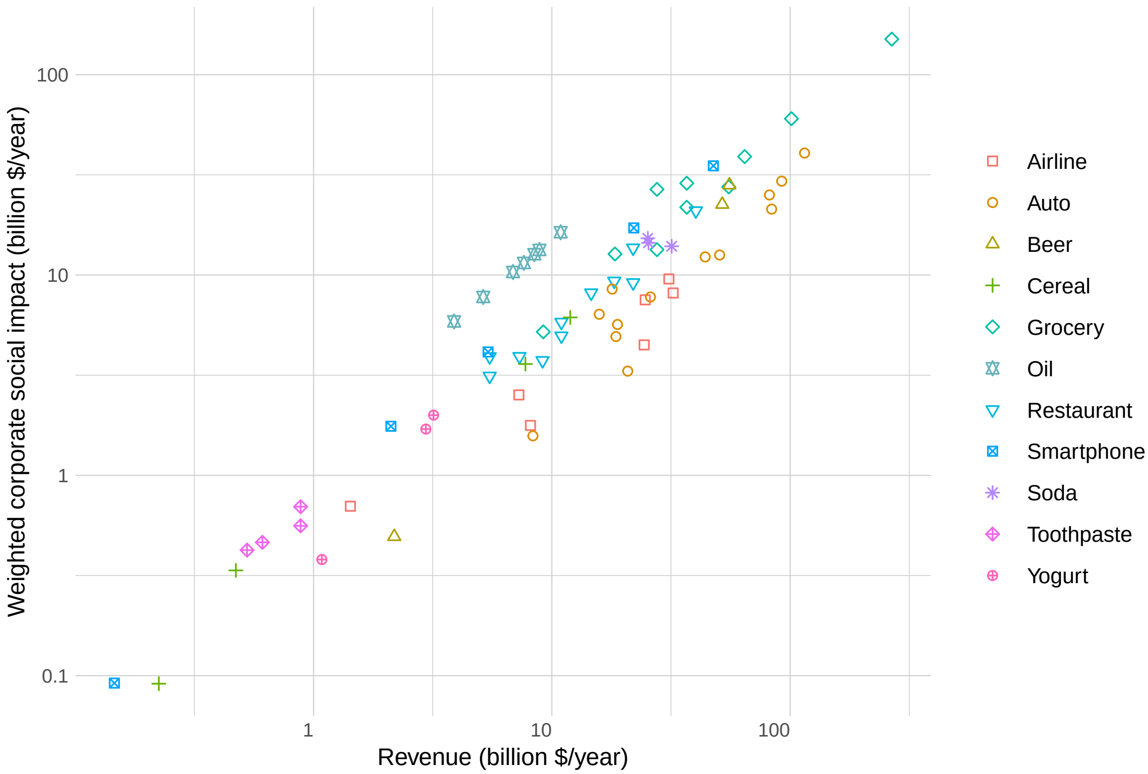
Table A4: **Firm-Level Summaries of Data Used for Worker Surplus Estimates**

Industry	Firm	(1) Employee count (thousands)	(2) Average total compensation (thousand $ / year)	(3) Number of establishments	(4) Average percent of county employment
Airline	Alaska	22.35	99.61	100	0.04
	Allegiant	3.64	89.18	15	0.05
	American	94.32	99.61	214	0.07
	Delta	60.14	99.61	206	0.08
	Frontier	4.99	99.61	108	0.01
	JetBlue	19.37	99.61	62	0.05
	Southwest	66.12	99.61	91	0.12
	Spirit	5.86	99.61	45	0.03
	United	54.7	99.61	198	0.04
Auto	BMW	20.53	53.09	41	0.09
	Fiat Chrysler	132.1	88.57	26	12.11
	Ford	112.36	75.67	573	0.13
	GM	137.36	88	43	3.65
	Honda	77.54	87.95	43	6.1
	Hyundai	24.28	52.37	9	0.09
	Kia	16.04	87.95	12	2.78
	Mazda	12.97	87.37	6	0.13
	Mercedes	28.62	60	164	0.17
	Nissan	66.62	90.12	15	9.32
	Subaru	24.96	52.36	10	1.87
	Toyota	111.3	78.45	47	6.66
	Volkswagen	58.22	52.81	66	0.36
Beer	Anheuser-Busch	170.51	84.27	80	1.54
	Molson Coors	93	77.91	29	1.88
Cereal	General Mills	18.37	85.39	58	0.57
	Kellogg	27.26	60.39	34	0.91
	Post	0.84	85.76	42	0.21
	Quaker	0.28	55.64	795	0
Cigarette	Philip Morris	115.66	88.39	40	1.06
Grocery	ALDI	21.7	51.59	786	0.03
	Ahold	111.15	51.74	673	0.35
	Albertsons	317.72	54.5	1444	0.4
	Amazon	78.56	53.09	704	0.08
	Costco	107.19	51.82	853	0.13
	Kroger	378.61	52.78	2233	0.59
	Meijer	93.06	51.59	360	0.7
	Publix	179.77	51.71	366	0.61
	Wakefern	67.97	51.6	144	0.35
	Walmart	1147.74	53.1	12519	1.27
Oil	BP	2.23	58	1076	0
	Chevron	2.91	64.88	894	0
	Conoco	1.24	54.68	1404	0
	Eni	2.08	82.66	6	0.22
	Exxon	3.19	58.35	1534	0
	Shell	1.8	60.11	1820	0
	Total	4.2	53.25	20	2.17
Restaurant	Burger King	16.44	51.74	1745	0.02
	Chick-fil-A	116.36	51.59	683	0.14
	Chipotle	81.48	51.59	548	0.05
	Domino's	26.47	51.59	1558	0.02
	JAB	83.48	51.61	649	0.07
	McDonald's	391.15	51.59	2333	0.33
	Starbucks	286.31	51.67	1183	0.13
	Subway	203.35	51.59	2787	0.19
	Wendy's	71.13	51.59	1455	0.08
	Yum! Brands	133.25	51.66	2259	0.12
Smartphone	Apple	25.07	67.41	177	0.03
	Google	1.55	77.43	42	0
	Lenovo	0.16	64.84	3	0.01
	Samsung	30.93	60.37	31	0.6
Soda	Coca-Cola	58.48	90.94	35	1.02
	Dr Pepper 7 Up	73	58.18	100	0.76
	Pepsi	101.13	55.64	795	0.22
Toothpaste	Church & Dwight	0.67	90.94	17	0.05
	Colgate	1.93	79.26	24	0.09
	Glaxo	1.16	90.92	19	0.03
	Procter & Gamble	1.26	86.71	140	0.01
Yogurt	Chobani	0.17	82.66	5	0.21
	Danone	10.69	75.42	20	0.68
	Yoplait	7.56	85.39	58	0.23

Notes: This table presents firm-level summaries of data used for the worker surplus estimates. *Average percent of county employment* is the average (over the counties where the firm has establishments) of the ratio of the firm's county-level employment count to the county's total employment. (For auto manufacturers with a small number of establishments, the average percent of *commuting zone* employment would be smaller.)

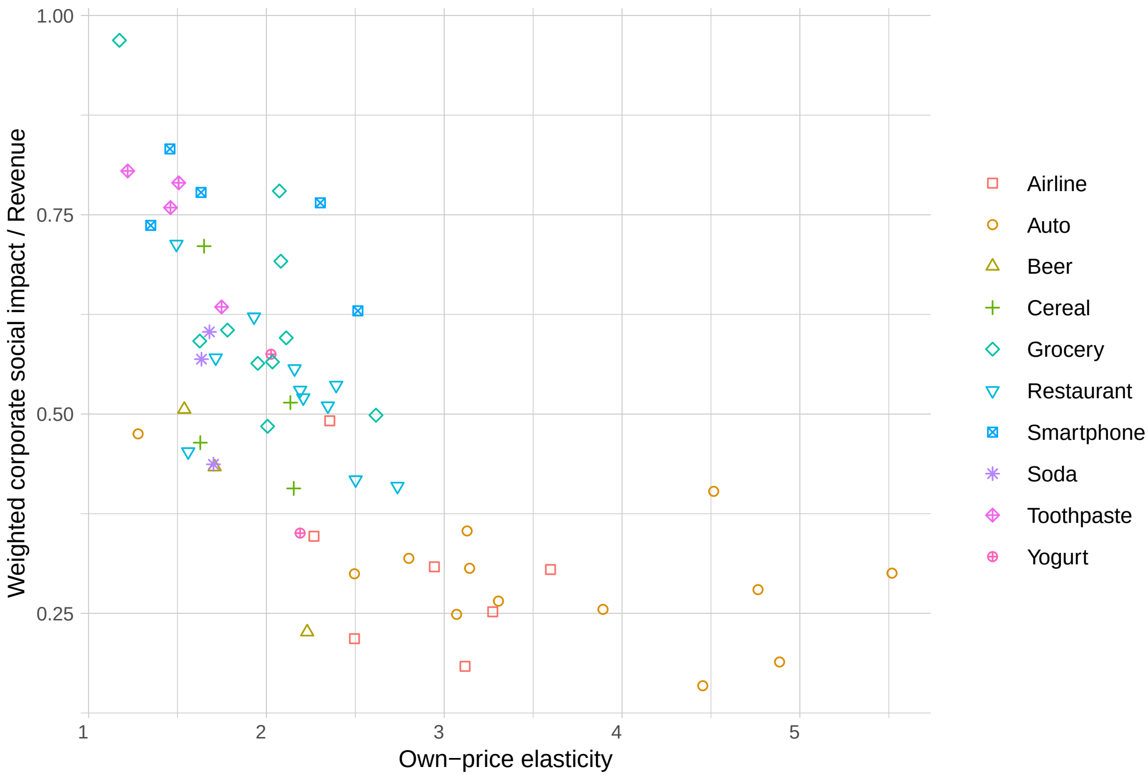
E Corporate Social Impact Estimates Appendix

Figure A13: **Weighted Corporate Social Impact versus Revenue**



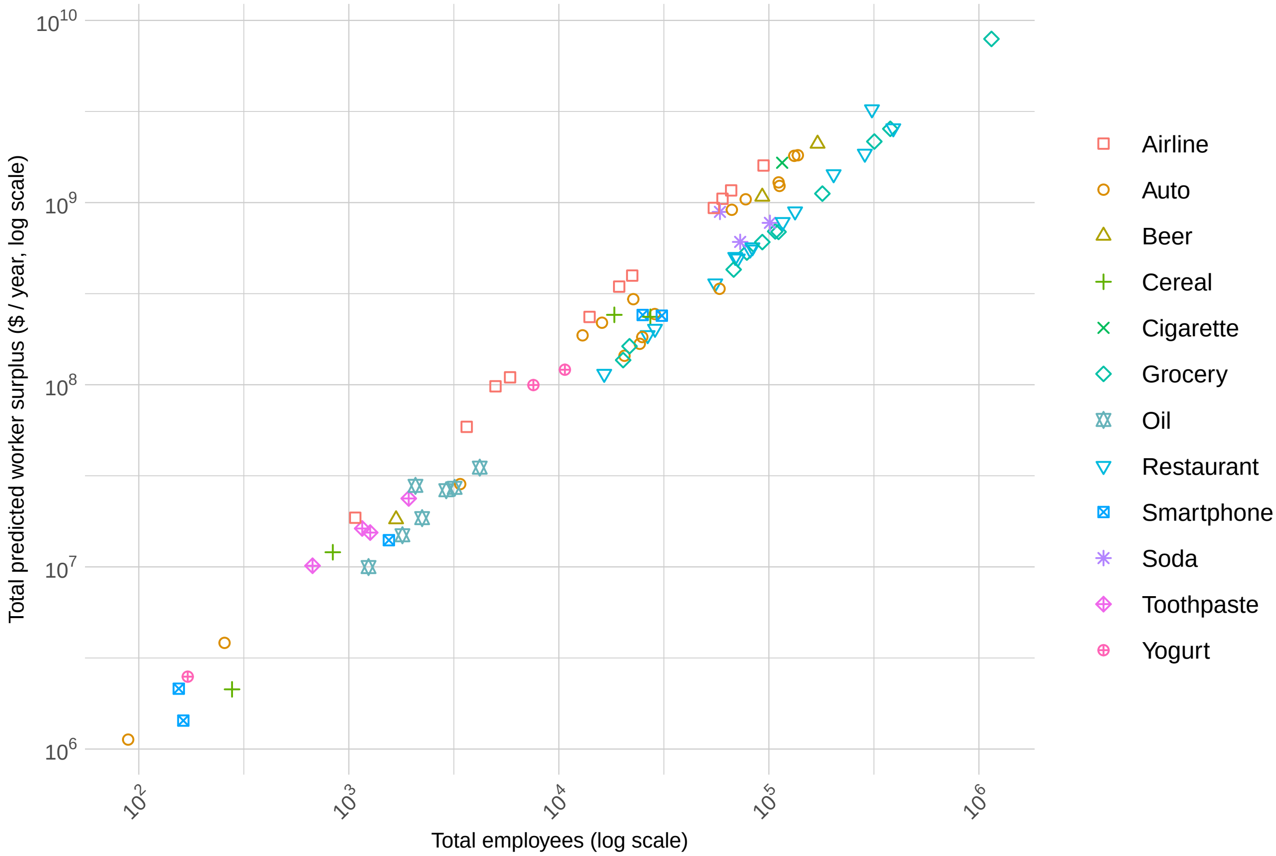
Notes: This figure presents weighted individual impact against revenue for each firm in our sample. This figure excludes firms with negative corporate social impact.

Figure A14: **Weighted Corporate Social Impact per Dollar of Revenue versus Own-Price Elasticity**



Notes: This figure presents weighted individual impact per dollar of revenue against own-price elasticity for each firm in the differentiated product industries in our sample. Own-price elasticity is calculated from responses to the *price response* survey question: (-1)×ln(share who would still buy from the firm after a 25 percent price increase) / ln(1.25). This figure excludes firms with negative corporate social impact.

Figure A15: **Worker Surplus versus Employee Count**



Notes: This figure presents worker surplus against total employees for each firm in our sample.

Table A5: **Components of Individual Impact by Firm (billion $/year)**

Industry	Firm	(1) Consumer surplus	(2) Profit	(3) Competitor profit	(4) Externality	(5) Worker surplus	(6) Corporate social impact	(7) Consumer surplus (weighted)	(8) Profit (weighted)	(9) Competitor profit (weighted)	(10) Worker surplus (weighted)	(11) Corporate social impact (weighted)	(12) Revenue
Airline	Alaska	3.9	2.33	-1.86	-0.93	0.4	3.84	2.59	0.28	-0.22	0.06	1.77	8.13
	Allegiant	0.77	0.44	-0.24	-0.12	0.06	0.91	0.79	0.05	-0.03	0.01	0.7	1.43
	American	10.73	8.41	-7.64	-0.21	1.6	12.88	8	1.01	-0.92	0.25	8.13	32.29
	Delta	12.63	8.69	-7.17	0.34	1.05	15.53	8.87	1.05	-0.86	0.17	9.56	30.99
	Frontier	0.45	0.34	-0.46	-0.77	0.1	-0.34	0.39	0.04	-0.06	0.02	-0.38	1.66
	JetBlue	4.56	2.32	-1.43	-1.26	0.35	4.55	3.62	0.28	-0.17	0.05	2.52	7.27
	Southwest	8.86	6.59	-5.86	-2.16	1.17	8.6	6.37	0.79	-0.71	0.19	4.48	24.4
	Spirit	0.72	0.57	-0.65	-1.25	0.11	-0.5	0.62	0.07	-0.08	0.02	-0.62	2.51
	United	8.06	6.31	-6.06	-0.12	0.93	9.13	7.46	0.76	-0.73	0.15	7.52	24.65
Auto	BMW	12.08	5.38	-3.59	-0.23	0.14	13.78	8.49	0.65	-0.43	0.04	8.51	17.91
	Fiat Chrysler	24.43	19.74	-19.25	-3.51	1.81	23.2	24.44	2.38	-2.32	0.34	21.32	83.64
	Ford	33.75	23.95	-19.65	-2.81	1.23	36.48	31.44	2.88	-2.37	0.26	29.41	92.19
	GM	40.54	30.1	-24.71	-3.79	1.82	43.97	43.41	3.62	-2.98	0.35	40.62	114.94
	Honda	19.38	13.26	-10.69	-1.65	1.04	21.34	13.73	1.6	-1.29	0.2	12.58	50.6
	Hyundai	4.8	3.79	-4.76	-0.71	0.17	3.29	6.45	0.46	-0.57	0.04	5.66	18.85
	Kia	4.48	3.53	-3.87	-0.41	0.22	3.94	6.78	0.43	-0.47	0.04	6.37	15.81
	Mazda	2.28	1.68	-2.21	-0.36	0.19	1.58	1.96	0.2	-0.27	0.04	1.57	8.33
	Mercedes	6.8	4.87	-4.12	0.3	0.24	8.09	4.49	0.59	-0.5	0.06	4.93	18.58
	Nissan	11.5	9.67	-10.05	-1.7	0.91	10.33	13.88	1.16	-1.21	0.17	12.31	44.01
	Subaru	5.86	4.65	-5.02	-0.88	0.18	4.79	4.19	0.56	-0.6	0.05	3.31	20.82
	Toyota	27.39	20.47	-17.47	-2.86	1.29	28.83	27.33	2.46	-2.1	0.26	25.09	81.86
	Volkswagen	11.46	6.91	-5.56	-0.47	0.34	12.67	8	0.83	-0.67	0.08	7.77	25.93
Beer	Anheuser-Busch	35.72	26.37	-19.4	-14.19	2.11	30.59	35.45	3.17	-2.34	0.42	22.51	51.9
	Molson Coors	41.73	29.51	-21.41	-15.09	1.08	35.81	42.03	3.55	-2.58	0.21	28.13	55.59
	Sazerac	1.91	1.04	-1.16	-0.63	0	1.17	1.14	0.13	-0.14	0	0.49	2.18
Cereal	General Mills	3.62	0.26	-0.2	-0.12	0.24	3.8	3.66	0.03	-0.02	0.05	3.59	7.75
	Kellogg	5.75	0.4	-0.25	-0.26	0.24	5.88	6.33	0.05	-0.03	0.05	6.14	11.94
	Post	0.4	0.02	-0.01	-0.01	0.01	0.41	0.34	0	0	0	0.34	0.47
	Quaker	0.24	0.01	-0.01	0	0	0.24	0.09	0	0	0	0.09	0.22
Cigarette	Philip Morris	-21.52	17.86	-10.28	-3.18	1.65	-15.46	-14.83	2.15	-1.24	0.32	-16.78	46.9
	Reynolds	-14.08	9.84	-9.41	-1.85	0	-15.5	-11.92	1.18	-1.13	0	-13.72	27.38
Grocery	ALDI	28.66	13.86	-9.91	-0.3	0.16	32.46	26.54	1.67	-1.19	0.04	26.76	27.62
	Ahold	22.64	15.8	-14.87	-0.32	0.69	23.94	28.75	1.9	-1.79	0.18	28.72	36.82
	Albertsons	29.81	20.9	-24.39	-0.38	2.16	28.1	27.8	2.52	-2.94	0.54	27.54	55.23
	Amazon	16.7	11.37	-11.61	-0.22	0.53	16.78	13.5	1.37	-1.4	0.13	13.38	27.62
	Costco	44.04	28.61	-24.27	-0.48	0.69	48.59	38.79	3.44	-2.92	0.18	39.01	64.44
	Kroger	58.41	42.72	-37.53	-0.84	2.54	65.31	59.88	5.14	-4.52	0.64	60.31	101.26
	Meijer	8.35	3.82	-4.88	-0.09	0.61	7.81	5.26	0.46	-0.59	0.16	5.2	9.21
	Publix	29.31	17.68	-13.14	-0.37	1.12	34.6	21.32	2.13	-1.58	0.29	21.78	36.82
	Wakefern	16.66	8.69	-7.74	-0.13	0.43	17.9	12.64	1.05	-0.93	0.11	12.74	18.41
	Walmart	143.66	116.09	-83.03	-2.2	7.91	182.44	146.7	13.98	-10	1.98	150.46	266.97
Oil	BP	36.72	3.52	-36.32	-6.91	0.02	-2.97	24.2	0.42	-4.37	0	13.34	8.87
	Chevron	34.96	3.31	-34.59	-6.58	0.03	-2.87	23.04	0.4	-4.16	0.01	12.7	8.44
	Conoco	16.15	1.53	-16.07	-3.03	0.01	-1.41	10.64	0.18	-1.93	0	5.86	3.89
	Eni	21.39	2.03	-21.25	-4.02	0.03	-1.82	14.09	0.24	-2.56	0.01	7.77	5.15
	Exxon	45.01	4.29	-44.4	-8.49	0.03	-3.56	29.66	0.52	-5.35	0.01	16.35	10.89
	Shell	31.63	3.01	-31.33	-5.95	0.01	-2.62	20.85	0.36	-3.77	0	11.49	7.63
	Total	28.48	2.71	-28.24	-5.35	0.04	-2.36	18.77	0.33	-3.4	0.01	10.35	6.87
Restaurant	Burger King	7.7	6.72	-4.75	-0.2	0.11	9.58	8.08	0.81	-0.57	0.03	8.14	14.62
	Chick-fil-A	7.5	5.56	-3.31	-0.16	0.78	10.37	4.66	0.67	-0.4	0.2	4.96	10.97
	Chipotle	4	2.88	-1.61	-0.09	0.55	5.73	3.7	0.35	-0.19	0.14	3.91	5.48
	Domino's	3.69	3.25	-2.5	-0.09	0.19	4.54	3.88	0.39	-0.3	0.05	3.92	7.31
	Inspire Brands	9.15	8.14	-6.09	-0.24	0	10.95	9.32	0.98	-0.73	0	9.33	18.28
	JAB	5.29	3.09	-1.82	-0.07	0.57	7.07	2.9	0.37	-0.22	0.14	3.13	5.48
	McDonald's	20.49	18.4	-13.01	-0.55	2.56	27.89	20.18	2.21	-1.57	0.65	20.93	40.22
	Starbucks	10.54	9.43	-7.67	-0.27	1.85	13.88	8.75	1.14	-0.92	0.47	9.16	21.94
	Subway	5.88	5.04	-3.84	-0.13	1.43	8.39	5.43	0.61	-0.46	0.36	5.81	10.97
	Wendy's	4.17	3.7	-3.28	-0.11	0.49	4.97	3.68	0.45	-0.39	0.13	3.74	9.14
	Yum! Brands	12.07	10.38	-7.01	-0.31	0.89	16.02	13.32	1.25	-0.84	0.23	13.64	21.94
Smartphone	Apple	40.11	29.8	-21.82	-0.13	0.24	48.2	34.2	3.59	-2.63	0.05	35.08	47.62
	Google	1.62	1.19	-1.11	0	0.01	1.71	1.75	0.14	-0.13	0	1.76	2.11
	LG	3.7	2.53	-3.54	-0.01	0	2.68	4.26	0.31	-0.43	0	4.13	5.4
	Lenovo	0.11	0.06	-0.11	0	0	0.07	0.1	0.01	-0.01	0	0.09	0.15
	Samsung	17.98	12.29	-13.69	-0.05	0.24	16.76	17.35	1.48	-1.65	0.06	17.18	22.08
Soda	Coca-Cola	16.67	14.37	-10.11	-1.23	0.89	20.59	15.79	1.73	-1.22	0.17	15.25	25.28
	Dr Pepper 7 Up	17.33	18.15	-11.81	-4.67	0.61	19.62	17.67	2.19	-1.42	0.14	13.91	31.83
	Pepsi	16.57	14.75	-10.12	-1.81	0.77	20.17	15.54	1.78	-1.22	0.19	14.47	25.44
Toothpaste	Church & Dwight	0.45	0.32	-0.32	-0.01	0.01	0.46	0.47	0.04	-0.04	0	0.46	0.61
	Colgate	0.65	0.47	-0.48	-0.01	0.02	0.66	0.7	0.06	-0.06	0	0.7	0.88
	Glaxo	0.49	0.31	-0.25	0	0.02	0.56	0.42	0.04	-0.03	0	0.42	0.53
	Procter & Gamble	0.61	0.45	-0.48	-0.01	0.02	0.59	0.57	0.05	-0.06	0	0.56	0.88
Yogurt	Chobani	0.69	0.53	-0.33	-0.02	0	0.87	0.38	0.06	-0.04	0	0.38	1.08
	Danone	1.79	1.49	-0.69	-0.06	0.12	2.66	1.64	0.18	-0.08	0.02	1.7	2.96
	Yoplait	1.91	1.62	-0.69	-0.07	0.1	2.88	1.93	0.2	-0.08	0.02	2	3.19

Notes: This table presents the components of individual impact for all firms in our sample. The "weighted" estimates impose a curvature of $\rho = 1$ on social marginal welfare weights, which approximately corresponds to log utility. All other estimates use equal social marginal welfare weights across income groups ($\rho = 0$).

Table A6: **Components of Share of Industry Impact by Firm (billion $/year)**

Industry	Firm	(1) Consumer surplus	(2) Profit	(3) Competitor profit	(4) Externality	(5) Worker surplus	(6) Corporate social impact	(7) Consumer surplus (weighted)	(8) Profit (weighted)	(9) Competitor profit (weighted)	(10) Worker surplus (weighted)	(11) Corporate social impact (weighted)	(12) Revenue
Airline	Alaska	9.62	4.69	-2.02	-2.62	0.4	10.06	6.2	0.56	-0.24	0.06	3.97	8.13
	Allegiant	1.38	0.71	-0.16	-0.25	0.06	1.74	1.64	0.08	-0.02	0.01	1.47	1.43
	American	32.07	16.19	-8.71	-2.8	1.6	38.35	22.08	1.95	-1.05	0.25	20.43	32.29
	Delta	30.51	15.08	-7.85	-1.3	1.05	37.49	20.71	1.82	-0.95	0.17	20.44	30.99
	Frontier	9.53	3.48	-1.67	-9.1	0.1	2.35	6.35	0.42	-0.2	0.02	-2.52	1.66
	JetBlue	7.81	3.71	-1.46	-2.1	0.35	8.31	5.74	0.45	-0.18	0.05	3.97	7.27
	Southwest	25.78	12.92	-6.93	-5.63	1.17	27.31	16.98	1.55	-0.83	0.19	12.26	24.4
	Spirit	8	3.61	-1.65	-8.31	0.11	1.75	5.67	0.43	-0.2	0.02	-2.39	2.51
	United	26.55	13.42	-7.49	-2.5	0.93	30.92	20.23	1.62	-0.9	0.15	18.59	24.65
Auto	BMW	20.28	8.27	-3.23	-1.16	0.14	24.31	13.72	1	-0.39	0.04	13.21	17.91
	Fiat Chrysler	96.1	46.28	-29.23	-15.38	1.81	99.57	100.07	5.57	-3.52	0.34	87.09	83.64
	Ford	96.83	48.01	-25.62	-12.95	1.23	107.51	97.45	5.78	-3.08	0.26	87.46	92.19
	GM	111.63	55.92	-31.3	-14.75	1.82	123.31	117.39	6.73	-3.77	0.35	105.95	114.94
	Honda	58.57	27.94	-14.11	-7.36	1.04	66.08	44.71	3.36	-1.7	0.2	39.21	50.6
	Hyundai	51.99	19.66	-14.28	-8.69	0.17	48.84	64.36	2.37	-1.72	0.04	56.36	18.85
	Kia	34.52	14.93	-8.67	-5.17	0.22	35.83	50.32	1.8	-1.04	0.04	45.95	15.81
	Mazda	31.21	12.72	-6.41	-6.18	0.19	31.52	30.65	1.53	-0.77	0.04	25.26	8.33
	Mercedes	30.31	14.36	-6.84	-2.22	0.24	35.85	26.4	1.73	-0.82	0.06	25.14	18.58
	Nissan	68.85	32	-20.37	-11.2	0.91	70.19	79.82	3.85	-2.45	0.17	70.19	44.01
	Subaru	41.42	18.39	-10.26	-7.3	0.18	42.43	34.61	2.21	-1.23	0.05	28.33	20.82
	Toyota	86.14	44	-24.35	-11.84	1.29	95.24	83.25	5.3	-2.93	0.26	74.04	81.86
	Volkswagen	30.74	16.34	-5.82	-3.6	0.34	38	25.44	1.97	-0.7	0.08	23.19	25.93
Beer	Anheuser-Busch	69.54	37.38	-11.09	-32.89	2.11	65.04	65.73	4.5	-1.33	0.42	36.42	51.9
	Molson Coors	69.79	41.05	-11.18	-33.46	1.08	67.28	69.9	4.94	-1.35	0.21	40.25	55.59
	Sazerac	2.69	3.5	0.64	-4.06	0	2.76	0.36	0.42	0.08	0	-3.2	2.18
Cereal	General Mills	10.56	0.39	-0.11	-0.47	0.24	10.61	11.61	0.05	-0.01	0.05	11.21	7.75
	Kellogg	13.17	0.5	-0.13	-0.67	0.24	13.1	14.19	0.06	-0.02	0.05	13.62	11.94
	Post	0.93	0.02	0	-0.03	0.01	0.95	0.56	0	0	0	0.54	0.47
	Quaker	0.54	0.02	0.01	-0.02	0	0.54	0.3	0	0	0	0.29	0.22
Cigarette	Philip Morris	-65.51	20.96	-5.42	-6.85	1.65	-55.17	-58.46	2.52	-0.65	0.32	-63.13	46.9
	Reynolds	-51.13	15.6	-3.63	-5.43	0	-44.58	-49.05	1.88	-0.44	0	-53.04	27.38
Grocery	ALDI	52.24	26.4	-7.65	-1.05	0.16	70.11	44.83	3.18	-0.92	0.04	46.08	27.62
	Ahold	86.4	44.88	-18.55	-2.07	0.69	111.35	96.38	5.4	-2.23	0.18	97.66	36.82
	Albertsons	160.39	73.36	-36.02	-3.57	2.16	196.32	152.97	8.83	-4.34	0.54	154.43	55.23
	Amazon	86.64	42.33	-19.34	-1.95	0.53	108.22	74.9	5.1	-2.33	0.13	75.85	27.62
	Costco	125.44	65.49	-28.98	-2.69	0.69	159.95	116.93	7.88	-3.49	0.18	118.81	64.44
	Kroger	191.22	98.39	-45.68	-4.02	2.54	242.45	173.49	11.85	-5.5	0.64	176.46	101.26
	Meijer	27.78	15.2	-4.22	-0.77	0.61	38.6	20.94	1.83	-0.51	0.16	21.65	9.21
	Publix	68.46	33.68	-10.18	-1.33	1.12	91.75	44.96	4.05	-1.23	0.29	46.75	36.82
	Wakefern	45.65	23.33	-8.34	-0.96	0.43	60.11	46.44	2.81	-1	0.11	47.4	18.41
	Walmart	378.47	187.83	-91.23	-6.97	7.91	476.02	377.99	22.61	-10.98	1.98	384.62	266.97
Oil	BP	35.58	3.52	-33.22	-6.91	0.02	-1.01	23.45	0.42	-4	0	12.96	8.87
	Chevron	33.86	3.31	-31.61	-6.58	0.03	-0.99	22.31	0.4	-3.81	0.01	12.33	8.44
	Conoco	15.59	1.53	-14.56	-3.03	0.01	-0.45	10.27	0.18	-1.75	0	5.68	3.89
	Eni	20.67	2.03	-19.29	-4.02	0.03	-0.58	13.62	0.24	-2.32	0.01	7.53	5.15
	Exxon	43.67	4.29	-40.77	-8.49	0.03	-1.27	28.78	0.52	-4.91	0.01	15.91	10.89
	Shell	30.62	3.01	-28.59	-5.95	0.01	-0.89	20.18	0.36	-3.44	0	11.15	7.63
	Total	27.56	2.71	-25.73	-5.35	0.04	-0.78	18.16	0.33	-3.1	0.01	10.04	6.87
Restaurant	Burger King	15.35	12.36	-5.24	-0.59	0.11	22	15.26	1.49	-0.63	0.03	15.55	14.62
	Chick-fil-A	11.84	8.82	-3.27	-0.37	0.78	17.8	8.44	1.06	-0.39	0.2	8.93	10.97
	Chipotle	6.77	4.31	-1.51	-0.19	0.55	9.93	5.51	0.52	-0.18	0.14	5.8	5.48
	Domino's	8.36	6.79	-2.96	-0.33	0.19	12.04	8.34	0.82	-0.36	0.05	8.52	7.31
	Inspire Brands	19.21	15.33	-6.89	-0.73	0	26.91	19.03	1.85	-0.83	0	19.31	18.28
	JAB	4.6	4.24	-0.7	-0.18	0.57	8.54	3.13	0.51	-0.08	0.14	3.52	5.48
	McDonald's	38.42	29.53	-12.77	-1.42	2.56	56.31	36.64	3.56	-1.54	0.65	37.89	40.22
	Starbucks	23.48	18.32	-8.49	-0.95	1.85	34.22	19.94	2.21	-1.02	0.47	20.65	21.94
	Subway	13.71	9.96	-5.32	-0.45	1.43	19.34	12.13	1.2	-0.64	0.36	12.6	10.97
	Wendy's	12.42	9.33	-4.63	-0.53	0.49	17.09	10.89	1.12	-0.56	0.13	11.05	9.14
	Yum! Brands	22.42	17.46	-7.31	-0.78	0.89	32.68	23.21	2.1	-0.88	0.23	23.87	21.94
Smartphone	Apple	70.5	34.42	-14.65	-0.25	0.24	90.27	63.2	4.14	-1.76	0.05	65.39	47.62
	Google	4.9	3.45	-0.77	-0.03	0.01	7.56	5.31	0.42	-0.09	0	5.6	2.11
	LG	19.41	9.1	-3.54	-0.1	0	24.87	21.18	1.1	-0.43	0	21.75	5.4
	Lenovo	3.8	1.7	-0.46	-0.02	0	5.02	3.39	0.21	-0.06	0	3.52	0.15
	Samsung	39.17	21.84	-8.35	-0.18	0.24	52.72	37.33	2.63	-1	0.06	38.82	22.08
Soda	Coca-Cola	27.32	22.29	-7.02	-4.13	0.89	39.35	25.73	2.68	-0.84	0.17	23.61	25.28
	Dr Pepper 7 Up	29.9	26.02	-8.56	-8.87	0.61	39.1	29.67	3.13	-1.03	0.14	23.05	31.83
	Pepsi	25.05	22.61	-6.56	-5.03	0.77	36.84	23.4	2.72	-0.79	0.19	20.49	25.44
Toothpaste	Church & Dwight	1.82	0.67	-0.26	-0.03	0.01	2.21	1.96	0.08	-0.03	0	1.98	0.61
	Colgate	2.24	0.83	-0.36	-0.03	0.02	2.7	2.36	0.1	-0.04	0	2.39	0.88
	Glaxo	1.5	0.58	-0.21	-0.02	0.02	1.87	1.47	0.07	-0.03	0	1.5	0.53
	Procter & Gamble	2.47	0.75	-0.45	-0.03	0.02	2.75	2.48	0.09	-0.05	0	2.49	0.88
Yogurt	Chobani	1.66	1.14	-0.28	-0.09	0	2.44	0.82	0.14	-0.03	0	0.83	1.08
	Danone	3.76	2.46	-0.6	-0.17	0.12	5.56	3.31	0.3	-0.07	0.02	3.38	2.96
	Yoplait	4.02	2.56	-0.62	-0.18	0.1	5.88	3.8	0.31	-0.08	0.02	3.87	3.19

Notes: This table presents the components of individual impact for all firms in our sample. The "weighted" estimates impose a curvature of $\rho = 1$ on social marginal welfare weights, which approximately corresponds to log utility. All other estimates use equal social marginal welfare weights across income groups ($\rho = 0$).

F Auto Industry Product-Level Model

In the body of the paper, we assume that each firm produces one representative product. To test whether that assumption affects our results, this appendix presents alternative estimates where the choice set is all vehicle models instead of all automobile firms. This appendix keeps the basic framework from the body of the paper, except we now use observed data on the prices and quantities of each vehicle model and add an additional moment to identify the elasticity of substitution across models.

This appendix modifies the model from Sections I and IV in the following specific ways:

- Each auto manufacturer f produces a set of products (vehicles) $\mathcal{J}_f$, setting prices to maximize the profit function in equation (3). Consumers' choice set now includes all vehicle models $\mathcal{J}$ instead of all firms $\mathcal{F}$.

- We use observed model-level prices p_j and market shares s_j, recorded in the standard data from Ward's. The model-level externalities ϕ_j from CO2 emissions are based on vehicle j's fuel economy rating.

- The first-order condition (FOC) from equation (10) becomes the standard multi-product Nash-Bertrand FOC:

$$\boldsymbol{p} - \boldsymbol{C}' + \boldsymbol{\Delta}^{-1}\boldsymbol{q}, \tag{28}$$

where $\boldsymbol{p}$, $\boldsymbol{C}'$, and $\boldsymbol{q}$ are the vectors of prices, marginal costs, and quantities for all vehicle models in the market, and $\boldsymbol{\Delta}$ is a $J \times J$ matrix whose (j, r) element is

$$\Delta_{jr} := \begin{cases} \frac{-\partial q_r}{\partial p_j}, & \text{if } r \text{ and } j \text{ are produced by the same firm} \\ 0, & \text{otherwise.} \end{cases}$$

- The utility from each vehicle model is identical to equation (11), except that there is a separate unobserved characteristic ξ_j for each product:

$$\tilde{u}_{ijt} = \left(\underbrace{\xi_j}_{\substack{\text{unobserved}\\ \text{characteristic}}} + \underbrace{\gamma_f}_{\text{internality}} + \underbrace{A_i \zeta_f}_{\substack{\text{income-firm}\\ \text{effect}}} + \underbrace{\sigma_f \nu_{if}}_{\text{firm RC}} + \underbrace{\sigma_n \nu_{in}}_{\text{inside good RC}} + \underbrace{\epsilon_{ift}}_{\substack{\text{extreme value}\\ \text{utility shock}}} \right) / \eta. \tag{29}$$

- Representative utility $V_{zj}(p_j, \boldsymbol{\nu}_i)$ and choice probabilities $P_{zj}(\boldsymbol{p})$ for income group z are analogous to equations (12) and (13), except that they are defined at the model level. Product j's choice probability is similarly $P_j(\boldsymbol{p}) = \sum_z \mu_z P_{zj}(\boldsymbol{p})$. The firm-level choice probabilities used in Section IV.B are now computed by summing over all products within the firm: $P_f(\boldsymbol{p}) = \sum_{j \in \mathcal{J}_f} P_j(\boldsymbol{p})$.

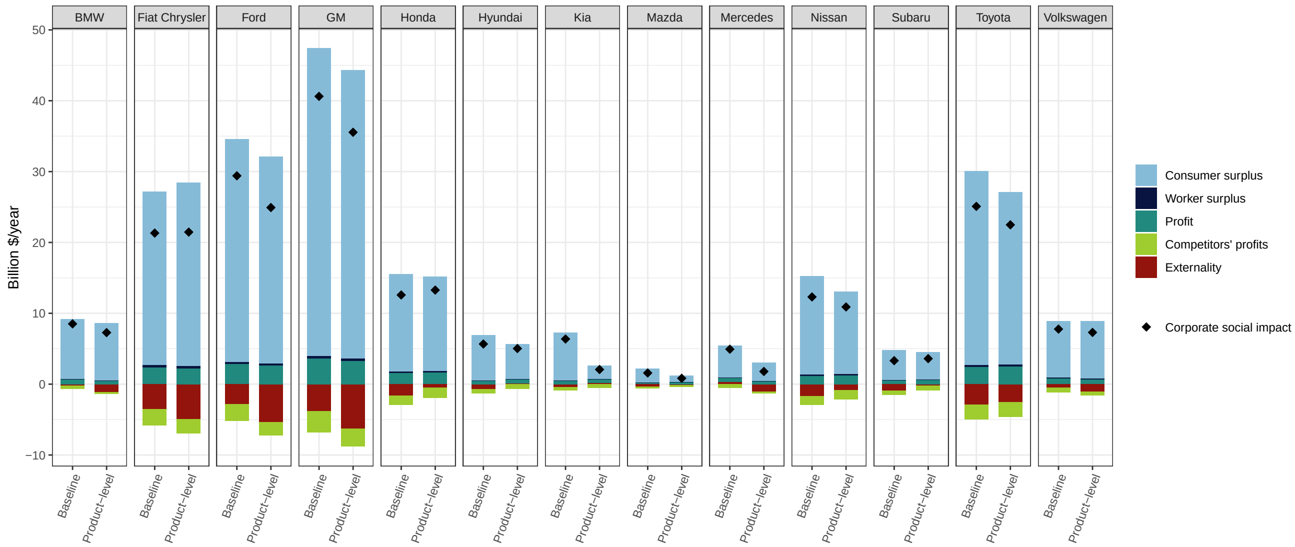
- We now estimate a σ_f for all firms instead of fixing $\sigma_f = 0$ for one firm.
- We now add a model-level substitution moment that identifies the model-level price response η from the *model-level price response* question asked on the survey: "Imagine the price of all [current model]s were 25% higher. Would you still have bought at [current model], even at the higher price?" Define H_{ij} as an indicator for whether respondent i responded "Yes," and define $\boldsymbol{p}'_j$ as the price vector after the price of product j increases by 25 percent. The model-level substitution moment is informative about the scaling factor η by matching the predicted and actual responses to a model-level 25 percent price increase:

$$g^{sub,model} = \left(\sum_i \omega_i \chi_{im}\right)^{-1} \sum_i \omega_i \chi_{im} \left(H_{ij} - \frac{\sum_j P_j\left(\boldsymbol{p}'_j\right)}{\sum_j P_j\left(\boldsymbol{p}^0\right)}\right). \tag{30}$$

Appendix Figure A16 compares the weighted individual impact estimates for the firm-level choice set (as already presented in Figure 4a in the body of the paper) and for the vehicle model-level choice set as described in this appendix. The estimates for each firm are very similar, implying that the aggregation to a firm-level representative product does not materially affect our results. This is unsurprising, given that the primary determinants of the effects of a firm's exit are the *firm*-level consumer surplus and average product externality.

One factor that is still missing in this robustness check is random coefficients on product attributes, which would generate more realistic substitution patterns between specific vehicle models after a firm exits. This would likely attenuate the differences across firms in effects on externalities, but these effects are already small relative to the consumer surplus effects.

Figure A16: **Automobile Industry Corporate Social Impact with Product-Level Choice Set**



Notes: This figure presents the components of weighted individual impact by firm in the automobile industry. The first bar in each pair presents the estimates under the firm-level choice set presented in the body of the paper. The second bar in each pair presents estimates under the vehicle model-level choice set presented in this appendix.

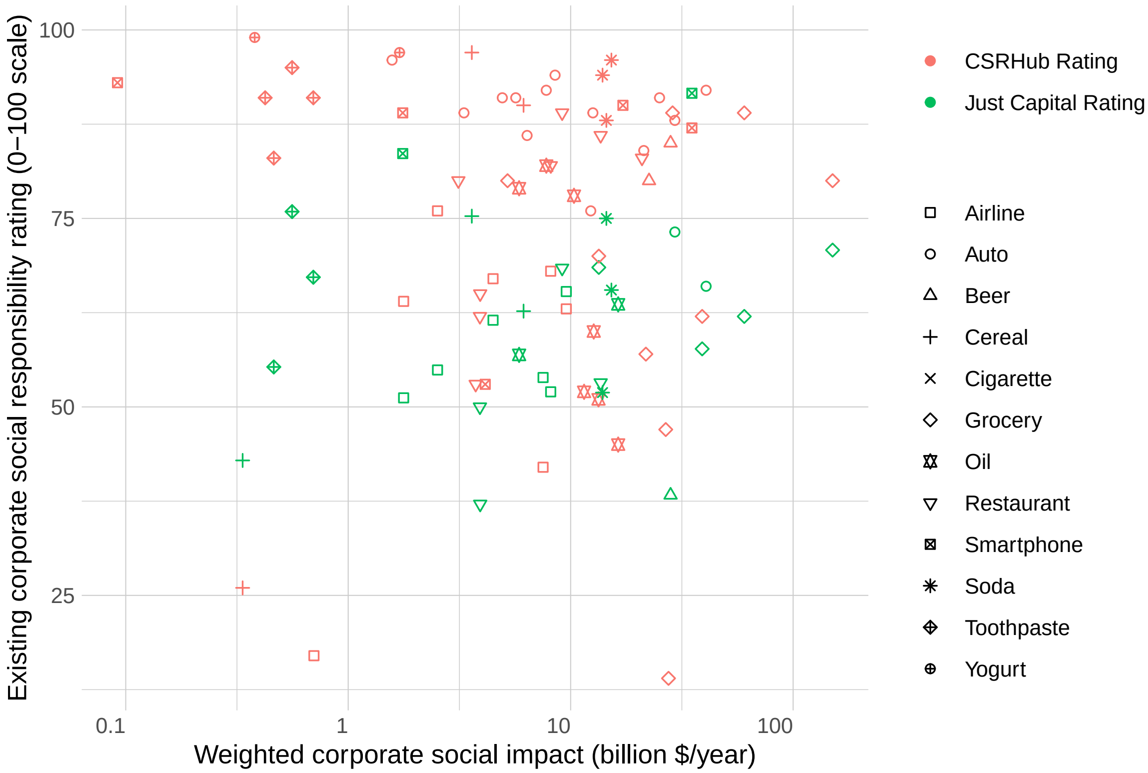
G Comparisons to Other Social Impact Metrics Appendix

Table A7: **Correlation Matrix of Components of Individual Impact versus ESG Metrics**

	Consumer surplus / Revenue	Worker surplus / Revenue	Externality / Revenue	CSI / Revenue	Just Capital	Just Capital Workers	Just Capital Customers	Just Capital Environment	CSRHub	Refinitiv	Refinitiv Social	Refinitiv Environment	S&P	S&P Social	S&P Environment
Consumer surplus / Revenue	1.00	-0.41	-0.96	-0.75	0.15	0.22	-0.29	-0.10	-0.63	-0.57	-0.15	0.12	0.05	0.20	-0.02
Worker surplus / Revenue	-0.41	1.00	0.31	0.17	-0.55	-0.48	-0.56	0.04	0.25	0.02	-0.01	-0.20	0.03	-0.08	0.01
Externality / Revenue	-0.96	0.31	1.00	0.86	-0.09	-0.24	0.36	0.25	0.70	0.50	0.08	-0.01	-0.03	-0.21	0.06
CSI / Revenue	-0.75	0.17	0.86	1.00	0.03	-0.14	0.39	0.39	0.70	0.26	-0.02	0.06	0.06	-0.16	0.17
Just Capital	0.15	-0.55	-0.09	0.03	1.00	0.78	0.60	0.38	-0.03	0.22	0.06	0.23	0.05	0.07	-0.02
Just Capital Workers	0.22	-0.48	-0.24	-0.14	0.78	1.00	0.53	0.07	-0.16	0.15	0.24	-0.02	0.33	0.38	0.25
Just Capital Customers	-0.29	-0.56	0.36	0.39	0.60	0.53	1.00	0.31	0.17	0.34	0.01	0.11	-0.02	-0.11	0.17
Just Capital Environment	-0.10	0.04	0.25	0.39	0.38	0.07	0.31	1.00	0.40	-0.01	-0.08	0.32	0.12	-0.02	0.13
CSRHub	-0.63	0.25	0.70	0.70	-0.03	-0.16	0.17	0.40	1.00	0.50	0.46	0.39	0.38	0.22	0.39
Refinitiv	-0.57	0.02	0.50	0.26	0.22	0.15	0.34	-0.01	0.50	1.00	0.70	0.23	0.17	0.10	0.19
Refinitiv Social	-0.15	-0.01	0.08	-0.02	0.06	0.24	0.01	-0.08	0.46	0.70	1.00	0.46	0.45	0.46	0.50
Refinitiv Environment	0.12	-0.20	-0.01	0.06	0.23	-0.02	0.11	0.32	0.39	0.23	0.46	1.00	-0.08	-0.12	0.16
S&P	0.05	0.03	-0.03	0.06	0.05	0.33	-0.02	0.12	0.38	0.17	0.45	-0.08	1.00	0.95	0.81
S&P Social	0.20	-0.08	-0.21	-0.16	0.07	0.38	-0.11	-0.02	0.22	0.10	0.46	-0.12	0.95	1.00	0.70
S&P Environment	-0.02	0.01	0.06	0.17	-0.02	0.25	0.17	0.13	0.39	0.19	0.50	0.16	0.81	0.70	1.00

Notes: This table presents the correlation matrix of the components of individual impact scaled by revenues against existing ratings from CSRHub (2023), Just Capital (2023), Refinitiv (2023), and S&P Global (2023) for all firms in our sample for which data are available.

Figure A17: **Weighted Corporate Social Impact versus ESG Metrics**



Notes: This figure presents our estimate of weighted individual impact against existing ratings from CSRHub (2023) and Just Capital (2022), for all firms in our sample for which data are available.