No Incidence Left Behind – Towards a Complete Understanding of Tax Incidence*

Richard Winter Philipp Doerrenberg Fabian Eble
Davud Rostam-Afschar Johannes Voget

February 9, 2024

First Draft. Comments Welcome.

Abstract

This paper provides novel evidence on the incidence of business taxes using comprehensive survey and experimental data on German firms. Managers can respond to tax burden changes along various adjustment margins, which impact different groups. Our experimental design allows us to measure tax responses along a large set of possible adjustment margins, whereas the literature typically studies one margin at a time. We document that from a EUR 100 increase in the tax burden, workers pay EUR 17 through changes in wages and employment, firm owners EUR 23 through forgone distributed profits, and consumers EUR 18 via price increases. The remaining 43 EUR are financed through changes in investment, reserves, and debt, among other margins. Exploiting randomized variation, we find that profit tax incidence is highly asymmetric with respect to tax increases and decreases, especially with regard to prices, and sensitive to the size of the tax change.

*All authors are affiliated with the University of Mannheim. Contact details: r.winter@uni-mannheim.de, doerrenberg@uni-mannheim.de, feble@uni-mannheim.de, rostam-afschar@uni-mannheim.de, voget@uni-mannheim.de. We thank Anne Brockmeyer, Giacomo Brusco, Florian Buhlmann, Michael Devereux, Jeffrey Hoopes, Tomáš Lichard, Eric Ohrn, Jens Mueller, Marcel Olbert, Andreas Peichl, Sebastian Siegloch, Barbara Stage, as well as participants at several conferences, seminars, and workshops for valuable feedback. We thank the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG) for financial support as part of the *TRR 266 Accounting for Transparency* cluster (Project-ID 403041268). The trial was registered with the AEA (RCT trial ID AEARCTR-0011379) and received ethical approval from the U. Mannheim Institutional Review Board.

"If I had ten questions to ask god, [. . .] one of [. . .][them] would be, what is the incidence of the corporation income tax?" – James Hines[1]

1 Introduction

Taxes on business profits are important cost factors for firms (Jacob, 2022). They affect financing and investment decisions (Giroud & Rauh, 2019; Ohrn, 2018; Zwick & Mahon, 2017), price setting (Baker et al., 2020), as well as hiring policy and wage negotiations (Arulampalam et al., 2012; Dwenger et al., 2019; Fuest et al., 2018). Furthermore, changes in profit taxes can impact both the scale and composition of labor and capital inputs employed by a firm. When a firm experiences a change in its profit tax burden, its manager has a variety of adjustment margins at her disposal to respond to the change in cost structure. Will the manager reduce wage growth or distributions to shareholders after an increase in the profit tax burden? Are output prices affected after a tax decrease, or are the additional funds funneled towards new investment projects? Whatever the manager decides, her choices will have consequences for the firm's stakeholders, namely, employees, owners and customers. These questions then lead to the question of tax incidence, which is crucial for determining the welfare and distributional effects of taxes and has important implications for optimal policy.[2]

Existing empirical literature using archival data usually studies one particular dimension of incidence at a time in one specific setting, e.g., the effect of taxes on wages or output prices in one particular country. Focusing on one margin is due to the challenge of finding adequate data and identification strategies to isolate the effect.[3] While these studies are able to causally identify the effects of taxes on single adjustment margins in their respective

[1]"The Future of Corporation Tax Research", Talk delivered by James Hines at Saïd Business School, University of Oxford (July 15, 2015), https://www.youtube.com/watch?v=CSxPe7tLOBg.

[2]Conceptually, there are several ways how incidence can be measured (Fullerton & Metcalf, 2002). Economists frequently measure the economic incidence by the change in welfare for a specific group induced by the tax relative to the sum of welfare changes of all groups considered (Fuest et al., 2018; Fullerton & Metcalf, 2002; Suárez Serrato & Zidar, 2016). We do not measure welfare in terms of utilities directly, but express the relative burden of the tax attributable to a specific group in terms of its share in the tax burden change. By employing this definition, we abstract from the dead-weight losses of the tax and do not allow for over-shifting by definition.

[3]Of the 30 most-cited empirical papers published on tax incidence from 2000 to 2023, we find that 22 study one decision margin, three have a focus on two decision margins, four investigate three margins, and only one paper considers five decision margins. In contrast to our study, those papers investigating multiple margins either focus on only one stakeholder group (i.e., they study different margins which all affect the same group of stakeholders, such as workers or customers) or employ spatial equilibrium frameworks with second-round effects to estimate tax incidence for several stakeholder groups. None of the papers investigate more than five margins in one unified setup (as do we). See below for more on the related literature.

setting, the variety of countries, tax types, timeframes, and identification strategies, makes it difficult to combine the insights they provide into one comprehensive picture (Hsieh et al., 2023). However, to fully understand the effects of profit taxes and their distributional implications, it is important to consider all dimensions along which taxes can exhibit effects.[4] This is where our paper comes in: we use data from a novel large-scale survey of German firms to provide evidence on the tax responses of firms along many different margins. Our aim is to improve the understanding of the *full* picture of profit tax incidence within one unified setting, thereby complementing the existing findings in the large literature. Survey data are useful in this context, as they allow the measurement of a comprehensive set of adjustment margins within a unified framework.[5]

Our starting point is the effect taxes have on the managerial decision margins. We focus on the short-run direct effects of the managers' adjustment decisions, abstracting from general equilibrium effects. We take a straightforward approach and ask firms about how profit taxes affect a set of decision margins in their companies. For this purpose, we randomly assigned survey respondents to hypothetical permanent tax increases and decreases in varying magnitudes, and inquired either how the additional funds available after a tax cut would be used or from which sources funds would be diverted to pay for the increased tax burden. Respondents were presented with an exhaustive list of categories to which they could attribute shares of the change in tax burden, e.g., wages, prices, shareholder distributions, investments, etc. Each of the shares was required to be an integer between zero and 100, and shares needed to sum to 100 across categories. In order to make sure that no relevant category was missing, we included an open field, where firms could indicate the missing category and the respective share. This design allows us to infer the full distribution of a, say, EUR 100 tax burden change and to determine the specific relative importance of each possible response margin.

Using this setup, we are able to examine the complete set of short-run effects of profit taxes on employees, firm owners and customers through the initial adjustment decisions by the

[4]Harberger (1962), which constitutes the seminal paper in this field, developed a simple two-sector closed economy model and finds that under plausible parameter values capital owners bear the entire incidence of the tax. However, this central result does no longer hold once an open economy setting is considered, where capital mobility becomes a relevant factor. Gravelle (2013) provides an overview of several recent theoretical models and shows how their insights hinge on the underlying assumptions being made. The results critically depend on factor mobility, factor substitution, capital intensity, international product substitution elasticities, and country size.

[5]Survey experiments have been successfully employed in similar contexts, e.g., Graham et al. (2017), and enjoy ever-increasing popularity in the social sciences (Stantcheva, 2023). Our survey design provides a unified examination of the broad effects of tax changes on adjustment margins, expanding beyond the scope of existing studies. However, it also shares the usual limitations of survey data. For further details on these limitations, see Section 7.

manager, i.e., for a given level of pre-tax profits. At the same time, we also measure channels through which indirect effects materialize, e.g., the changes of investment and financing, which down the road feedback into future pre-tax profits and are thus important for total incidence. Random assignment of the sign of the tax change provides the opportunity to test for asymmetries in the stated incidence reported by survey participants, whereas experimental variation in the size of the tax change allows us to tease out the sensitivity of profit tax effects with respect to treatment intensity. To the best of our knowledge, our paper is the first to provide evidence from a large-scale survey of companies that is able to distinguish the effects of differently signed tax changes as well as differences in treatment intensity.

Our main findings can be summarized as follows. First, we document that a hypothetical EUR 100 increase in the profit tax burden of a company is financed by workers (EUR 17), owners (EUR 23) and consumers (EUR 18) to a similar extent. In other words, of the EUR 58 borne directly by the three stakeholder groups, employees account for 29%, firm owners for 40%, and customers with 31%. Our results for tax increases are in line with studies using archival data, suggesting that the survey answers are reliable and reasonable. Arulampalam et al. (2012), Suárez Serrato & Zidar (2016), Fuest et al. (2018), Dwenger et al. (2019) and Risch (2024), among others, estimate the incidence of local business taxes, personal income taxes and the corporate income tax on workers through wage adjustments and employment, finding varying incidence estimates of 11-50%. Recent studies investigating the effects of corporate profit taxation on consumer prices find incidence estimates in the range of 30-60% (Baker et al., 2020; Dedola et al., 2022). In addition to direct incidence on workers, owners, and consumers, we broaden our perspective to include indirect channels such as investments and retained earnings. Our findings reveal that 15% of the tax increase is offset by a reduction in planned investments, while 13% is absorbed by existing reserves. The roles of increased tax-saving opportunities and new debt acquisition are comparatively minor.

Second, we observe asymmetric reactions with regard to tax increases and decreases. From additional EUR 100 of available funds due to a decreased tax burden, EUR 31 are received by workers through increased wages or new jobs, EUR 9 are distributed to firm owners and only EUR 3 are used to decrease output prices. This presents a stark contrast to the EUR 18 burden that customers have to bear in the case of a tax increase. The significant price asymmetry we observe aligns with the findings of Benzarti et al. (2020), who note that price reactions to tax increases are twice as pronounced as those to tax decreases. Moreover, EUR 21 are used to build reserves and EUR 31 to finance new investment projects. Again, a reduction in tax planning and debt repayment seem to be less important decision margins.

Third, we observe heterogeneous effects with regard to the size of the tax change. We find

that larger tax changes increase the incidence on workers, mainly through the extensive employment adjustment channel. The results indicate that this increased worker incidence mainly stems from the owner payout and reserves categories. For tax increases, this implies that firm owners are hesitant to shoulder a greater proportion of the tax burden as the increase gets larger. Conversely, with tax decreases, employees benefit proportionally more as the tax reduction becomes larger.

Finally, by exploiting the presence of a rich set of company characteristics in our survey data, we further investigate the determinants of profit tax incidence. Our results suggest that wage incidence is lower for companies organized as pass-through firms (such as sole proprietors or partnerships) compared to corporations. The incidence on workers through employment adjustments seems to be mediated by company size, suggesting that the employment impact becomes larger as the stock of employees increases. These findings collectively suggest that, following tax changes, labor adjustments appear more feasible for larger firms than for smaller companies, possibly because of their greater bargaining power relative to their workforce. Moreover, incidence also seems to be affected by the degree of uncertainty faced by the company as well as the economic sector it operates in. For instance, when a company has greater certainty about its future revenue path, it is less inclined to cut investments in response to a higher tax burden. This is consistent with prior studies finding that high macroeconomic uncertainty leads firms to pause or postpone investment (Bloom, 2009; Kumar et al., 2023). These firms can reallocate funds for planned investment towards paying for the increase in tax burden, while firms facing lower uncertainty may be engaged in long-term investment plans that cannot be changed in the short-run.

Our paper relates to several strands of literature. For a review of the earlier empirical literature on corporate tax incidence, see Clausing (2013), Hanlon & Heitzman (2010) or Jacob (2022). In general, most studies in the literature focus on only one adjustment margin (and thus one group of stakeholders). Moreover, the few studies that examine multiple adjustment margins (see Footnote 3 above) differ from ours in that they either focus on different margins which all matter for only one single stakeholder group, like workers (Risch, 2024; Giroud & Rauh, 2019) or customers (Kosonen, 2015; Jacob et al., 2023), or use spatial equilibrium models to assess the impact of taxes on various groups (Suárez Serrato & Zidar, 2016).

The study by Suárez Serrato & Zidar (2016) is noteworthy because they provide incidence estimates for several groups simultaneously, finding that the incidence of the US state corporate income tax falls to 40% on capital, 30-35% on workers, and to 25-30% on landowners. Their study uses a spatial equilibrium framework with second-round effects, whereas we consider

first-round effects in a partial equilibrium setting to study how managers initially respond to tax changes (including indirect effects). We thus add a different angle to the incidence question and do not rest on assumptions commonly invoked in general equilibrium models.

Our study also provides new evidence concerning the incidence of taxes on consumers. Given the limitations of archival data related to price data and other margins in settings with exogenous tax variations, empirical evidence on the extent to which taxes are passed through to customers is notably scarce. A few recent papers show that the burden is with customers (Kosonen, 2015; Benzarti & Carloni, 2019; Baker et al., 2020; Kang et al., 2021; Dedola et al., 2022; Jacob et al., 2023). With regard to asymmetric differences in the incidence of the value-added tax, Benzarti et al. (2020) suggest that prices react stronger after value-added tax increases than for decreases and that price increases after tax hikes lead to higher profits and mark-ups of firms. Jacob et al. (2023) also finds similarly asymmetric results in Germany's gasoline market, considering changes in the local business tax rate. Aside from studying these margins along other margins, we add to these studies by showing the asymmetry results hold also for a broader set of profit taxes, and generalize the findings to different industries.

A further contribution of our study is to quantify how managerial decision-making in response to business taxes influences the major stakeholder groups (owners, employees, customers) indirectly, for example through tax-induced adjustments of investments, tax avoidance, and CEO compensation (which will eventually affect long-term pre–tax profits). With regard to investments, studies so far found dampening effects of higher taxes on investments (Chen et al., 2023; Jacob & Zerwer, 2023; Ohrn, 2018; Zwick & Mahon, 2017; Hanlon et al., 2015). For instance, Jacob & Zerwer (2023) demonstrate that Spanish firms curtailed investments following the introduction of a local emission tax (i.e., not a profit tax as in our case and most of the literature). They also observe that the emission tax has a detrimental effect on wages (using Orbis wage information). Giroud & Rauh (2019) find that the range of the tax elasticity of business activity depends on the type of taxes and the legal form of the firm. Dyreng et al. (2022) show that, in cases in which the corporate incidence falls primarily on firms and not on workers, firms engage in more tax avoidance. Finally, Bornemann et al. (2023) and De Simone et al. (2022) both find that a reduction in the deductibility of executive pay leads to no reduction with regard to the amount and structure of CEO compensation and suggest that the burden of higher taxes lies with shareholders of the firm. We add to this stream of papers by providing evidence that the usage of these margins heavily depends on the sign of the tax change.

The paper proceeds as follows. In Section 2, we introduce the survey and provide a detailed description of the survey and experimental design. Section 3 presents the average distribution

of the tax burden change separately for tax increases and decreases. Section 4 uses experimental variation to investigate if incidence depends on the magnitude of the tax change. Section 5 studies the asymmetry between tax increases and decreases using experimental variation. In Section 6, we investigate the determinants of tax incidence. Section 7 concludes the paper and discusses the limitations of our study.

2 Survey Design and Data

2.1 Survey and Sampling

Our tax incidence questions were fielded in the second wave of the German Business Panel (GBP), which launched on November 16, 2020 and closed on June 24, 2021. The GBP constitutes a large-scale survey of executives and high-level decision makers of companies operating in Germany, which periodically assesses their views and expectations regarding topics in accounting and tax policy. Firms participating in the GBP closely align with the target population in terms of industry affiliation. However, there is a slight under-representation of small firms and sole proprietors, and a corresponding over-representation of larger firms. To address this and enhance representativeness, the GBP offers survey weights, which we employ in the following empirical analysis. A detailed overview of the survey methodology and content is provided by Bischof et al. (2023).

The contact information of firms was obtained from the Bureau van Dijk Orbis database. The subsample of firms that participated in our survey was drawn randomly from the overall address pool and invited to participate in our online survey via email. A total of 8,392 respondents completed the questionnaire used for this paper. We sent invitation e-mails for the online survey on 45 work days between November 16, 2020 and January 22, 2021. Firms were randomly assigned to one of the 45 days. After seven, 14, and 28 days, we sent a reminder e-mail. We collected survey responses from November 16, 2020 through June 24, 2021. Approximately 87% of survey respondents are the owner or CEO of the corresponding firm.

2.2 Tax Incidence Survey Questions

The survey experiment started with the following question:

> *"Assume that your company has a (1%/10%/25%) permanently higher profit tax burden as a result of a tax increase. How do you finance the additional burden?"*

Figures B1 and B2 provide examples of the tax incidence questions as appearing in the online interface of the survey in German. Respondent companies were randomly assigned to one of the six different treatment groups defined by the combination of i) direction of tax change, either increase or decrease; and ii) magnitude of the tax change, either 1%, 10% or 25%.[6] We opted to assign percentage changes in tax burden over percentage point changes in statutory tax rates, as German firms face different tax rates depending on their legal form and hence are at different baseline levels of tax rates. These differences in applicable tax rates also motivated us to choose the term profit tax for our question over something more specific such as the corporate income tax, as respondent firms might be subject to different taxes. The term profit tax is inclusive of the German local business tax, which has different effects on pass-through entities and corporate firms, the personal income tax, as well as the corporate income tax.[7]

After receiving treatment, firms were presented with an exhaustive list of categories and could select shares attributable to each of them, either by using the slider next to each category, or by entering them directly via the boxes on the far right. Entered shares had to be non-negative and were required to add up to 100.

Table 1 contrasts the available categories for the tax increase and decrease groups. Respondents could attribute the additional burden (in the case of a tax increase) or additional funds (in the case of a tax decrease) of the profit tax change to the following adjustment margins: employee compensation, job creation or destruction, payouts to partners or shareholders[8], retained earnings or reserves, customer prices, investments, use of tax saving opportunities, and other categories (in the form of an open field question). In addition, the tax increase treatment groups had the option to select increases in debt capital in order to reflect the possibility that there might not be resources in the company to finance the additional burden.

In the following, we motivate the choice of our set of adjustment margins and how they affect the three stakeholder groups we consider. We distinguish between adjustment margins that have a direct effect on stakeholder groups and those with more indirect implications. For the direct impact on wages and employment, profit distributions and prices, the affected stakeholders are straightforward (workers, owners and consumers, respectively). However,

[6]The tax decrease treatment was worded correspondingly: *"Assume that your company has a (1%/10%/25%) permanently **lower** profit tax burden as a result of a tax **cut**. How do you **distribute the additional funds**?"*

[7]The German corporate tax is levied on the income of incorporated firms. The local business tax is payable by both pass-through firms and corporations, and is also applied as a tax on the profits of a business. The personal income tax is levied on the income earned by sole proprietors or partners in business partnerships. In the case of partnerships, partners are taxed at their respective personal income tax rates.

[8]Respondents only saw the category matching their stated legal form.

managers may also choose adjustment margins that influence future pre-tax profits, thereby indirectly affecting stakeholder incidence. Numerous studies have documented the influence of tax changes on investment decisions (Hanlon et al., 2015; Ohrn, 2018; Zwick & Mahon, 2017; Giroud & Rauh, 2019; Chen et al., 2023). An increase in profit taxes might prompt managers to curtail capital investments. This reduction could lead to diminished labor productivity and lower *future* wages (Arulampalam et al., 2012). According to classical tax incidence literature (Harberger 1962; Fuest et al., 2018), higher taxes can also lead to increased product prices for customers due to lower output as firms reduce investment. This often results in a shrinkage at both firm and industry levels (Djankov et al., 2010; Giroud & Rauh, 2019; Brekke et al., 2017), driven by marginally profitable firms exiting the market or downsizing at the firm level due to rising marginal costs of capital and labor (Jacob et al., 2023). Thus, tax-induced investment changes can significantly impact the incidence on firm owners, employees, and customers in the long run.

A higher tax burden may also incentivize firms to exploit tax saving opportunities more extensively. Successfully leveraging these opportunities allows firms to moderate the need for adjustments in investments, wages, or output prices, thereby lessening the impact on capital and labor (Jacob et al., 2023). The propensity to utilize such tax saving strategies may hinge on factors like the labor supply elasticity, tax deductibility options, or the degree to which higher tax incidence affects shareholders versus employees (Fuest et al., 2018; Dyreng et al., 2022). Additionally, higher taxes could lead to an increase in debt financing or a decrease in retained earnings (Djankov et al., 2010). Such shifts may complicate financing of investment or exacerbate principal-agent problems, particularly when a larger proportion of investment is externally financed (Ohrn, 2018).[9] Changes in financing structures, coupled with negative investment effects, can therefore result in greater tax incidence on either workers or firm owners, contingent upon factors like the labor supply elasticity and capital mobility.

The *Others* category was added to ensure that no relevant incidence category was missing. If a respondent selected a positive share, she could give a free-text answer indicating the missing category or categories. Figure B5 illustrates the text answers given in the *Others* category prompt for the tax decrease and tax increase treatments, respectively. The most stated missing category in the decrease treatment seems to be the use of the additional funds for debt repayment, indicated by the large fonts corresponding to terms such as liabilities (=Verbindlichkeiten), repayment (=Rückzahlung), or loans (=Kredite, Darlehen). Another factor seems to be that several companies were not making any profits, rendering a reduction in the profit tax burden impossible.

[9]This effect is reversed in the case of tax decreases. For example, see Ohrn (2018).

Table 1: Incidence Categories

Tax Increase	Tax Decrease
Decreased payment to employees	Increased payment to employees
Reduction of jobs	Creation of additional jobs
Decreased payout to partners	Increased income for partners
Lower distributions to shareholders	Higher distributions to shareholders
Decrease in retained earnings/reserves	Increase in retained earnings/reserves
Price increases (for customers)	Price reductions (for customers)
Lower investments	Higher investments
More use of tax saving opportunities	Less use of tax saving opportunities
Others	Others
Increase in debt capital	Decrease in debt capital(*)

Note:
This table shows the different incidence categories available to respondents for the tax increase and decrease treatment arms respectively. Based on participants being randomly assigned to either the tax increase or tax decrease group, they are presented with the following question: Assume that your company has a (1%/10%/25%) permanently higher/lower profit tax burden as a result of a tax increase/cut. How do you finance the additional burden/distribute the additional funds? (*): Note that the category Decrease in Debt Capital was not available initially, but recovered by the open field entries of the Others category.

We accommodated the results from the textual analysis by generating a category *Decrease in Debt Capital*. For this purpose, shares entered for the category *Others* were reclassified as being used for debt repayment if the text field associated with the *Others* category contained keywords such as liabilities, repayment, debt, etc. Using this method, we are able to recover 39 positive responses for the debt repayment category, which is significantly less than the over 558 positive shares attributed to the debt category in the tax increase groups. For the tax increase treatments, the most relevant channel which was not available to respondents appears to be the cessation of activities or shifting activities abroad, as well as general cost reductions.

The order, in which the answer options were presented to the participants, was not randomized. While this could theoretically introduce some ordering effects, we are confident that this is not a major concern in our setting for two reasons. First, as the entered shares had to sum to 100, respondents could not consider the options in isolation but in the context of the full picture. Moreover, respondents could only proceed to the next screen once the sum constraint was satisfied. Second, the descriptive survey results presented below do not reveal a pecking-order pattern, in the sense that the first few categories are chosen to a larger degree than the others. Furthermore, we acknowledge that in the final implementation of the online survey by the GBP, the order of the second and third categories was switched across the increase and decrease treatment groups. This is illustrated in Figure B1 in combination with Figure B2. This implementation issue does not affect the within-sign experimental design, i.e., the different tax increase treatments are consistent with each other. For the comparison of effects between tax increases and decreases, on the other hand, we cannot rule out that the differential ordering has an effect. However, it is unlikely that this inconsistency drives our results, for the same reasons mentioned above.

2.3 Summary Statistics and Covariate Balance

The survey collects data on fundamental company characteristics such as legal form, industry affiliation, as well as revenue and number of employees in the previous year. Figure B4 provides some insights about the distribution of company characteristics in our sample. Panel (a) displays the shares of companies operating as corporations, partnerships and sole proprietors. The companies in our data are mostly corporations, with a share of about 72%, followed by sole proprietors and partnerships with shares of 13% and 14%, respectively. Panel (b) and (c) indicate that less than 10% of firms have more than 50 employees or revenues exceeding six million EUR. However, compared to the underlying firm population, larger firms are heavily over-sampled, since in the population of firms in Germany only 2.6% of

firms have more than 50 employees and only 6.8% have revenues exceeding two million EUR. Lastly, Panel (d) illustrates the distribution of firms by WZ08 1-digit industry classification. The majority of companies operate in the manufacturing, retail, professional services and communication sectors, with shares of 17%, 16%, 13% and 14%, respectively.

In order to investigate how well the randomization procedure worked, we conducted multiple balance tests utilizing the available characteristics of the survey respondents in our data. Table 2 provides information on the distribution of covariates over the two treatments and presents balancing tests. Columns two through four show means and standard deviations for key company characteristics for the subsets of observations for which non-missing values for all considered variables were observed. Columns five and six provide test statistics and p-values for difference-in-means tests used to assess covariate balance. Most covariates seem to be similarly distributed across the two sub-samples. We observe some slight differences in means for revenues and number of employees, however, given the large dispersion of these two characteristics, we cannot reject the hypothesis that the population moments are identical. Furthermore, our treatment groups are well-balanced in terms of the respondents' gender, their position within the company, and the organizational form of the company.

Table 2: Descriptive Statistics and Balance Tests

	Decrease (N=2947)		Increase (N=2971)			
	Mean	Std. Dev.	Mean	Std. Dev.	Diff. in Means	p
Revenue prev. year	14,261,625	338,159,074	29,887,015	604,079,630	15,625,389	0.22
No. employees prev. year	94	3,164	71	1,199	-23	0.71
Female	0.18	0.38	0.18	0.38	0.00071	0.95
Corporation	0.72	0.45	0.73	0.44	0.01	0.39
Sole Proprietor	0.13	0.33	0.13	0.34	0.0064	0.46
Partnership	0.15	0.36	0.13	0.34	-0.016	0.072
Manufacturing	0.17	0.37	0.16	0.37	-0.0064	0.51
Construction	0.07	0.25	0.077	0.27	0.0075	0.27
Trade	0.15	0.36	0.14	0.35	-0.0093	0.31
Services	0.3	0.46	0.31	0.46	0.0073	0.54
Other	0.31	0.46	0.31	0.46	0.00086	0.94
HHI	1,132	2,076	1,130	2,041	-1.7	0.98
CR4	0.35	0.26	0.36	0.26	0.0037	0.6

Note:
This table shows balance tests for our two treatment arms tax increase and tax decrease. For the tests, we require non-missing observations for all included covariates. The table displays unweighted averages and standard deviations, along with difference-in-means test statistics and p-values.

3 Full Distribution of Tax Changes

We initially pool the three intensity groups for tax increases and decreases in order to examine the average response to profit tax changes. Tables B1 and B2 present summary measures for the outcome variables in the two treatment arms. The second and third columns depict un-weighted and weighted averages respectively, whereas the three rightmost columns show sample percentages of shares being equal to zero, one, or in the open interval. We see some small differences in means between the un-weighted and weighted observations, however, none of the differences are substantial. The sample percentages show that companies made extensive use of most categories, with some exceptions. For the tax increase treatments, only the category *Others* is used by less than 10% of companies. For the tax decrease treatments on the other hand, prices, tax planning, debt and other categories are used to a negligible degree, with less than 10% of observations being positive. The tables show that our method of retrieving answers for the debt category from the text entries is not that successful, as only 1% of observations can be reclassified. For the subsequent analyses, we will use the un-weighted observations.

Figure 1 illustrates the average distribution of the tax burden change on the different adjustment margins for tax increases (Panel a) and decreases (Panel b), separately. The averages show the fundamentally different incidence resulting from differently signed tax changes. For tax increases, we find that workers bear about 17% of the profit tax incidence, where 9.5% are channeled through reduced wages and 7.1% through job cuts. When looking at tax decreases on the other hand, we find an incidence on workers that is with 31.3% almost twice as large as for increases, with 18.1% resulting from an increase in wages, and 13.2% from the creation of new jobs. One explanation for this lower impact on employees for the tax increase treatments could be the downward stickiness of wages as well as employment protection laws in Germany. We find similar differences when considering the effect of the tax treatments on distributions to partners and shareholders. The survey data suggests that firm owners bear about 24% of the additional tax burden, compared to merely 9% of additional funds received in case of a tax cut. For retained earnings, we also see some differences, with a sizable incidence of 13% in case of increases, compared to 21% for the tax decrease treatment. This might at least partly be due to the prevailing economic conditions when the survey experiment was conducted, as companies were in financial distress due to the impact of the Corona crisis and in need of cash buffers as future developments were hard to predict. The incidence on consumer prices features by far the highest asymmetry we detect. On average, the additional tax burden is passed on to consumers by 19%, whereas only 3% of the additional funds available after a tax decrease would be used to lower prices. This result

is consistent with prior findings for other taxes. E.g., Benzarti et al. (2020) find substantial differences in pass-through of VAT tax cuts and hikes for Finnish hairdresser salons.

Furthermore, we detect asymmetries for the responses of investment to tax changes. The averages suggest that investment levels are less affected by tax increases as they are by tax decreases. With 27%, investments are almost twice as responsive to tax decreases than increases. In order to investigate the underlying mechanisms responsible for companies choosing to change their investment behavior in response to a tax change, we asked respondents selecting shares for investment in excess of 5% about their reasoning. Figure B3 presents an example of the question as appearing in the online interface of the survey. Participants could choose values on a scale from 0 to 100, where 0 indicated that more (less) funds would be available for investment after a tax decrease (increase), and 100 indicated that the investment was more or less worthwhile. A lower value selected therefore indicates that the company faces credit constraints and a higher value suggests that the effects of the tax change on the profitability of the investment matters more. Figure B6 illustrates the results of these follow-up questions. We binned the possible responses into three categories. Answers below 25 were attributed to the category *Less money to invest*, answers between 26 and 75 were classified as indicating that both reasons were equally important, and answers above 76 were taken as indication that the profitability aspect predominated. The results indicate that the majority of companies seem to exert an investment response because of credit constraints and less so because investments are more or less worthwhile after the tax change.

As we discussed in Section 2.2, we differentiate between direct and indirect tax incidence.[10] We follow prior studies and define the direct incidence of the profit tax as the short-term immediate impact of the tax change on workers, firm owners and consumers. Considering a given level of pre-tax profit, the direct incidence indicates how a change in the profit tax burden is shared across stakeholders at the margin through wage, employment, payouts and price adjustments. The indirect incidence, on the other hand, relates to general equilibrium effects caused by changes in firm investment behavior and output prices, which in turn affect the capital-labor ratio, the future level of pre-tax profits as well as factor payments. Several papers using archival data in this field abstract from these general equilibrium effects and provide evidence on the direct incidence. In our setup, the direct incidence corresponds to the categories *Compensation*, *Employment*, *Payout* and *Price*.[11] Even though we observe some aspects of the mechanisms of indirect incidence, such as changes in investments or tax

[10] cf. Arulampalam et al. (2012)

[11] One could argue that changes in retained earnings/reserves could also be attributed to the owners of the company, in addition to payouts. However, this only holds true if the reserves are eventually distributed to the firm's owners and not used for future investments.

planning behavior, deriving the total incidence of the profit tax change requires a theoretical model that accounts for the mechanism of indirect incidence feeding back into the direct incidence categories. Abstracting from such a general equilibrium model, our results for the indirect incidence measures nevertheless inform future theoretical research. They highlight the importance and magnitude of these second-round effects for the overall tax incidence effect.

Given our interpretation of the *Compensation*, *Employment*, *Payout* and *Price* categories components of the direct incidence of the profit tax on workers, firm owners and customers, we can contrast our results to the existing findings based on archival data. As the impact on these categories is expressed as a percentage of the change in tax burden, the categories are measured in the same units and can directly be compared to each other. We define the direct incidence on workers as the ratio of the sum of the *Compensation* and *Employment* categories over the sum of the previously mentioned direct incidence categories. The incidence on firm owners and consumers is defined analogously. This definition is related, but not equivalent, to the definition of direct incidence adopted by earlier literature. For instance, Fuest et al. (2018) compute the incidence of the German local business tax on workers and firm owners by computing their respective welfare changes based on a simple partial equilibrium model. The economic incidence of the tax in their setup is then the welfare change for the considered group relative to the sum of welfare changes for all groups. As our measure is based on the change in tax revenue, we abstract from dead-weight losses of the tax as well as over-shifting, both of which have the potential to generate burden in excess of the generated tax revenue (Fullerton & Metcalf, 2002).

Our estimates of average worker incidence when considering the distribution of tax burden among workers and capital owners is with 41% for tax increases well within the range of prior findings. Arulampalam et al. (2012) find a long-run direct incidence of corporate income taxes on wages of 49% in a cross-country setting, controlling for effects on pre-tax profit levels. Fuest et al. (2018) exploit variation in Local Business Tax rates and estimate a direct incidence on wages of 51%, with the rest of the burden being borne by capital (which amounts to 59% in our case). For prices, our measured average incidence of 31% is in line with the findings of Baker et al. (2020), who find an incidence of state corporate income taxes on retail prices of 31% as well.

In summary, we find comparable direct incidence estimates for wages, shareholder payouts and prices for tax increases compared to previous findings in the literature and document plausible asymmetries between tax increases and decreases. Workers benefit substantially more from a tax decrease than they suffer from a tax increase. For firm owners and consumers, the

reverse appears to hold true. Moreover, for our sample of mostly cash constrained firms, we document a substantially higher investment response for tax decreases compared to increases.

4 Magnitude of the Tax Change

4.1 Empirical Strategy

We use two distinct approaches to uncover the incremental effects of tax changes on the profit tax incidence. Following Mullahy (2015), let $\boldsymbol{y}^g \equiv (\boldsymbol{y}_1^g, \ldots, \boldsymbol{y}_M^g), g \in \{d, i\}$, denote the $N \times M$ matrices of outcomes for the tax decrease (d) and tax increase (i) treatments, where $y_{cm}^g \in [0, 100]$ denotes share in percentage points attributed to category m in company c for treatment group g, N the number of firms in the sample, and M the number of categories. In the following, we consider the normalized shares $s_{cm}^g := y_{cm}^g/100 \in [0, 1]$. Letting $\boldsymbol{X}^g$ denote the $N \times K$ matrix of additional covariates, we can characterize the system of share equations as

$$E[s_{cm}^g|\boldsymbol{X}^{\boldsymbol{g}}] = G_m(\boldsymbol{X}^g; \boldsymbol{\beta}^g) \in (0, 1),\ m = 1, \ldots, M \tag{1}$$

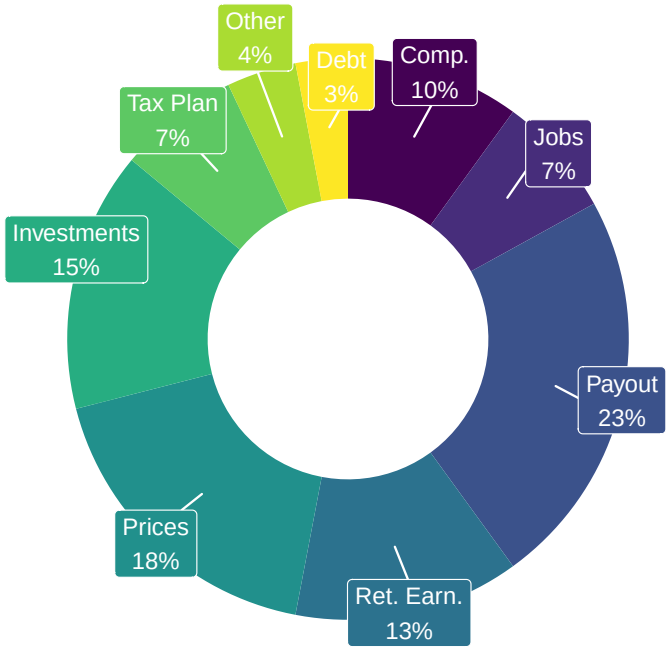
$$\sum_{m=1}^{M} s_{cm}^g = 1,\ c = 1, \ldots, N,\ g \in \{d, i\} \tag{2}$$

$$\Pr(s_{cm}^g = 0|X^g) > 0\ \forall m = 1, \ldots, M,\ g \in \{d, i\} \tag{3}$$

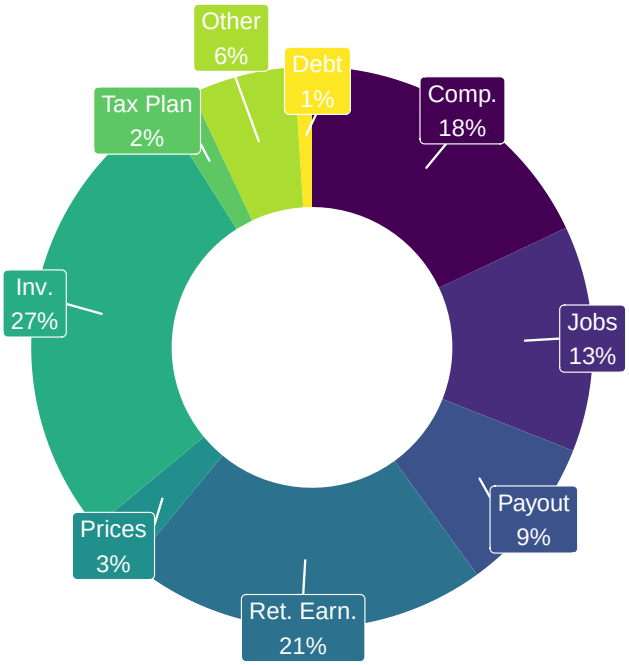
$$\Pr(s_{cm}^g = 1|X^g) > 0\ \forall m = 1, \ldots, M,\ g \in \{d, i\}, \tag{4}$$

where $\boldsymbol{\beta}^g = (\boldsymbol{\beta}_1^g, \ldots, \boldsymbol{\beta}_2^g)$ is a $K \times M$ vector of parameters and $G_m(\boldsymbol{X}^g; \boldsymbol{\beta}^g)$ a parametric conditional mean function. Equation (1) signifies the bounded nature of our outcome variables. Note that the condition as stated precludes the case in which one share obtains a boundary value $\mu \in \{0, 1\}$ for some combination of covariates $\boldsymbol{X}^g$. This condition is necessary for our second approach, which will be discussed in detail below.[12] Equation (2) is the unit-sum constraint, stemming from the fact that, by construction, the shares of different categories need to sum to one for each firm in the sample. Equations (3) and (4) illustrate that individual shares might attain boundary values with non-trivial probabilities, which requires special care when choosing the correct econometric specification. Taken together, the four equations characterize our data structure as so-called compositional or multivariate fractional response data. Our main interest lies in estimating the parameters $\boldsymbol{\beta}$ of the conditional mean functions $G_m(\boldsymbol{X}; \boldsymbol{\beta})$.

[12]The fringe case where a share would obtain a boundary value for all combinations of covariates is not particularly interesting for further analysis and not a concern in our setting.



(a) Tax Increase



(b) Tax Decrease

Figure 1: Average Incidence Comparison. The Figure shows unweighted averages of the separate answer categories for the tax increase and decrease treatments separately. The sample is based on 7990 observations, 4000 for the tax increase and 3990 for the tax decrease group. Observations are restricted to completed answers with non-missing survey weights.

In our baseline specification, we ignore the bounded nature of our outcome variables (1) as well as the unit-sum constraint (2) and assume a linear conditional mean function for each category m for our two treatment arms d and i:

$$s_{cm}^{g} = \beta_{0m}^{g} + \beta_{1m}^{g} TAX10_{i}^{g} + \beta_{2m}^{g} TAX25_{i}^{g} + \varepsilon_{i},\ m = 1, \ldots, M, \tag{5}$$

where $TAX10_{c}^{g}$ and $TAX25_{i}^{g}$ are indicator variables equal to one if company c was in the respective treatment group.[13] We then estimate each share equation separately by Ordinary Least Squares, which makes the estimated effects easier to interpret. $\hat{\beta}_{0m}^{g}$ estimates the mean incidence in percent on category m for the the lowest treatment intensity group in treatment arm g, whereas $\hat{\beta}_{1m}^{g}$ and $\hat{\beta}_{2m}^{g}$ identify the incremental effects of the larger tax change treatments relative to the baseline treatment. Ignoring the underlying restrictions of our data set has two main potential drawbacks, as pointed out, e.g., by Mullahy (2015) or Murteira & Ramalho (2016). First, similar to a linear probability model, predicted shares are not guaranteed to fall in the interval $[0, 1]$ for all combinations of covariates, and do not necessarily sum to one. Second, the model might misrepresent the partial effects of covariates. However, as we are mostly focusing on estimating the effects of dummy variables of experimental treatments, these caveats are not a major concern in our setting. We show the robustness of our results by employing an alternative estimation approach (see Section 4.1.1) that takes both the boundedness as well as the unit-sum constraint into account.

4.1.1 Multivariate Fractional Logit

Because of the aforementioned shortcomings of the linear model, we also consider an alternative specification for the conditional mean functions $G_m(\boldsymbol{X}; \boldsymbol{\beta}), m = 1, \ldots, M$. Following Mullahy (2015), we specify the M conditional means to have a multinomial logit functional form given as

$$E[s_{cm}^{g} | \boldsymbol{X}^{g}] = G_m(\boldsymbol{X}^{g}; \boldsymbol{\beta}^{g}) = \frac{\exp(\boldsymbol{x}_{c}^{g'} \boldsymbol{\beta}_{m}^{g})}{\sum_{l=1}^{M} \exp(\boldsymbol{x}_{c}^{g'} \boldsymbol{\beta}_{l}^{g})},\ m = 1, \ldots, M \tag{6}$$

As for the conventional multinomial logit model, the parameters of the conditional mean functions $\boldsymbol{\beta}$ are not identified without imposing a normalization restriction. We choose investment as the reference category. Suppose without loss of generality that category M is the *investment* category. That way, we can rewrite the conditional means as

$$E[s_{cm}^{g} | \boldsymbol{X}^{g}] = G_m(\boldsymbol{X}^{g}; \boldsymbol{\beta}^{g}) = \frac{\exp(\boldsymbol{x}_{c}^{g'} \boldsymbol{\delta}_{m}^{g})}{1 + \sum_{l=1}^{M-1} \exp(\boldsymbol{x}_{c}^{g'} \boldsymbol{\delta}_{l}^{g})},\ m = 1, \ldots, M, \tag{7}$$

[13] E.g., $TAX10_{c}^{d} = 1$ if unit c was in the 10% tax decrease group.

where $\delta_m^g \equiv \beta_m^g - \beta_M^g$. Interpretation of signs and magnitudes of the estimated δ coefficients is in general not straightforward. Far more useful in our context, where we want to compare the results of the multivariate fractional logit model with the OLS estimates, are the average partial effects resulting from the model, which are invariant to the selected normalization procedure. The average partial effects for the multivariate fractional logit model, when considering a dummy variable, are given by

$$\begin{aligned} \hat{APE}_{mk} &= \frac{1}{N}\sum_{c=1}^{N} \hat{PE}_{mkc} \\ &= \frac{1}{N}\sum_{c=1}^{N} \frac{\Delta E[s_{cm}^g | \boldsymbol{x}_c^g]}{\Delta x_{ck}^g} \\ &= \frac{1}{N}\sum_{c=1}^{N} \frac{\exp(\boldsymbol{x}_{-k,c}^{g'}\boldsymbol{\beta}_{m,-k} + \beta_{mk}^g)}{1 + \sum_{l=1}^{M-1}\exp(\boldsymbol{x}_{-k,l}^{g'}\boldsymbol{\beta}_{l,-k}^g + \beta_{lk}^g)} - \frac{\exp(\boldsymbol{x}_{-k,c}^{g'}\boldsymbol{\beta}_{m,-k})}{1 + \sum_{l=1}^{M-1}\exp(\boldsymbol{x}_{-k,l}^{g'}\boldsymbol{\beta}_{l,-k}^g + \beta_{lk}^g)}, \end{aligned} \tag{8}$$

where $\Delta x_{ck}^g = 1$ and $\boldsymbol{x}_{-k,c}$ denotes the vector of explanatory variables for observation c excluding variable k.

4.1.2 Inference

Our setup requires estimation of a relatively large set of coefficients, which cannot be considered in isolation when conducting statistical inference. When testing a large set of coefficients for significance, the nominal power of a single test quickly deteriorates, potentially yielding significant estimates by chance. We take a conservative approach when conducting inference and implement the Benjamini & Yekutieli (2001) correction for p-values. The resulting q-values can be interpreted as the rate of false positive findings we would need to be willing to accept in order for the coefficient to be still considered to be significant. The correction takes into account the number of pairwise comparisons conducted for one specification of the share equation system and controls the False Discovery Rate (FDR) in contrast to similar methods such as the Bonferroni correction, which controls the family-wise error rate. In all our specifications, we present robust standard errors in parentheses next to the coefficient estimates, and adjusted p-values below. We interpret a q-value smaller than 10% as a significant finding.

4.2 Results

Tax Increase Treatment. We start our analysis by estimating specification (5) for the tax increase treatment arm. The regression results are illustrated in Table B3 and Panel (a) of Figure 2. Panel (a) of Figure 2 shows the coefficient estimates of the 10% and 25% treatment

intensity dummies for each share equation with simultaneous confidence bounds based on the Bonferroni correction. The intercept estimates representing the corresponding means of the baseline 1% treatment intensity group are indicated by the boxed numbers above the x-axis. For the most part, the estimates of the 1% treatment are in the same range as the means of the summary table B1, with some exceptions.

Most notably, we see significant incremental effects for the *Job Destruction* category. Starting off at a base level of 5%, the effect increases for the larger tax increases by about 3 percentage points, indicating a 58% higher incidence for medium and large tax hikes. We also observe an increased share attributed to the *New Debt* category, where the share is higher by about 1 percentage point for the larger tax hikes, compared to the two percent base level observed for the 1% increase group. This higher burden on workers and debt capital seems to be benefiting firm owners, as the shares on retained and distributed earnings decreases as the tax hike becomes larger. The incidence on payouts to partners and shareholders decreases from a base level of 25% by 2 and 3 percentage points, whereas the share on retained earnings decreases by roughly 2 percentage points for the medium and large tax treatments, respectively. This pattern is consistent with firm owners paying for modest increases in tax burden out of their own pockets, but are less willing or able to cope with the additional tax burden as the magnitude of tax increase increments. For larger tax changes, more drastic measures need to be taken in the sense that jobs have to be cut in order to keep the company profitable. Interestingly, neither the pass-through to prices nor the effect on investment seem to be mediated by the size of the tax change. Moreover, the incidence increase on labor seems to be driven exclusively by the impact of job cuts, as the effect on wages is statistically indistinguishable for the three treatment intensities. A potential explanation could lie in the aforementioned downward stickiness of wages.

As survey respondents only provided stated incidences and there is no way of telling whether the responses were truthful or not, one might be skeptical about these results. However, if companies were to give socially acceptable answers to the survey questions or try to affect the outcome of the survey by providing exaggerated or untruthful statements, we would not expect to find any significant differences based on the magnitude of the tax change. In order to check for the robustness of our findings with respect to the chosen methodology, we provide estimates using the methodology presented in Section 4.1.1 in Panel (b) of Figure 2 and Table B5. Reassuringly, the magnitudes and significance of the partial effects estimates are almost equivalent to the ones estimated by OLS, suggesting that our results are not sensitive to to the choice of the econometric specification.

Tax Decrease Treatment. We repeat the analysis of the preceding section for the tax

decrease treatments. Tables B4 and B6 and Panels (c) and (d) of Figure 2 illustrate the results of this exercise. Where the baseline estimates for the one percent treatment intensity are vastly different for tax decreases compared to tax increases, the patterns of incremental effects are surprisingly similar. We find sizable incremental effects of the profit tax incidence on workers driven by job creation. Where the baseline estimate of 11% is almost twice as large compared to the tax increase coefficient, the incremental effects measured by the treatment intensity dummies are, with 3 (10% change) and 5 (25% change) percentage points, comparable in magnitude. The increase in incidence on workers can be explained almost entirely by a shift from capital in the form of a decreased effect on retained earnings. The incremental effects on debt are also significant, however negligible in terms of economic magnitude with incremental effects of less than a percentage point. We suggest that interpreting the estimates for the debt category in the tax decrease treatments with caution, given the potential measurement error induced by the fact that this category did not exist initially.

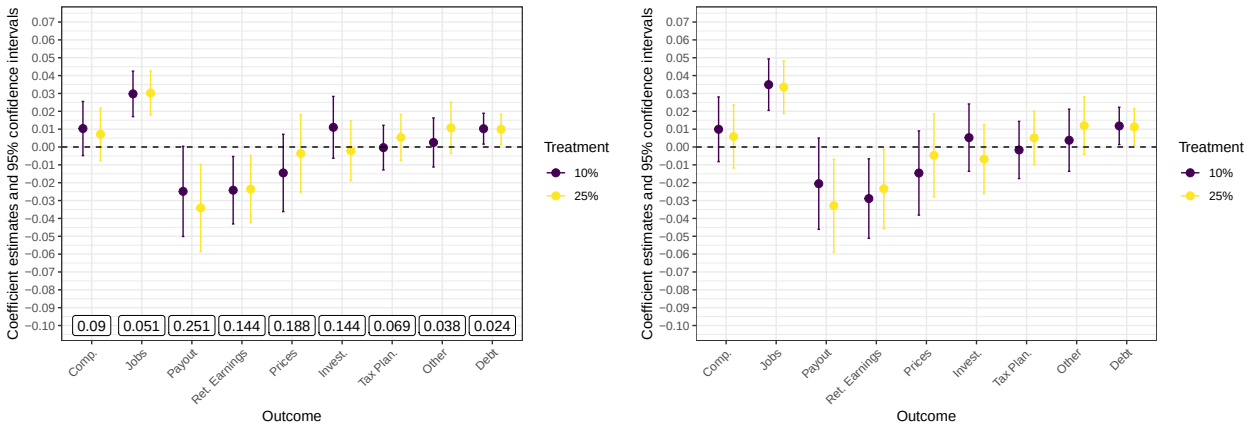
The complementary results from the multivariate fractional logit specification presented in in Panel (d) of Figure 2 and Table B6 are again quite similar in terms of magnitudes and significance, albeit the confidence intervals for the partial effects computed from the Krinsky-Robb standard errors are a bit larger, which renders the coefficient of the 10% treatment for the job creation category and the coefficients of the incremental effects on debt repayment insignificant at the 5% level.

5 Asymmetry between Tax Increases and Tax Decreases

5.1 Empirical Strategy

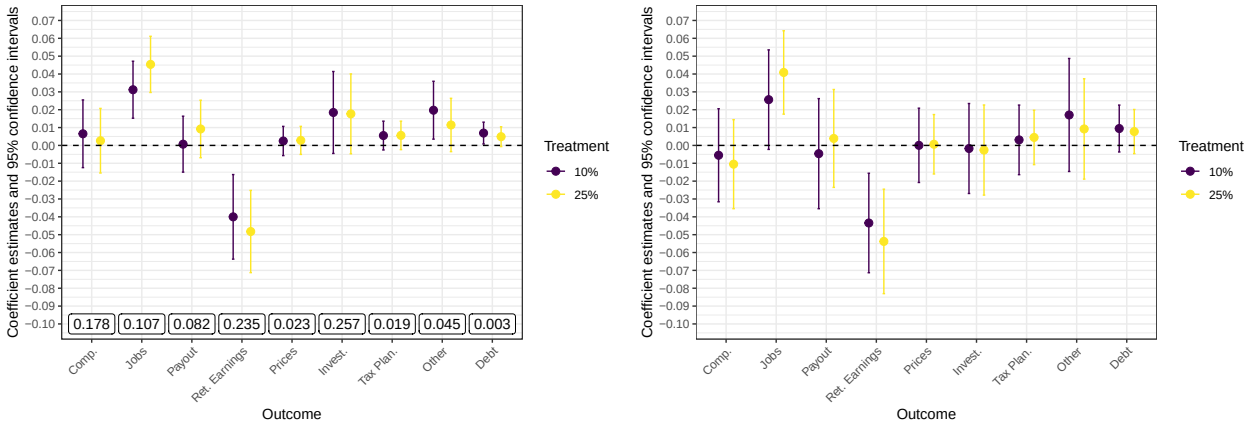
To examine the asymmetry in profit tax incidence between tax increases and decreases, we exploit the symmetry in our outcome measures for the two tax treatment arms, as each of the tax increase outcomes directly corresponds to an equivalent outcome for the tax decrease treatment. Hence, we create new pooled outcome variables according to

$$s_{cm} = \begin{cases} s^d_{cm}, \text{ if } \Delta t < 0 \\ s^i_{cm}, \text{ if } \Delta t > 0 \end{cases}, \tag{9}$$



(a) OLS Increase

(b) MFLOGIT Increase



(c) OLS Decrease

(d) MFLOGIT Decrease

Figure 2: Comparison of OLS coefficient estimates and MFLOGIT average partial effects

where Δt denotes the percentage change in the profit tax burden. We estimate the following pooled linear specification by equation-by-equation OLS:

$$\begin{aligned} s_{cm} = &\gamma_{1m} TAXINC1_c + \gamma_{2m} TAXDEC1_c \\ &+ \gamma_{3m} TAXINC10_c + \gamma_{4m} TAXDEC10_c \\ &+ \gamma_{5m} TAXINC25_c + \gamma_{6m} TAXDEC25_c + \epsilon_{cm}, \; m = 1, \ldots, M \end{aligned} \tag{10}$$

As there is no sensible reference category anymore once we consider tax increases and tax decreases simultaneously, we omit the intercept term and estimate the regression with the full set of treatment dummies.[14] The pooled specification allows us to directly test hypotheses

[14]Note that the coefficients of the separate models correspond to the pooled model, e.g., $\beta^d_{0m} \equiv \gamma_{2m}$ or $\beta^i_{1m} \equiv \gamma_{3m} - \gamma_{1m}$

regarding the asymmetry between tax increases and decreases via simple F tests.

5.2 Results

The preceding analyses suggest that there are substantial differences in the economic incidence of the profit tax between tax increases and tax decreases. In the following, we formally test for statistical significance of these differences, using the pooled model. The first set of tests, T_1, investigates whether there are different incremental effects for tax increases and decreases for our 10% treatment compared to the baseline intensity. Specifically, we test the null hypothesis $\gamma_{3m} - \gamma_{1m} = \gamma_{4m} - \gamma_{2m}$ for each category m. Rejecting the null would indicate that moving from a low to medium tax change has a different impact on the usage of a specific adjustment margin depending on the sign of the tax change. In a similar fashion, the set T_2 includes the same tests for the 25% treatment, again compared to the baseline intensity. The hypotheses tested become $\gamma_{5m} - \gamma_{1m} = \gamma_{6m} - \gamma_{2m}$ for each m. The final set of tests, T_3, checks whether we find statistical support for the different level effects we documented in the descriptive analysis of Section 3. In this instance, we test jointly the hypotheses $\gamma_{1m} = \gamma_{2m},\ \gamma_{3m} = \gamma_{4m}$, and $\gamma_{5m} = \gamma_{6m}$ for each m. Rejecting the joint hypothesis makes us confident that the substantial differences in levels we see are also statistically significant.

Given the estimates from the pooled OLS specification, we can test these hypotheses by implementing simple t and F-tests. The first two sets of hypotheses are checked by testing whether the difference between the coefficients of the 1% and 10% or 1% and 25% tax increase dummies is significantly different from the equivalent differences for the tax decrease dummy coefficients, respectively. We explore the validity of the third set by a joint test for equality in coefficients of corresponding treatment intensities for each share equation separately. That way, we reject the hypothesis of symmetric incidence in a given category, if for at least one treatment intensity the level effects of the tax treatment are significantly different from each other.

The p-values of the tests of the three sets of statistical hypotheses are given in Table 3. As indicated by the first two rows of the table, we do not find much evidence for the first and second sets of hypotheses. For all share equations, except for the payout category for the 25% treatment, the tests for equality cannot be rejected at the 5% significance level, which leads us to conclude that the observed patterns in treatment intensity are almost indistinguishable for tax increases and decreases. Considering that baseline intensity estimates are quite different, the similarity of the incremental effects in absolute value is interesting. Regarding the third hypothesis, however, we find strong support for asymmetric incidence given our estimates. For every share equation, we reject the hypothesis of coefficient equality at any conventional

significance level.

Table 3: Hypotheses Tests

	Wages	Jobs	Payout	Reserves	Prices	Investment	Tax	Other	Debt
T1	0.7375	0.8821	0.0672	0.2667	0.1179	0.5822	0.8821	0.0855	0.5030
T2	0.6816	0.1066	0.0016	0.0778	0.5553	0.1316	0.1066	0.9428	0.2899
T3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0052	0.0000

Note:
This table provides p-values for F-tests regarding the three formal asymmetry tests. T1: There are different incremental effects for tax increases and decreases for the 10% treatment compared to the baseline intensity (1%). T2: There are different incremental effects for tax increases and decreases for the 25% treatment compared to the baseline intensity (1%). T3: The incidence of the profit tax is fundamentally different for the tax increases and tax decreases.

6 Determinants of Tax Incidence

In this section, we depart from the causal inference of our previous section and exploit the presence of a rich set of covariates for an analysis of the determinants of incidence. We emphasize that the subsequent analysis can only investigate associations and should not be interpreted as causal effects. The choice of independent variables is partly guided by results from prior research and theory regarding mediators of incidence, and partly of an exploratory nature.

6.1 Specification

For our analysis of determinants of the attributed shares, we run the following equation-by-equation OLS specification:

$$
\begin{aligned}
y_c = &\beta_0 + \beta_1 SoleProp_c + \beta_2 Partner_c \\
&+ \beta_3 EmpSmall_c + \beta_4 EmpMed_c + \beta_5 EmpLarge_c \\
&+ \sum_{k=1}^{4} \beta_{5+k} UNC_c^k + \beta_{10} Liq_c + \beta_{11} Prof_c \\
&+ \beta_{12} Manuf_c + \beta_{13} Const_c + \beta_{14} Trade_c + \beta_{15} Serv_c \\
&+ \sum_{l=1}^{3} \beta_{15+l} CR8_c^l + \beta_{19} MNE_c + \vartheta_c,
\end{aligned} \tag{11}
$$

where the category superscript m is suppressed for brevity. The specification includes a set of firm-level characteristics as well as industry-level variables. $SoleProp$ and $Partner$ denote dummy variables for sole proprietors and partnerships, and investigate whether the average treatment effect differs by legal form. The coefficients measure differences in outcomes compared to corporations. $EmpSmall$, $EmpMed$ and $EmpLarge$ are dummies for employee size categories, where small companies have between 10 and 49 employees, medium companies 50 to 249 and large companies more than 250 employees. The coefficients are relative to micro enterprises with less than 10 employees and proxy for company size. $\{UNC^k, k = 1, 2, 3, 4\}$ is a set of indicators for general uncertainty, measured by the difficulty to predict future revenues. The self-reported uncertainty categories are based on a 5-point Likert scale. Categories UNC^1 and UNC^2 correspond to very low and low uncertainty, whereas UNC^3 and UNC^4 represent high and very high uncertainty. The reference category is medium uncertainty.

Given that most of our sample firms are small private companies, Orbis does not provide reliable measures of liquidity and profitability, which we expect to be important mediators of the effect. To proxy for these variables, we utilize responses from two questions in the same survey wave. These questions asked companies about the impact of the Corona crisis on their liquidity and profits, using a scale ranging from -100 to 100. We define Liq and $Prof$ as dummy variables, each set to 1 if firms report a number less than 0 on this scale, indicating a negative impact of the Corona crisis on their liquidity and profitability, respectively. In terms of industry characteristics, we include several indicator variables. $Manuf$, $Const$, $Trade$ and $Serv$ are dummies for the manufacturing, construction, retail, and service sectors as used by Fuest et al. (2018). $\{CR8^l, l = 1, 2, 3\}$ define 25% intervals for the Concentration Ratio based on the 8 largest companies in an industry.[15] Finally, MNE indicates whether

[15]The Concentration Ratio is calculated from Orbis financial, industry and ownership data, see Online Appendix A.1 for details. We also included categorical versions of the Herfindahl-Hirschman Index (HHI) and Concentration Ratios based on the four and 20 largest companies, details are provided in Online Appendix

the industry has an above median share of multinational enterprises, which is used to proxy for exposure to MNEs.[16]

The selection of determinants in our study is guided by findings from prior research. Regarding legal form, Giroud & Rauh (2019) demonstrate that the tax elasticity of business activity varies depending on whether the firm is a corporation or a pass-through entity. They observe that pass-through entities exhibit lower tax elasticities in terms of employment and the number of establishments compared to corporations. This difference could potentially be attributed to corporations generally being larger than pass-through entities, thus having a greater capacity to reallocate business activities to low-tax jurisdictions. Regarding firm size, Fuest et al. (2018) find that larger firms show lower wage adjustments in response to local business tax increases in Germany, likely due to better profit-shifting opportunities. Moreover, they observe that wages tend to be more responsive to changes in tax rates in more profitable firms. Firms with lower profit margins also appear to respond more asymmetrically to tax changes, tending to increase prices more significantly following tax hikes compared to their reductions in prices after tax cuts (Benzarti et al., 2020). Existing literature also indicates that companies facing heightened firm-specific uncertainty are more inclined to increase their cash reserves (Hanlon et al., 2017). Furthermore, prior research shows that elevated economy-wide uncertainty often leads firms to delay or suspend their investment plans (Bloom, 2009; Kumar et al., 2023).

We also test for industry heterogeneity, as firms operating in specific industries may exhibit greater sensitivity to fluctuations in tax rates. For instance, firms in labor-intensive industries, such as manufacturing, might react more strongly along non-labor-related margins, like owner payout or output prices, compared to firms in less labor-intensive sectors (Giroud & Rauh, 2019). Conversely, the impact on wages could be more pronounced in industries producing more tradable goods, where heightened competition prevents firms from adjusting prices following tax increases (Fuest et al., 2018). Theory also suggests that the degree of competition within an industry should affect the ability of firms to pass tax changes onto consumers (Fullerton & Metcalf, 2002). Furthermore, a higher presence of multinational enterprises (MNEs) in a market could limit pricing flexibility, as multinationals might circumvent increases in tax burdens by shifting profits out of the current jurisdiction (Arulampalam et al., 2012; Fuest et al., 2018; Giroud & Rauh, 2019). In the subsequent section, we will examine these heterogeneities in the context of our study.

A.2. The results are qualitatively similar across specifications.

[16]We identify MNEs from the ownership information in Orbis as German companies that are either majority-owned by a foreign entity or control a foreign subsidiary. We refer to Online Appendix A.1 for additional information.

6.2 Results

We will focus our discussion on the most relevant determinants, which are presented in Table 4 and 5 for tax increases and decreases, respectively. The tables show coefficient estimates that have an associated adjusted p-value of less than 10%. We reproduce the full regression tables in Online Appendix B.4.

Table 4: OLS Regressions Tax Increase

	Comp.	Jobs	Payout	Ret. Earnings	Prices	Invest.
Intercept	0.071		0.237	0.145	0.226	0.166
SoleProp	−0.048		−0.101	0.055		
Partner	−0.031		0.055			
EmpSmall		0.024				
EmpMed		0.049				
UNC1	−0.064					−0.056
UNC2						−0.046
UNC3		0.033				
UNC4		0.064	−0.049	−0.049		
Liq		0.023	−0.041			
Const					0.068	
Trade			−0.050			
Serv						−0.032
Num.Obs.	3083	3083	3083	3083	3083	3083
R2	0.032	0.061	0.046	0.023	0.031	0.025
R2 Adj.	0.026	0.055	0.040	0.017	0.025	0.019
AIC	−1827.8	−2773.9	1227.5	−413.1	558.3	−1024.1
BIC	−1701.1	−2647.2	1354.2	−286.4	685.1	−897.4
RMSE	0.18	0.15	0.29	0.22	0.26	0.20

Note:
This table presents OLS results for regressions of stated incidence outcomes on a set of control variables for the tax increase group. Only coefficients with a p-value adjusted for multiplicity that is smaller than 10 percent are shown. For the full table with standard errors and p-values, see the corresponding table in Online Appendix B.3.

Table 5: OLS Regressions Tax Decrease

	Comp.	Jobs	Payout	Ret. Earnings	Prices	Invest.
Intercept	0.187	0.142	0.105	0.203	0.018	0.290
SoleProp	−0.055					
Partner	−0.036		0.048			
EmpSmall	0.047	0.041	−0.031	−0.036		
EmpMed				−0.060		
EmpLarge			−0.055			0.160
UNC4			−0.032		0.016	
Manuf		−0.036				0.064
Trade		−0.036				
CR81						−0.041
Num.Obs.	3077	3077	3077	3077	3077	3077
R2	0.028	0.023	0.048	0.011	0.017	0.026
R2 Adj.	0.022	0.017	0.042	0.005	0.011	0.020
AIC	−602.5	−1315.9	−1534.0	810.5	−5788.3	675.9
BIC	−475.8	−1189.3	−1407.3	937.1	−5661.6	802.6
RMSE	0.22	0.19	0.19	0.27	0.09	0.27

Note:
This table presents OLS results for regressions of stated incidence outcomes on a set of control variables for the tax decrease group. Only coefficients with a p-value adjusted for multiplicity that is smaller than 10 percent are shown. For the full table with standard errors and p-values, see the corresponding table in Online Appendix B.3.

For tax increases, we see substantial differences in wage and payout incidence across legal forms in Table 4. The results suggest that average incidence on wages is ceteris paribus 4.8 and 3.1 percentage points lower for sole proprietors and partnerships, respectively. Incidence on entrepreneur and partner payouts seem to be quite different to shareholder distributions, as we measure a 10.1 percentage point lower average incidence for owner payout and a 5.5 percentage point higher incidence on partner payout compared to shareholder distributions. Based on our data, we cannot distinguish whether this is because transparent companies are inherently different from corporations or whether the distribution channels themselves are not comparable. The substantially lower values for sole proprietors could also be due to misunderstandings by the respondents. Furthermore, sole proprietors seem to be more able to finance the increased tax burden through available reserves, with a 5.5 percentage point higher incidence on retained earnings.

For most categories in Table 4, size as measured by the number of employees does not seem to play a major role in determining the incidence of a tax increase. Except for incidence on employment, all coefficients are negligible in magnitude and lack significance throughout. For employment incidence, we find that job incidence seems to be positively associated with

company size. The effect increases from 2.4 percentage points for small companies to about 6.5 percentage points for companies with more than 250 employees. Due to the small number of large companies in our data set, the coefficient is associated with a relatively large degree of uncertainty, with an adjusted p-value of about 12%. Similar to Fuest et al. (2018), we also do not find wage effects for very large firms. Rather, our results suggest that larger firms are more determined in addressing their increased tax burden by decreasing labor costs through a reduction in employment.

Uncertainty about future revenue, on the other hand, exerts some interesting patterns on our tax incidence measures. Especially, uncertainty levels in the extremes seem to be associated with the strongest differences in incidence. Results in Table 4 suggest that incidence on employee compensation is about 6.4 percentage points lower when future revenues can be precisely estimated, compared to a situation where revenues can only approximately be predicted. A similar pattern can be found for investment. When a company is certain about the trajectory of their future revenues, it is less inclined to cut investments in order to finance the increased tax burden. Companies who indicated that their future revenue stream was precisely predictable stated that they would use about 5.6 percentage points less from funds originally intended to finance investment projects. On the other side of the spectrum, we find that very high levels of uncertainty with respect to future revenues can also lead to different incidence outcomes. The incidence on employment through job cuts is about 3.3 percentage points higher for the high uncertainty group, whereas very high uncertainty is associated with a 6.4 percentage point higher incidence on employment. With an average incidence of about 7% this is a sizable difference. The heterogeneous incidence results for labor and investments with regard to uncertainty indicates that more confident firms have a better capacity to maintain their strategies with regard to employment and investment decisions amidst unexpected tax increases, potentially attributable to the financial buffer that comes from having stable revenue predictions. Interestingly, high levels of uncertainty also seem to be associated with lower incidence on shareholder and partner payouts as well as retained earnings. This phenomenon might be explained by the fact that companies with high levels of uncertainty regarding their revenues are less profitable on average compared to companies that can predict their revenue stream more precisely.

Next, we present the results for the tax decrease treatment groups in Table 5. As was the case for tax increases, we again observe sizable differences in wage incidence across legal forms. Apparently, transparent companies pass-on less of a cash windfall through a tax decrease to their employees than corporations. On average, sole proprietors and partnerships ceteris paribus display 5.5 percentage point and 3.6 percentage point lower wage incidence than

corporations. We also see some differences in employment incidence pointing into the same direction, however, due to the high levels of uncertainty attached to the estimates, we refrain from stressing this point too much. For partnerships, we also find a higher payout incidence compared to corporations. Again, we cannot be sure whether this result is due to the fact that the company types themselves are inherently different from each other or whether the distribution channel is the culprit.

Similar to tax increases, firm size measured by employees seem to be not strongly associated with most firm decisions. Nevertheless, the results in Table 5 hint towards higher compensation and more job creation for companies with a lower number of employees if taxes would decrease. This is in line with Fuest et al. (2018), who find a stronger wage effect for small- and medium-sized firms compared to larger firms. Moreover, we observe that a lower tax burden for larger firms is associated with lower payouts to owners and lower amount of retained earnings as compared to very small companies. For example, compared to very small firms, smaller and medium-sized firms increase retained earnings less by 3.6 and 6 percentage points, respectively. Also, firms with a large number of employees have a 5.5 percentage point lower payout to shareholders compared to very small firms. As very small firms are often run by the owner, the results indicate that tax decreases are used to increase the owner's salary and increase the potential for future investments by increasing retained earnings. This finding is in line with Benzarti & Carloni (2019), who find that the primary beneficiaries of value-added tax cuts for restaurants in France were the restaurant owners, most of whom employed fewer than 10 employees. Finally, we also observe that very large firms are more likely to invest more (16 percentage points) and plan to make less use of tax planning activities (1.9 percentage points). Since tax planning activities are especially important for larger firms with foreign locations, a decrease in the tax burden reduces the need to spend resources on these activities. Further, investments of larger firms often benefit from stronger economies of scale. Thus, we observe higher investments when the tax burden decreases.

In general, we do not observe a strong correlation between uncertainty with regard to future revenues and our outcomes for tax decreases. Noteworthy are payouts and prices. Here, the results suggest that firm decision-makers, who are very uncertain about their firm's future revenue development, plan to have a lower payout level (3.2 percentage points) and are more likely to decrease prices (1.6 percentage points). As these decision-makers are more insecure about the future business development, they are more willing to keep the additional resources due to the tax decrease within the business and are more likely to decrease prices due to the lower tax burden to increase the demand for their products.

Overall, heterogeneous effects with regard to different industries are limited. Nevertheless,

we notice that firms in the manufacturing industry plan to invest more if the tax burden decreases (6.4 percentage points) but are less likely to increase employment (3.6 percentage points) compared to other sectors. With regard to employment change, the same holds true for firms in the trade sector. On average, firms in this sector also are less likely to increase employment (3.6 percentage points). A potential explanation could be that these industries are in general less labor-intensive than construction and services. Overall, we do not find strong associations with regard to multinational enterprises in an industry and industry concentration levels.

7 Conclusion

The question of who bears the economic incidence of taxes on company profits is a first-order question in the literature and remains an ongoing research topic. We contribute to this debate by pursuing a novel empirical strategy based on stated incidence in a large firm survey. In contrast to existing studies, this empirical approach allows us to shed light on the effect of business taxes on a large set of possible adjustment margins and affected groups in a unified setting.

We document that out of a €100 tax burden increase, stakeholders absorb the impact differently: employees contribute €17 via adjustments in wages and employment, firm owners bear €23 through reduced distributed profits, while consumers bear €18 through price hikes. The residual €42 are accounted for by alterations in investment, reserves, and debt, along with other financial adjustments. Moreover, our results suggest that tax adjustments' impact on stakeholders varies by direction and size. Employees are less affected by tax hikes but gain more from reductions, whereas capital owners are more impacted by tax increases than by decreases. Moreover, tax cuts elicit stronger investment responses than increases. The most notable asymmetry appears in customer pricing: a significant portion of the increased costs due to tax hikes is transferred to consumers, whereas only a small fraction of the fiscal relief following tax cuts is passed on via decreased prices. Additionally, our analysis of treatment intensity shows that larger tax changes affect employment stronger than firm owner payouts and retained earnings.

By exploiting the presence of a rich set of company characteristics in our survey data, we further investigate the determinants of profit tax incidence. Our results suggest that wage incidence is lower for companies organized as sole proprietors or partnerships compared to corporations. The incidence on workers through employment adjustments seems to be mediated by company size, suggesting that the employment impact becomes larger as the

stock of employees increases. Incidence also seems to be affected by the degree of uncertainty faced by the company, as well as the economic sector it operates in.

Our survey design enables an examination of how a vast array of potential adjustment margins are affected by tax changes in a unified setup. This approach extends beyond the scope of existing archival studies. However, it is also subject to the typical limitations inherent to survey data. Rather than relying on observed behavior, our methodology is based on self-reported responses to hypothetical tax changes. A potential drawback of using hypothetical treatments is that their speculative nature might lead to reduced effort from respondents or give rise to experimenter demand effects (Haaland et al., 2023). For example, when facing a hypothetical tax increase, managers may hesitate to lower wages or lay off employees, particularly if they aim to be perceived as more *socially responsible* by the experimenter.

We argue that these issues are of limited importance in our setting for three reasons. First, experimenter demand effects are likely less pronounced in online surveys compared to face-to-face interviews due to the increased anonymity experienced by participants (de Quidt et al., 2018; Haaland et al., 2023; Stantcheva, 2023). Additionally, the neutral framing of our survey regarding taxation further reduces the likelihood of experimenter demand effects (Haaland et al., 2023; Stantcheva, 2023). Since we employ a between-subject design, experimenter demand effects are also likely to be less problematic compared to those in within-subject designs (de Quidt et al., 2019). Second, we compare our estimates of direct incidence on workers, firm owners, and consumers to prior literature relying on archival data sources and find similar results. This comparison bolsters our confidence in the validity of our survey results. Third, the majority of our responses were collected during a period when the German economy was still grappling with the economic repercussions of the Corona crisis. This context lends credibility to the possibility of tax code changes, thus mitigating the hypothetical degree of our survey scenarios. In sum, while we acknowledge the potential for measurement bias and experimenter demand effects, we believe these concerns to be minor in our setting.

Based on our findings of asymmetry between tax increases and decreases, tentative conclusions can be drawn for tax policy. We note that workers benefit more from tax reductions than they suffer from tax increases, while the reverse appears true for firm owners. This suggests that tax reductions for workers may be progressive, potentially having broader implications for the economy as a whole. These insights underscore the need for nuanced tax policy frameworks that consider differential impacts on various economic stakeholders. Furthermore, our results advocate for further empirical research to validate these observations and guide effective, equitable tax policy formulation.

References

Affeldt, P., Duso, T., Gugler, K., & Piechucka, J. (2021). Marktkonzentrationstrend steigt in Dienstleistungsmärkten deutlich. *DIW Wochenbericht*, 20, 339–347. https://doi.org/10.18723/DIW_WB:2021-20-1

Arulampalam, W., Devereux, M. P., & Maffini, G. (2012). The direct incidence of corporate income tax on wages. *European Economic Review*, *56*(6), 1038–1054. https://doi.org/10.1016/j.euroecorev.2012.03.003

Bajgar, M., Berlingieri, G., Calligaris, S., Criscuolo, C., & Timmis, J. (2019). *Industry concentration in Europe and North America*. OECD Productivity Working Papers, No. 18, OECD Publishing, Paris. https://doi.org/10.1787/2ff98246-en

Baker, S. R., Sun, S. T., & Yannelis, C. (2020). *Corporate taxes and retail prices*. No. w27058, National Bureau of Economic Research. https://doi.org/10.3386/w27058

Benjamini, Y., & Yekutieli, D. (2001). The control of the false discovery rate in multiple testing under dependency. *The Annals of Statistics*, *29*(4), 1165–1188. https://www.jstor.org/stable/2674075

Benzarti, Y., & Carloni, D. (2019). Who really benefits from consumption tax cuts? Evidence from a large VAT reform in France. *American Economic Journal: Economic Policy*, *11*(1), 38–63. https://doi.org/10.1257/pol.20170504

Benzarti, Y., Carloni, D., Harju, J., & Kosonen, T. (2020). What goes up may not come down: Asymmetric incidence of value-added taxes. *Journal of Political Economy*, *128*(12), 4438–4474. https://doi.org/10.1086/710558

Bischof, J., Dörrenberg, P., Rostam-Afschar, D., Simons, D., & Voget, J. (2023). *The German Business Panel: Evidence on accounting and business taxation*. TRR 266 Accounting for Transparency Working Paper Series No. 46. Available at SSRN: https://ssrn.com/abstract=3777306 or https://dx.doi.org/10.2139/ssrn.3777306

Bloom, N. (2009). The impact of uncertainty shocks. *Econometrica*, *77*(3), 623–685. https://doi.org/10.3982/ECTA6248

Bornemann, T., Jacob, M., & Sailer, M. A. (2023). Do corporate taxes affect executive compensation? *The Accounting Review*, *98*(2), 31–58. https://doi.org/10.2308/TAR-2019-0567

Brekke, K. R., Pires, A. J. G., Schindler, D., & Schjelderup, G. (2017). Capital taxation and imperfect competition: ACE vs. CBIT. *Journal of Public Economics*, *147*, 1–15. https://www.sciencedirect.com/science/article/pii/S0047272716302225

Chen, S., De Simone, L., Lester, R., & Hanlon, M. (2023). The effect of innovation box regimes on investment and employment activity. *The Accounting Review*, *98*(5), 187–214. https://doi.org/10.2308/TAR-2019-0338

Clausing, K. A. (2013). Who pays the coprorate tax in a global economy? *National Tax Journal*, *66*(1), 151–184. https://doi.org/10.17310/ntj.2013.1.06

De Simone, L., McClure, C., & Stomberg, B. (2022). *Examining the effects of the TCJA on executive compensation.* Kelley School of Business Research Paper No. 19-28, Available at SSRN: https://ssrn.com/abstract=3400877 or http://dx.doi.org/10.2139/ssrn.3400877

Dedola, L., Osbat, C., & Reinelt, T. (2022). *Tax thy neighbour: Corporate tax pass-through into downstream consumer prices in a monetary union.* ECB Working Paper No. 2022/2681, Available at SSRN: https://ssrn.com/abstract=4162262 or http://dx.doi.org/10.2139/ssrn.4162262

Djankov, S., Ganser, T., McLiesh, C., Ramalho, R., & Shleifer, A. (2010). The effect of corporate taxes on investment and entrepreneurship. *American Economic Journal: Macroeconomics*, *2*(3), 31–64. https://www.aeaweb.org/articles?id=10.1257/mac.2.3.31

de Quidt, J., Haushofer, J., & Roth, C. (2018). Measuring and bounding experimenter demand. *American Economic Review*, *108*(11), 3266–3302. https://www.aeaweb.org/articles?id=10.1257/aer.20171330

de Quidt, J., Vesterlund, L., & Wilson, A. J. (2019). Experimenter demand effects. In *Handbook of Research Methods and Applications in Experimental Economics*, Chapter 20, 384–400.

Dwenger, N., Steiner, V., & Rattenhuber, P. (2019). Sharing the burden? Empirical evidence on corporate tax incidence. *German Economic Review*, *20*(4), e107–e140. https://doi.org/10.1111/geer.12157

Dyreng, S.D., Jacob, M., Jiang, X. & Müller, M.A. (2022). Tax incidence and tax avoidance. *Contemporary Accounting Research*, *39*, 2622–2656. https://doi.org/10.1111/1911-3846.12797

Fuest, C., Peichl, A., & Siegloch, S. (2018). Do higher corporate taxes reduce wages? Micro evidence from Germany. *American Economic Review*, *108*(2), 393–418. https://doi.org/10.1257/aer.20130570

Fullerton, D., & Metcalf, G. E. (2002). Tax incidence. In *Handbook of Public Economics*, Chapter 26, Vol. 4, pp. 1787–1872. Elsevier. https://doi.org/10.1016/S1573-4420(02)80005-2

Giroud, X., & Rauh, J. (2019). State taxation and the reallocation of business activity: Evidence from establishment-level data. *Journal of Political Economy*, *127*(3), 1262–1316. https://doi.org/10.1086/701357

Graham, J. R., Hanlon, M., Shevlin, T., & Shroff, N. (2017). Tax rates and corporate decision-making. *The Review of Financial Studies*, *30*(9), 3128–3175. https://doi.org/10.1093/rfs/hhx037

Gravelle, J. (2013). Corporate tax incidence: Review of general equilibrium estimates and analysis. *National Tax Journal*, *66*(1), 185–214. https://doi.org/10.17310/ntj.2013.1.07

Haaland, I., Roth, C., & Wohlfart, J. (2023). Designing information provision experiments. *Journal of Economic Literature*, *61*(1), 3–40. https://www.aeaweb.org/articles?id=10.1257/jel.20211658

Hanlon, M., & Heitzman, S. (2010). A review of tax research. *Journal of Accounting and Economics*, *50*(2-3), 127–178. https://www.sciencedirect.com/science/article/pii/S0165410110000340

Hanlon, M., Lester, R., & Verdi, R. (2015). The effect of repatriation tax costs on U.S. multinational investment. *Journal of Financial Economics*, *116*(1), 179–196. https://doi.org/10.1016/j.jfineco.2014.12.004

Hanlon, M., Maydew, E. L., & Saavedra, D. (2017). The taxman cometh: Does tax uncertainty affect corporate cash holdings? *Review of Accounting Studies*, *22*(3), 1198–1228. https://doi.org/10.1007/s11142-017-9398-y

Harberger, A. C. (1962). The incidence of the corporation income tax. *Journal of Political Economy*, *70*(3), 215–240. https://www.jstor.org/stable/1828856

Hsieh, M. H., Sanz-Maldonado, G., & Slemrod, J. (2023). *External validity in empirical public finance*. University of Michigan Working Paper. https://gatton.uky.edu/sites/default/files/Media%20Root/External%20validity%204-24-23.pdf

Jacob, M. (2022). Real effects of corporate taxation: A review. *European Accounting Review*, *31*(1), 269–296. https://doi.org/10.1080/09638180.2021.1934055

Jacob, M., Müller, M. A., & Wulff, T. (2023). Do consumers pay the corporate tax? *Contemporary Accounting Research*, *40*(4), 2785–2815. https://doi.org/10.1111/1911-3846.12897

Jacob, M., & Zerwer, K. (2023). *Who bears the emission tax burden? Evidence from capital investments.* TRR 266 Accounting for Transparency Working Paper Series No. 83, Available at SSRN: https://ssrn.com/abstract=4094069 or http://dx.doi.org/10.2139/ssrn.

Kalemli-Ozcan, S., Sorensen, B., Villegas-Sanchez, C., Volosovych, V., & Yesiltas, S. (2019). *How to construct nationally representative firm level data from the Orbis Global database: New facts on SMEs and aggregate implications for industry concentration.* Tinbergen Institute Discussion Paper 15-110/IV, Available at SSRN: https://ssrn.com/abstract=2660191 or http://dx.doi.org/10.2139/ssrn.2660191

Kang, Y., Li, O. Z., & Lin, Y. (2021). Tax incidence in loan pricing. *Journal of Accounting and Economics*, *72*(1), 101418. https://doi.org/10.1016/j.jacceco.2021.101418

Kosonen, T. (2015). More and cheaper haircuts after VAT cut? On the efficiency and incidence of service sector consumption taxes. *Journal of Public Economics*, *131*, 87–100.

https://doi.org/10.1016/j.jpubeco.2015.09.006

Kumar, S., Gorodnichenko, Y., & Coibion, O. (2023). The effect of macroeconomic uncertainty on firm decisions. *Econometrica*, *91*(4), 1297–1332. https://doi.org/10.3982/ECTA21004

Mullahy, J. (2015). Multivariate fractional regression estimation of econometric share models. *Journal of Econometric Methods*, *4*(1), 71–100. https://doi.org/10.1515/jem-2012-0006

Murteira, J. M. R., & Ramalho, J. J. S. (2016). Regression analysis of multivariate fractional data. *Econometric Reviews*, *35*(4), 515–552. https://doi.org/10.1080/07474938.2013.806849

Ohrn, E. (2018). The effect of corporate taxation on investment and financial policy: Evidence from the DPAD. *American Economic Journal: Economic Policy*, *10*(2), 272–301. https://doi.org/10.1257/pol.20150378

Suárez Serrato, J. C. S., & Zidar, O. (2016). Who benefits from state corporate tax cuts? A local labor markets approach with heterogeneous firms. *American Economic Review*, *106*(9), 2582–2624. https://www.aeaweb.org/articles?id=10.1257/aer.20141702

Risch, M. (2024). Does taxing business owners affect employees? Evidence from a change in the top marginal tax rate. *The Quarterly Journal of Economics*, *139*(1), 637–692. https://doi.org/10.1093/qje/qjad040

Stantcheva, S. (2023). How to run surveys: A guide to creating your own identifying variation and revealing the invisible. *Annual Review of Economics*, *15*(1), 205–234. https://doi.org/10.1146/annurev-economics-091622-010157

Zwick, E., & Mahon, J. (2017). Tax policy and heterogeneous investment behavior. *American Economic Review*, *107*(1), 217–248. https://doi.org/10.1257/aer.20140855

Online Appendix for

No Incidence Left Behind – Towards a Complete Understanding of Tax Incidence

Richard Winter[†], Philipp Dörrenberg[◇], Fabian Eble[♯], Davud Rostam-Afschar[°], Johannes Voget[¶]

Contact: [†]**Winter**: r.winter@uni-mannheim.de. [◇]**Dörrenberg**: doerrenberg@uni-mannheim.de. [♯]**Eble**: feble@mail.uni-mannheim.de. [°]**Rostam-Afschar**: rostam-afschar@uni-mannheim.de. [¶]**Voget**: voget@uni-mannheim.de.

A Orbis

A.1 Bureau van Dijk's Orbis Data

We utilize the Orbis database from Bureau van Dijk in order to construct additional covariates which we use in Section 6 in order to examine how certain industry characteristics affect incidence. The starting point for our sales based concentration measures detailed in A.2 are the annual financial data. We begin by defining a variable for the year of observation based on the closing date. Following Kalemli-Ozcan et al. (2019), Observations of companies with closing date up until June are assigned to the previous year, whereas companies with closing date between June and December are assigned to the current year. With this definition, we obtain the following distribution of financial statements of German firms over time. Figure A1 Panel (a) clearly indicates that Orbis coverage is rather poor before 2005, as less than 200,000 companies are available in the data. Between 2006 and 2019, coverage seems satisfactory, with 600,000-800,000 financial statements each year. Apparently, the coverage for 2020 and 2021 is not sufficient in the flat-files yet, hence we will focus on financial statements of 2019 for the further steps.

In order to avoid double counting and get a more precise classification of main activity, we focus on unconsolidated statements only. Panel (b) of Figure A1 illustrates the distribution of firm-year observations by consolidation code. C1 and C2 denote consolidated statements, LF limited financial information, and U1 and U2 unconsolidated statements. As is apparent, the majority of firm-year observations is represented by unconsolidated financial statements.

We augment the financial statement data with ownership information from the ownership flat-files. This data allows us to identify corporate global ultimate owner for each subsidiary in our sample, which in turn enables computation of credible concentration measures that take the connections of business groups into account. More specifically, we use the links from 2019 in order to get ownership relationships matching the financial data.

Finally, to arrive at industry-level concentration measures, we merge the financial and ownership data with industry information. The industry classification in Orbis is quite detailed, which allows us to identify the four-digit NACE Rev. 2 code of most companies. Note that this information is static. We use the most recent industry classification for each subsidiary. Panel (c) of Figure A1 illustrates the distribution of financial statements by level 1 NACE Rev. 2 codes. Based on the aforementioned coverage situation, we choose to rely on financial statement data from 2019 in order to compute our concentration measures. However, we use the most recent industry classifications and ownership information available to us. As mentioned, we include unconsolidated statements and firm with limited financial data.

A.2 Industry Concentration Measures

We compute two industry concentration measures based on the Orbis database. The purpose of these measures is to be used as proxy measures for competition in an industry. We acknowledge that these revenue based measures we employ come with several shortcomings, as pointed out e.g., by Bajgar et al. (2019) or Affeldt et al. (2021).

Despite these caveats, we investigate whether industry concentration can explain differences in price incidence in our survey data. In our estimations, we rely on three different sales-based measures for industry concentration: The Herfindahl-Hirsch Index as well as the CR4 and CR8 measures. We account for the presence of business groups by treating companies with the same corporate ultimate owner in an industry as one unit.

A.2.1 Herfindahl-Hirschman Index

The Herfindahl-Hirschman Index (HHI) is a concentration measure that accounts for the number of firms in a market, as well as concentration, by incorporating the relative size (market share) of all firms in a market.

$$HHI = \sum_{i=1}^{n} (MS_i)^2 \tag{12}$$

where MS_i denotes the market share in percent of firm i and there are n firms in the market. By construction, the HHI can take on values on the interval $[\frac{10{,}000}{N}, 10{,}000]$. We categorize the continuous HHI measure into four indicators according to the following table:

HHI	Interpretation
<100	Competitive Market
<1000	Unconcentrated
<2500	Medium concentration
>=2500	High concentration

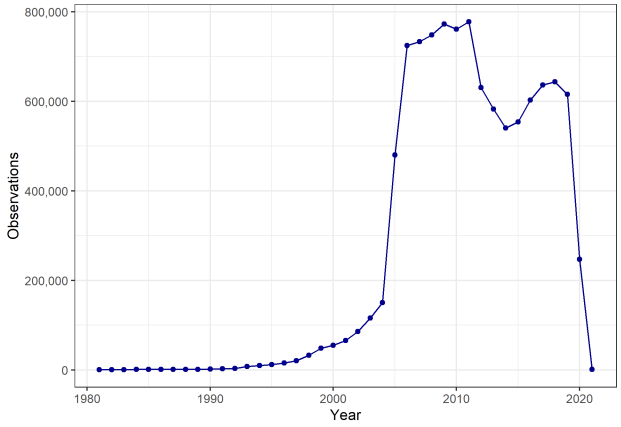
Figure A2 illustrates the distribution of HHI indices based on NACE Rev. 2 industries in our sample. The distribution has a hyperbolic shape, with high HHI values being associated with low numbers of observations. The red dots in the figure indicate HHI values that are based on less than 10 firms in a given industry. The next figure presents the distribution of HHI indices for the different industries in ascending order.

A.2.2 Concentration Ratio

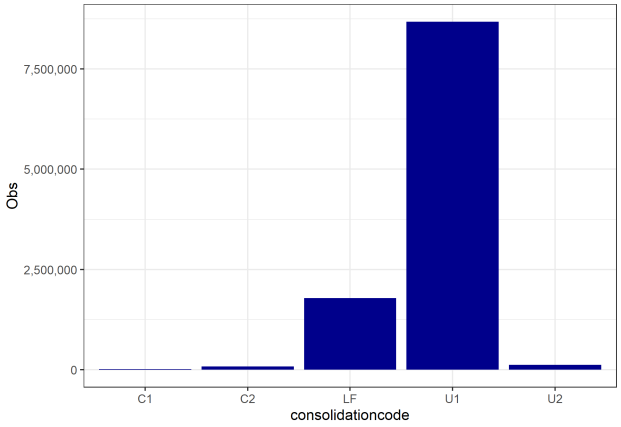
The Concentration Ratio is another sales based measure of industry concentration. It measures the percentage of market share held by a specified number of firms. Formally, the Concentration Ratio for the X largest firms is defined as

$$CR_i(X) = \sum_{rk(c) \leq X} \frac{sales_{ci}}{\sum_k sales_{ki}} \in (0, 1] \tag{13}$$

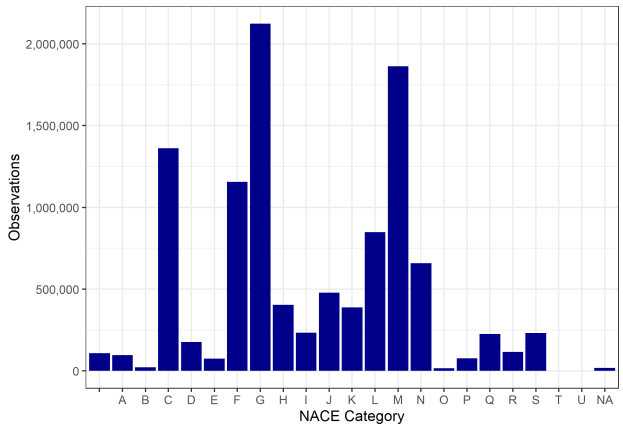
Figure A3 shows the distribution of the 4,8 and 20 Concentration Ratios calculated using the Orbis financial data.



(a) Year Coverage in Orbis Financial Data



(b) Distribution of Consolidation Code



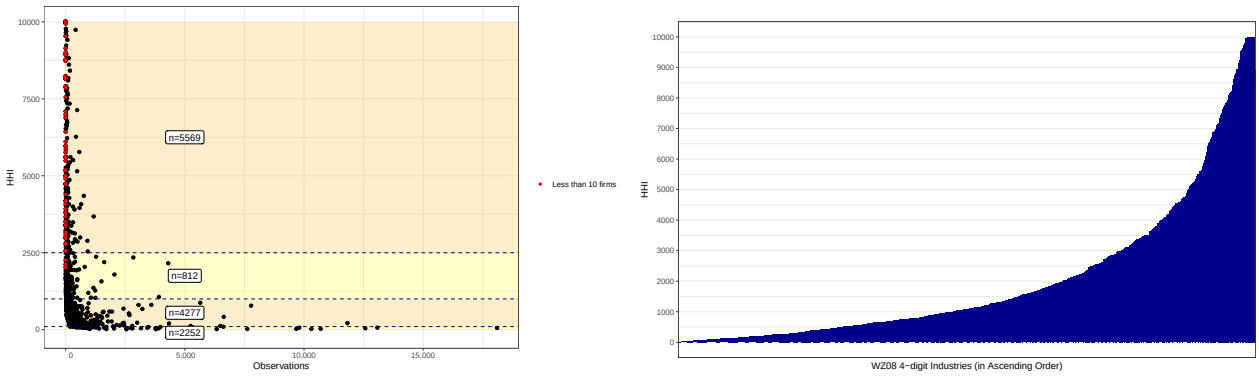
(c) Industry Coverage

Figure A1: Orbis Descriptive Figures

Table A2: Orbis Financials Descriptive Statistics

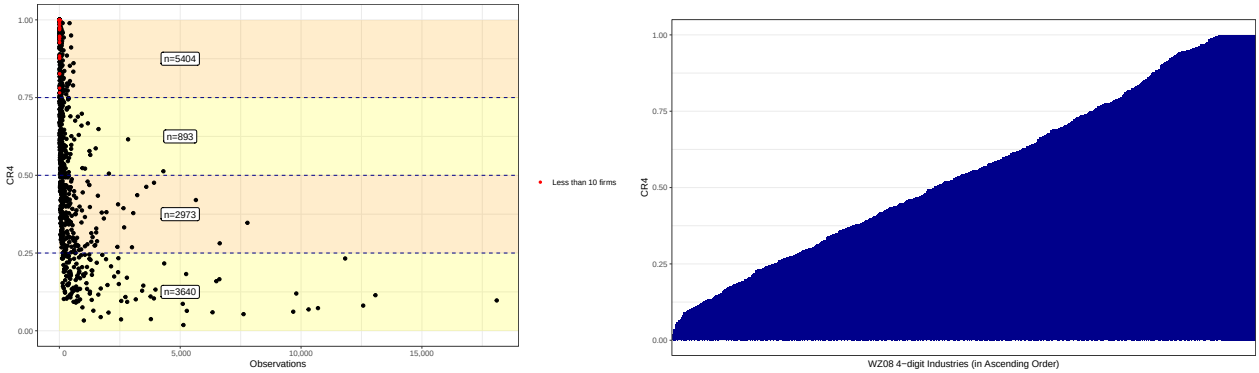
	N	Mean	SD	Median	P25	P75	PercentMissing
numberofemployees	522,003	43.3	910.71	10	3	25	14
turnover	257,174	18,846,040.0	423,365,132.16	1,000,000	350,000	3,020,000	58
sales	131,973	24,192,058.0	498,998,952.93	2,100,000	1,050,000	5,408,070	78
totalassets	483,290	14,558,667.0	485,145,777.74	983,833	379,721	3,144,088	20
grossprofit	1,035	143,433,231.0	1,030,409,838.51	8,668,703	1,737,311	29,035,306	100
plbeforetax	45,864	4,623,536.0	95,061,985.93	530,912	4,826	2,021,549	92
plaftertax	45,742	3,785,279.0	86,840,159.22	392,536	1,359	1,547,662	92
cashflow	45,241	5,449,317.0	135,270,012.46	839,392	134,232	2,374,887	93
ebitda	45,901	5,093,046.0	120,191,148.03	1,086,474	125,634	3,014,387	92

Note:
This table displays financial statement information of German firms for the financial year 2019. The sample includes unconsolidated and limited financials.



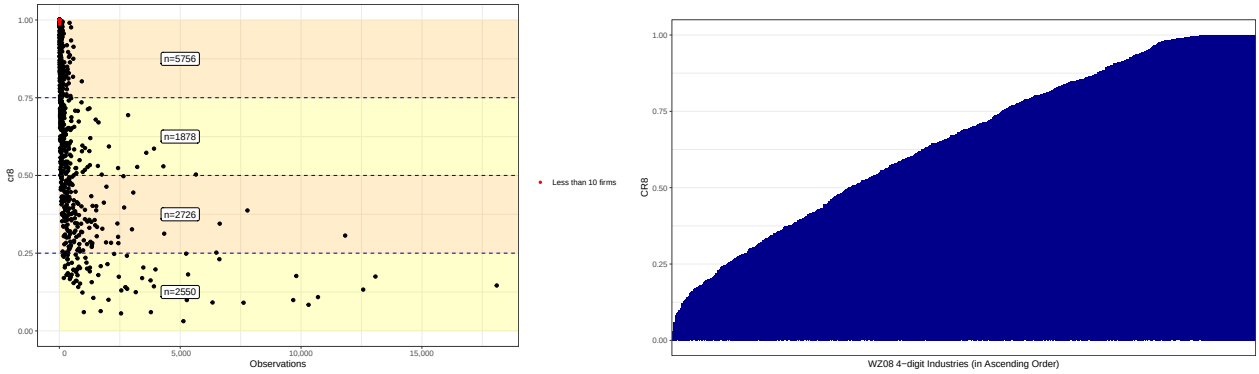
(a) Observations (b) Distribution

Figure A2: Herfindahl-Hirsch Index in Orbis 4-digit NACE Rev. 2 Industries



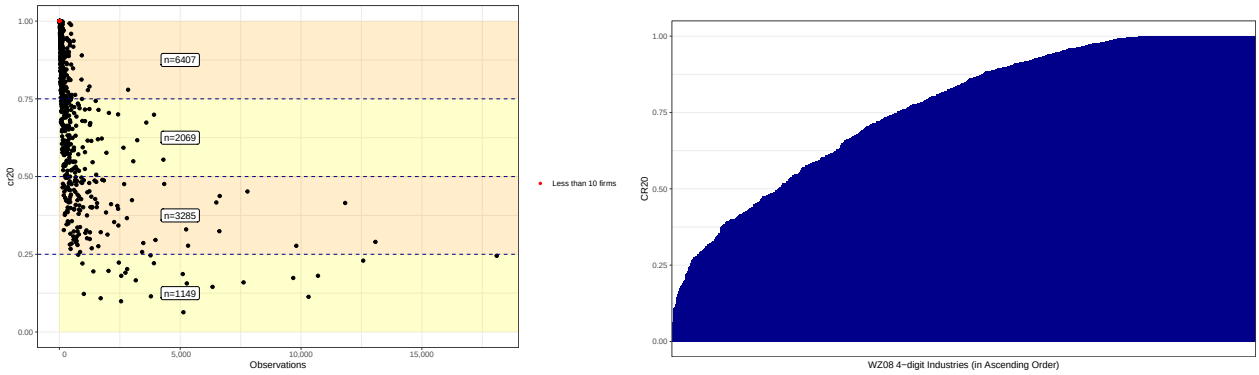
(a) CR4 Observations

(b) CR4 Distribution



(c) CR8 Observations

(d) CR8 Distribution



(e) CR20 Observations

(f) CR20 Distribution

Figure A3: Concentration Rates in Orbis 4-digit NACE Rev. 2 Industries

B Additional Figures and Tables

B.1 Screenshots of Original Survey Questions

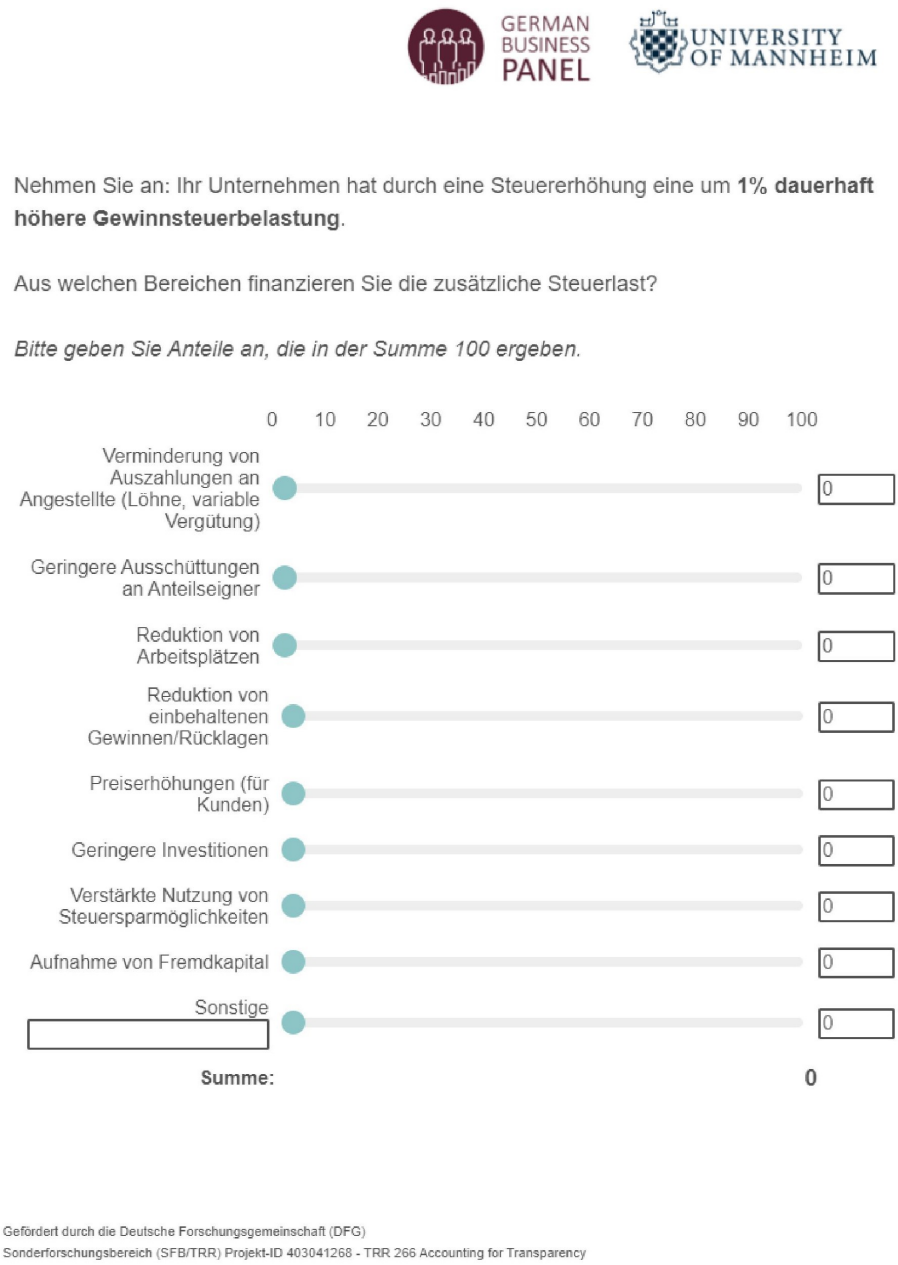


Figure B1: Example Survey Question Tax Increase Treatment

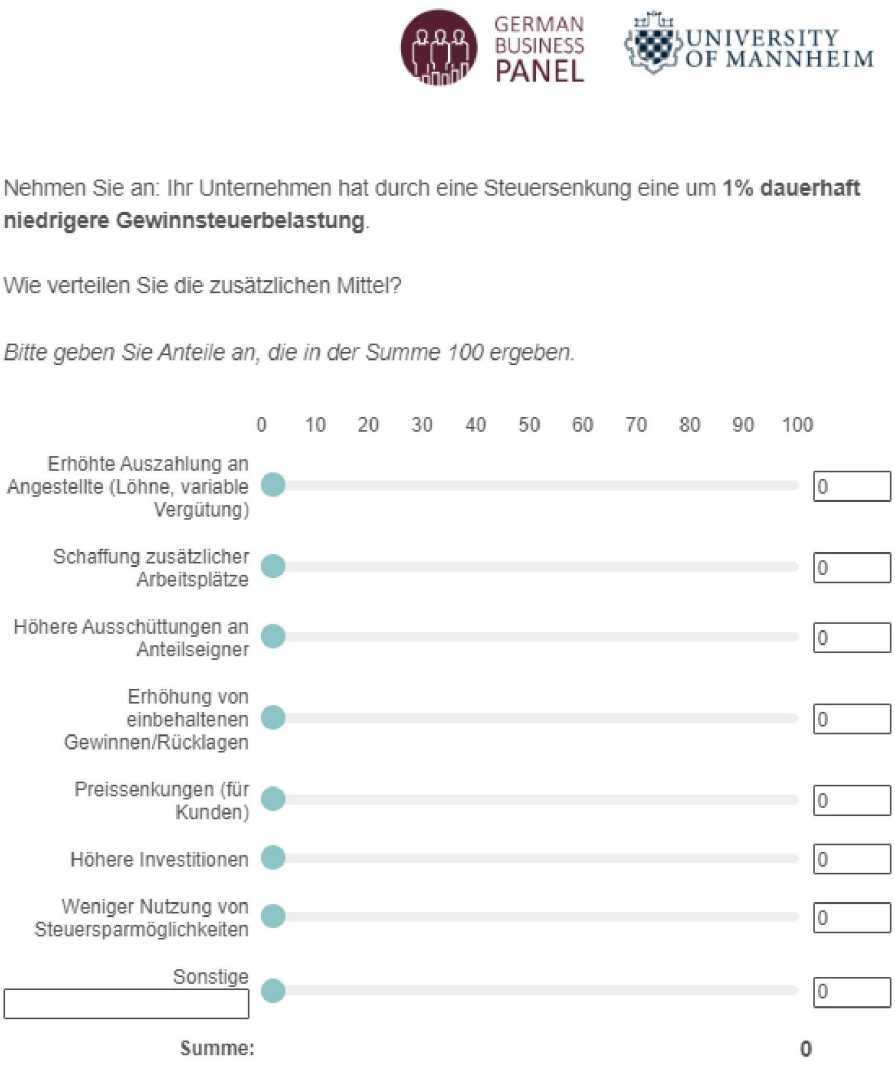


Figure B2: Example Survey Question Tax Decrease Treatment

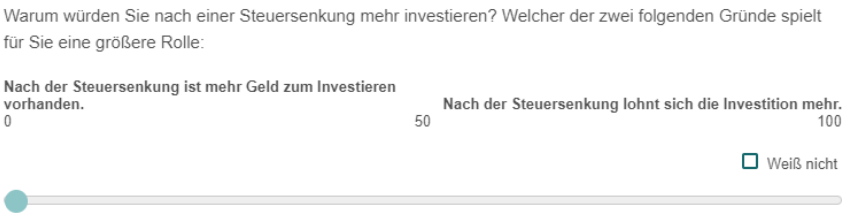
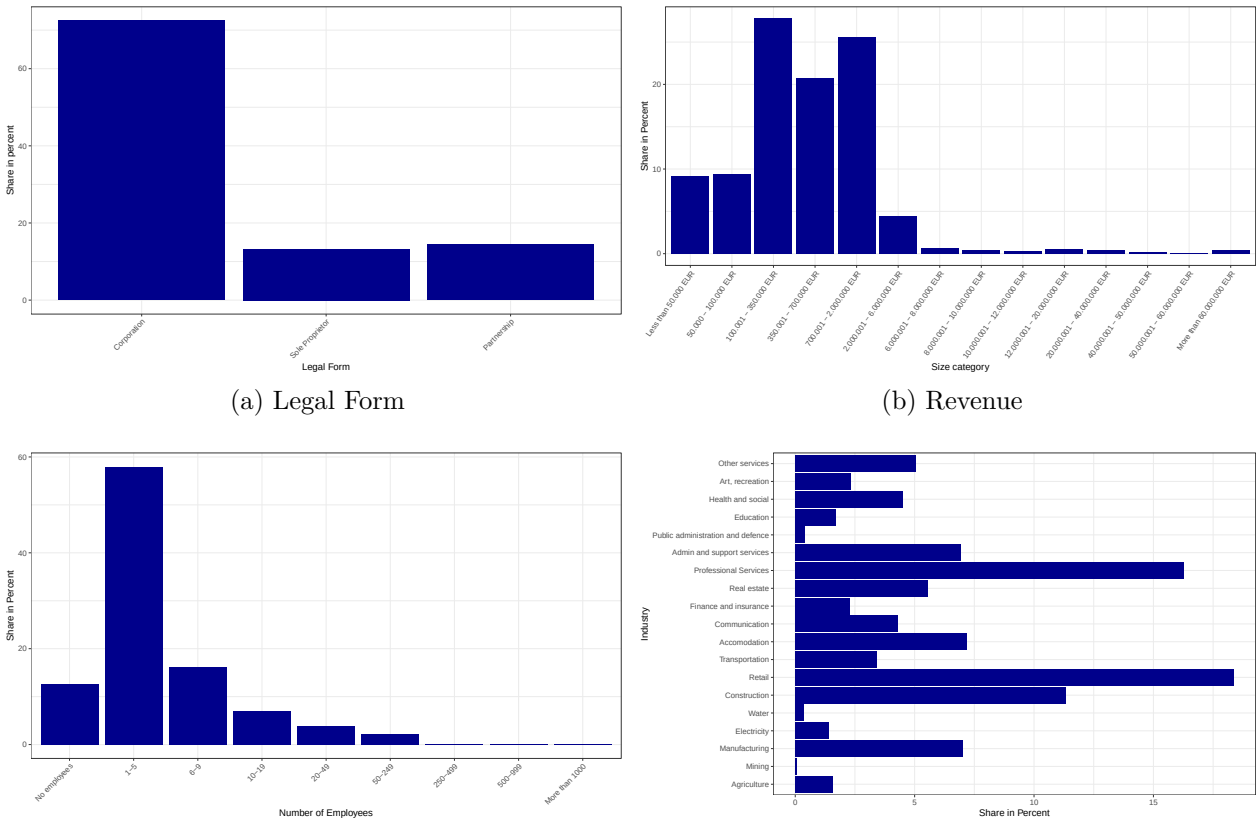


Figure B3: Example Survey Question Reasons for Change in Investment

B.2 Descriptives



(a) Legal Form

(b) Revenue

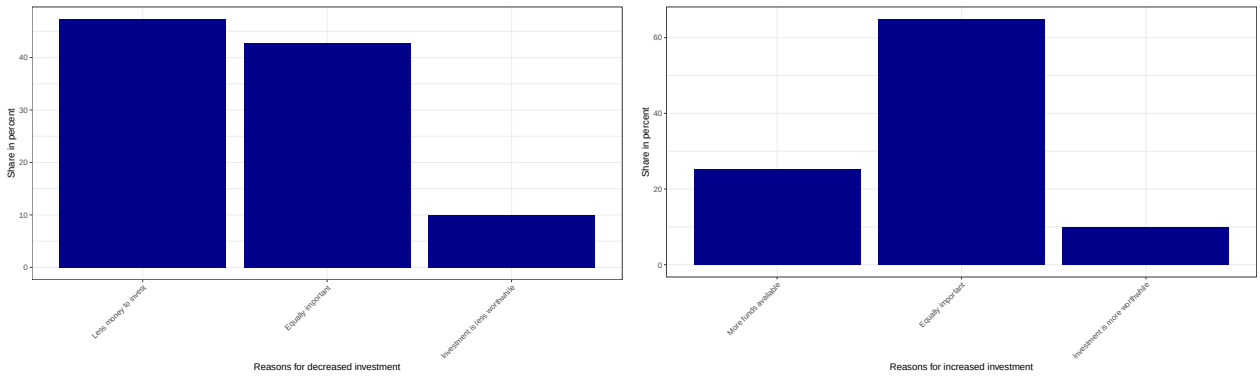
(c) Number of Empoyees

(d) One-digit Industry

Figure B4: Distribution of Firm Characteristics

(a) Tax Increase (b) Tax Decrease

Figure B5: Text Entries in Others Category. In the tax increase treatment groups, 140 respondents made use of the open field. In the tax decrease groups, 218 respondents added a missing category.



(a) Tax Increase (b) Tax Decrease

Figure B6: Reasons for Change in Investment

Table B1: Descriptive Statistics Tax Increase

	Mean		Sample Percentages		
Outcome	Unwghtd.	Weighted	$s_{im} = 0$	$s_{im} = 1$	$0 < s_{im} < 1$
Comp.	0.095	0.089	0.644	0.009	0.347
Jobs	0.071	0.064	0.735	0.008	0.257
Payout	0.235	0.221	0.467	0.058	0.475
Ret. Earnings	0.129	0.133	0.608	0.026	0.366
Prices	0.182	0.199	0.464	0.046	0.490
Invest.	0.144	0.148	0.501	0.012	0.486
Tax Plan.	0.071	0.068	0.711	0.009	0.281
Other	0.042	0.045	0.911	0.027	0.062
Debt	0.031	0.033	0.869	0.004	0.127

Note:
This table shows descriptive statistics for the tax increase outcome variables. The sample is based on 4000 observations, requiring non-missing values for the survey weights.

Table B2: Descriptive Statistics Tax Decrease

	Mean		Sample Percentages		
Outcome	Unwghtd.	Weighted	$s_{im} = 0$	$s_{im} = 1$	$0 < s_{im} < 1$
Comp.	0.181	0.172	0.412	0.020	0.568
Jobs	0.132	0.121	0.575	0.008	0.417
Payout	0.086	0.091	0.708	0.021	0.270
Ret. Earnings	0.205	0.210	0.467	0.056	0.476
Prices	0.025	0.028	0.890	0.003	0.107
Invest.	0.270	0.262	0.331	0.050	0.619
Tax Plan.	0.022	0.022	0.909	0.004	0.087
Other	0.054	0.065	0.886	0.032	0.081
Debt	0.007	0.008	0.990	0.006	0.004

Note:
This table shows descriptive statistics for the tax decrease outcome variables. The sample is based on 3990 observations, requiring non-missing values for the survey weights.

Table B3: OLS Regressions Tax Increase

	Comp.	Jobs	Payout	Ret. Earnings	Prices	Invest.	Tax Plan.	Other	Debt
10% higher	0.010 (0.007)	0.030 (0.006)	−0.025 (0.012)	−0.024 (0.009)	−0.015 (0.010)	0.011 (0.008)	0.000 (0.006)	0.003 (0.006)	0.010 (0.004)
	p=1.000	p=0.000	p=0.411	p=0.103	p=1.000	p=1.000	p=1.000	p=1.000	p=0.153
25% higher	0.007 (0.007)	0.030 (0.006)	−0.034 (0.011)	−0.024 (0.009)	−0.004 (0.010)	−0.002 (0.008)	0.005 (0.006)	0.011 (0.007)	0.010 (0.004)
	p=1.000	p=0.000	p=0.071	p=0.103	p=1.000	p=1.000	p=1.000	p=1.000	p=0.153
Num.Obs.	4202	4202	4202	4202	4202	4202	4202	4202	4202
R2	0.001	0.008	0.002	0.002	0.001	0.001	0.000	0.001	0.002
R2 Adj.	0.000	0.007	0.002	0.002	0.000	0.000	0.000	0.000	0.001
AIC	−2308.1	−3407.2	1877.2	−588.7	773.1	−1251.9	−3658.5	−2592.2	−6699.7
BIC	−2282.7	−3381.8	1902.6	−563.3	798.5	−1226.6	−3633.1	−2566.8	−6674.4
RMSE	0.18	0.16	0.30	0.23	0.27	0.21	0.16	0.18	0.11

Note:
This table presents results from OLS regressions of tax incidence categories on treatment intensity dummies for the tax increase treatment groups. Robust standard errors are given in parantheses. P-values are adjusted for the multiple comparisons problem using the procedure suggested by Benjamini & Yekutieli (2001).

Table B4: OLS Regressions Tax Decrease

	Comp.	Jobs	Payout	Ret. Earnings	Prices	Invest.	Tax Plan.	Other	Debt
10% lower	0.007 (0.009)	0.031 (0.008)	0.001 (0.007)	−0.040 (0.011)	0.002 (0.004)	0.018 (0.011)	0.006 (0.004)	0.020 (0.008)	0.007 (0.003)
	p=1.000	p=0.001	p=1.000	p=0.005	p=1.000	p=0.990	p=1.000	p=0.215	p=0.408
25% lower	0.003 (0.009)	0.045 (0.007)	0.009 (0.008)	−0.048 (0.011)	0.003 (0.004)	0.018 (0.011)	0.006 (0.004)	0.011 (0.007)	0.005 (0.003)
	p=1.000	p=0.000	p=1.000	p=0.000	p=1.000	p=0.990	p=1.000	p=1.000	p=0.721
Num.Obs.	4190	4190	4190	4190	4190	4190	4190	4190	4190
R2	0.000	0.009	0.000	0.006	0.000	0.001	0.001	0.002	0.001
R2 Adj.	0.000	0.009	0.000	0.005	0.000	0.000	0.000	0.001	0.001
AIC	−631.1	−1689.9	−1846.5	1189.0	−7476.2	1092.6	−7377.0	−1693.3	−9438.0
BIC	−605.7	−1664.6	−1821.2	1214.4	−7450.9	1118.0	−7351.6	−1667.9	−9412.7
RMSE	0.22	0.20	0.19	0.28	0.10	0.28	0.10	0.20	0.08

Note:
This table presents results from OLS regressions of tax incidence categories on treatment intensity dummies for the tax increase treatment groups. Robust standard errors are given in parantheses. P-values are adjusted for the multiple comparisons problem using the procedure suggested by Benjamini & Yekutieli (2001).

Table B5: Average Partial Effects Tax Increase Model

Coefficient	Statistic	Comp.	Jobs	Payout	Ret. Earnings	Prices	Invest.	Tax Plan.	Other	Debt
10% higher	estimate	0.010	0.035	-0.021	-0.029	-0.015	0.005	-0.002	0.004	0.012
	std	0.009	0.007	0.013	0.011	0.012	0.010	0.008	0.009	0.005
	p-value	1.000	0.000	0.902	0.206	1.000	1.000	1.000	1.000	0.322
25% higher	estimate	0.006	0.033	-0.033	-0.023	-0.005	-0.007	0.005	0.012	0.011
	std	0.009	0.007	0.013	0.011	0.012	0.010	0.008	0.008	0.005
	p-value	1.000	0.000	0.206	0.347	1.000	1.000	1.000	1.000	0.322

Note:
This table shows average partial effects estimates, bootstrapped standard errors and adjusted p-values for the MFLOGIT model. P-values are adjusted for the multiple comparisons problem using the procedure suggested by Benjamini & Yekutieli (2001)

Table B6: Average Partial Effects Tax Decrease Model

Coefficient	Statistic	Comp.	Jobs	Payout	Ret. Earnings	Prices	Invest.	Tax Plan.	Other	Debt
10% lower	estimate	-0.006	0.026	-0.005	-0.043	0.000	-0.002	0.003	0.017	0.009
	std	0.013	0.014	0.016	0.014	0.011	0.013	0.010	0.016	0.007
	p-value	1.000	1.000	1.000	0.047	1.000	1.000	1.000	1.000	1.000
25% lower	estimate	-0.011	0.041	0.004	-0.054	0.001	-0.003	0.004	0.009	0.008
	std	0.013	0.012	0.014	0.015	0.008	0.013	0.008	0.014	0.006
	p-value	1.000	0.019	1.000	0.019	1.000	1.000	1.000	1.000	1.000

Note:
This table shows average partial effects estimates, bootstrapped standard errors and adjusted p-values for the MFLOGIT model. P-values are adjusted for the multiple comparisons problem using the procedure suggested by Benjamini & Yekutieli (2001)

Table B7: OLS results joint models

	Wages	Jobs	Payout	Reserves	Prices	Investment	Tax	Other	Debt
1% higher	0.090 (0.005)	0.051 (0.004)	0.251 (0.009)	0.144 (0.007)	0.188 (0.008)	0.144 (0.006)	0.051 (0.004)	0.038 (0.005)	0.024 (0.003)
	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001
1% lower	0.178 (0.007)	0.107 (0.005)	0.082 (0.006)	0.235 (0.009)	0.023 (0.003)	0.257 (0.008)	0.107 (0.005)	0.045 (0.005)	0.003 (0.001)
	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=0.021
10% higher	0.101 (0.005)	0.081 (0.005)	0.227 (0.008)	0.120 (0.006)	0.173 (0.007)	0.155 (0.006)	0.081 (0.005)	0.040 (0.005)	0.034 (0.003)
	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001
10% lower	0.184 (0.006)	0.138 (0.005)	0.083 (0.005)	0.195 (0.007)	0.026 (0.003)	0.275 (0.007)	0.138 (0.005)	0.065 (0.006)	0.010 (0.003)
	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001
25% higher	0.098 (0.005)	0.082 (0.004)	0.217 (0.007)	0.120 (0.005)	0.184 (0.007)	0.142 (0.005)	0.082 (0.004)	0.049 (0.005)	0.034 (0.003)
	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001
25% lower	0.180 (0.005)	0.153 (0.005)	0.091 (0.005)	0.187 (0.007)	0.026 (0.003)	0.274 (0.007)	0.153 (0.005)	0.056 (0.005)	0.008 (0.002)
	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001	p=<0.001
Num.Obs.	8392	8392	8392	8392	8392	8392	8392	8392	8392
R2	0.333	0.263	0.322	0.315	0.297	0.441	0.263	0.065	0.055
R2 Adj.	0.332	0.263	0.321	0.315	0.296	0.440	0.263	0.064	0.054
AIC	−2775.5	−4926.1	828.8	785.5	−3168.5	162.0	−4926.1	−4240.1	−15 693.5
BIC	−2726.3	−4876.8	878.0	834.7	−3119.2	211.3	−4876.8	−4190.8	−15 644.3
RMSE	0.20	0.18	0.25	0.25	0.20	0.24	0.18	0.19	0.09

Note:

This table presents results from OLS regressions of joint tax incidence categories on treatment intensity dummies for all tax treatment groups. Robust standard errors are given in parantheses. P-values are adjusted for the multiple comparisons problem using the procedure suggested by Benjamini & Yekutieli (2001).

B.3 Time Variation in Incidence

In order to gauge how our responses vary with economic conditions, we take a look at how the incidence answers evolve over time, measured by the response date.

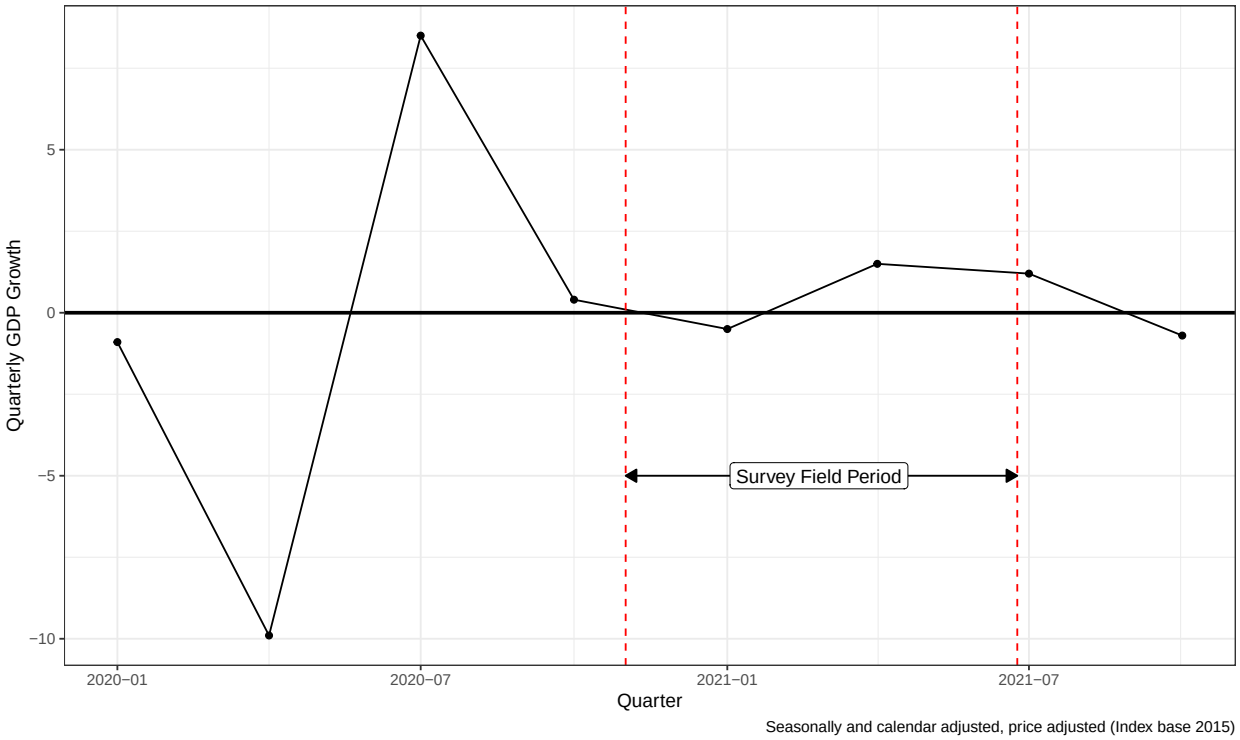
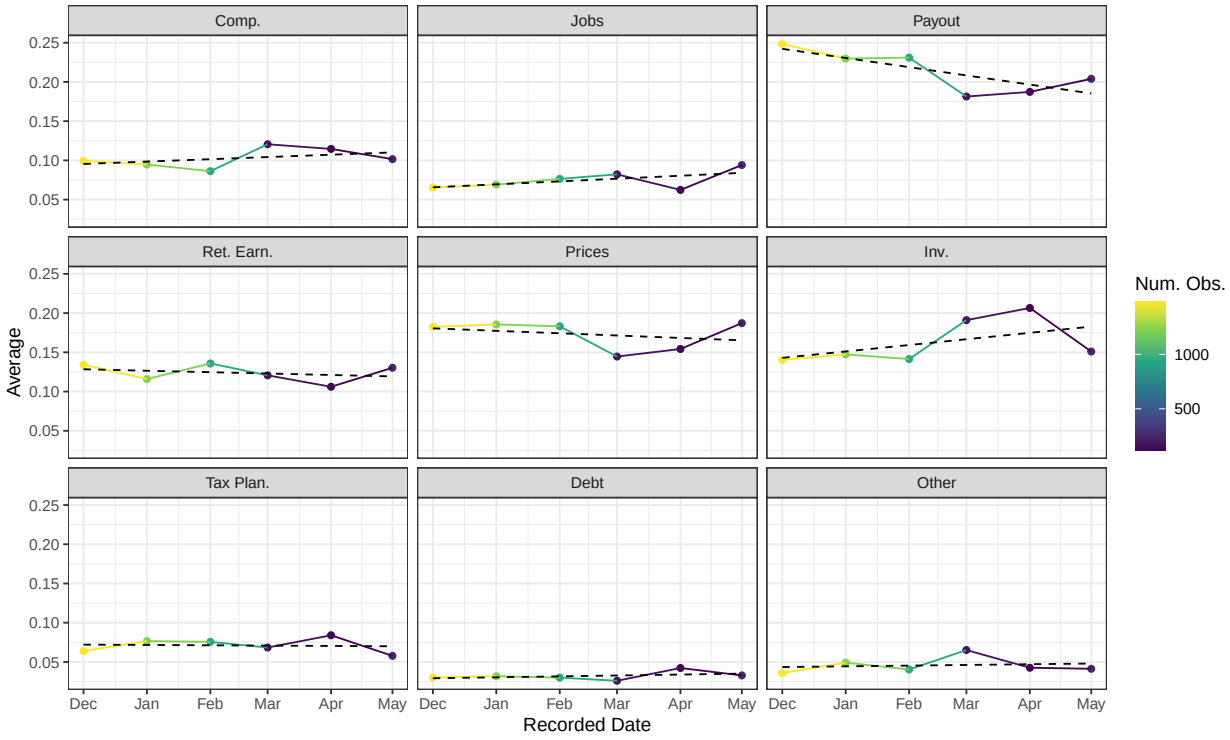


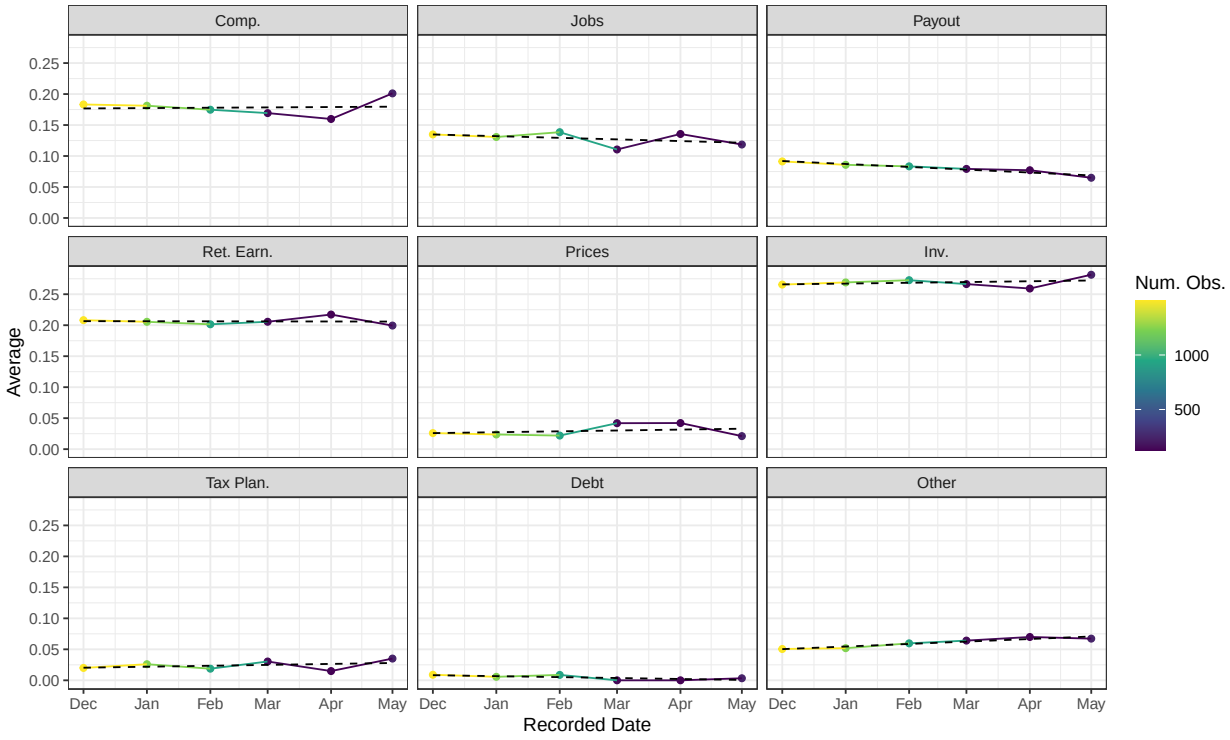
Figure B7: Evolution of GDP Growth

Figure B7 displays the growth rate of the seasonal, calendar and price adjusted evolution of GDP growth throughout 2021 and illustrates the period where the survey was in the field.

Figure B8 shows how the average incidence responses in the tax increase and decrease treatments vary over time. For jobs, prices and investments we detect a positive trend, whereas the relevance of payout reductions decreases by almost 10 percentage points over the sample period. The line color illustrates the amount of completed surveys in that particular month, indicating that the majority of our responses come from December 2020 and January 2021. For the tax decrease treatment, we find a similar negative trend in payout incidence, which mostly seems to be in favor of employee compensation.



(a) Tax Increases



(b) Tax Decreases

Figure B8: Trends in Incidence

B.4 Determinants of Tax Incidence

Table B8: OLS Regressions Tax Increase

	Comp.	Jobs	Payout	Ret. Earnings	Prices	Invest.	Tax Plan.	Other	Debt
Intercept	0.071 (0.012)	0.020 (0.008)	0.237 (0.020)	0.145 (0.014)	0.226 (0.018)	0.166 (0.014)	0.067 (0.010)	0.044 (0.011)	0.024 (0.007)
	p=0.000	p=1.000	p=0.000	p=0.000	p=0.000	p=0.000	p=0.000	p=0.428	p=1.000
SoleProp	−0.048 (0.009)	−0.003 (0.009)	−0.101 (0.015)	0.055 (0.015)	0.030 (0.016)	0.031 (0.012)	0.020 (0.010)	0.008 (0.010)	0.007 (0.007)
	p=0.000	p=1.000	p=0.000	p=0.251	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
Partner	−0.031 (0.009)	−0.013 (0.007)	0.055 (0.017)	−0.013 (0.011)	−0.008 (0.013)	0.005 (0.011)	0.015 (0.008)	0.004 (0.009)	−0.014 (0.004)
	p=0.339	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
EmpSmall	−0.002 (0.007)	0.024 (0.007)	0.004 (0.012)	−0.015 (0.009)	−0.015 (0.011)	0.005 (0.008)	0.009 (0.006)	−0.009 (0.007)	−0.002 (0.004)
	p=1.000	p=0.521	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
EmpMed	−0.017 (0.011)	0.049 (0.013)	−0.028 (0.022)	0.029 (0.020)	−0.035 (0.018)	−0.002 (0.014)	0.005 (0.011)	0.009 (0.013)	−0.008 (0.006)
	p=1.000	p=0.197	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
EmpLarge	0.008 (0.025)	0.065 (0.023)	−0.058 (0.036)	−0.036 (0.028)	−0.016 (0.033)	0.032 (0.029)	−0.011 (0.016)	0.012 (0.029)	0.004 (0.013)
	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
UNC1	−0.064 (0.009)	−0.008 (0.008)	0.020 (0.033)	0.038 (0.026)	0.085 (0.033)	−0.056 (0.016)	−0.026 (0.013)	0.018 (0.019)	−0.007 (0.007)
	p=0.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
UNC2	−0.016 (0.013)	−0.007 (0.007)	0.049 (0.026)	−0.018 (0.019)	0.025 (0.024)	−0.046 (0.015)	−0.003 (0.014)	0.022 (0.016)	−0.006 (0.006)
	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
UNC3	0.005 (0.009)	0.033 (0.007)	−0.007 (0.014)	−0.016 (0.011)	−0.010 (0.012)	0.011 (0.010)	−0.006 (0.008)	−0.015 (0.008)	0.006 (0.005)
	p=1.000	p=0.003	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
UNC4	0.016 (0.010)	0.064 (0.008)	−0.049 (0.015)	−0.049 (0.012)	−0.012 (0.013)	0.025 (0.011)	−0.005 (0.008)	0.007 (0.009)	0.003 (0.006)
	p=1.000	p=0.000	p=1.000	p=0.085	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
Liq	0.015 (0.009)	0.023 (0.007)	−0.041 (0.013)	−0.002 (0.011)	−0.019 (0.011)	0.023 (0.009)	−0.002 (0.007)	−0.007 (0.007)	0.011 (0.005)
	p=1.000	p=0.525	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
Prof	0.016 (0.008)	0.000 (0.007)	0.030 (0.014)	−0.006 (0.011)	−0.026 (0.012)	−0.017 (0.010)	−0.013 (0.007)	0.008 (0.008)	0.008 (0.004)
	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
Manuf	0.001 (0.010)	0.020 (0.009)	−0.045 (0.016)	−0.010 (0.013)	0.033 (0.015)	0.000 (0.012)	0.000 (0.008)	−0.008 (0.009)	0.010 (0.007)
	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
Const	0.008 (0.014)	0.004 (0.012)	−0.048 (0.022)	0.000 (0.017)	0.068 (0.022)	−0.016 (0.017)	0.002 (0.012)	−0.023 (0.011)	0.004 (0.009)
	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
Trade	−0.004 (0.010)	0.020 (0.009)	−0.050 (0.017)	0.006 (0.013)	0.025 (0.015)	−0.012 (0.012)	0.006 (0.009)	0.001 (0.010)	0.007 (0.007)
	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
Serv	0.003 (0.009)	0.006 (0.007)	0.015 (0.015)	0.007 (0.011)	0.014 (0.013)	−0.032 (0.010)	0.001 (0.007)	−0.005 (0.008)	−0.010 (0.005)
	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
CR81	0.017 (0.009)	−0.013 (0.007)	0.031 (0.015)	−0.006 (0.011)	−0.023 (0.013)	−0.008 (0.010)	0.006 (0.007)	−0.004 (0.009)	−0.001 (0.005)
	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
CR82	0.021 (0.010)	−0.008 (0.009)	0.021 (0.016)	0.016 (0.012)	−0.026 (0.015)	−0.022 (0.011)	0.005 (0.008)	−0.008 (0.009)	0.001 (0.006)
	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
CR83	0.022 (0.011)	0.010 (0.011)	0.021 (0.019)	0.020 (0.015)	−0.034 (0.017)	−0.021 (0.013)	0.003 (0.010)	−0.020 (0.010)	−0.002 (0.006)
	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
MNE	0.010 (0.007)	−0.004 (0.006)	0.027 (0.012)	0.001 (0.009)	−0.026 (0.011)	−0.018 (0.008)	0.007 (0.006)	0.009 (0.007)	−0.006 (0.004)
	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
Num.Obs.	3083	3083	3083	3083	3083	3083	3083	3083	3083
R2	0.032	0.061	0.046	0.023	0.031	0.025	0.008	0.009	0.017

Table B8: OLS Regressions Tax Increase *(continued)*

	Comp.	Jobs	Payout	Ret. Earnings	Prices	Invest.	Tax Plan.	Other	Debt
R2 Adj.	0.026	0.055	0.040	0.017	0.025	0.019	0.002	0.003	0.011
AIC	−1827.8	−2773.9	1227.5	−413.1	558.3	−1024.1	−2912.5	−2185.1	−5055.0
BIC	−1701.1	−2647.2	1354.2	−286.4	685.1	−897.4	−2785.8	−2058.4	−4928.3
RMSE	0.18	0.15	0.29	0.22	0.26	0.20	0.15	0.17	0.11

Note:
This table presents OLS results for regressions of stated incidence outcomes on a set of control variables for the tax increase group. Robust standards are given in parenthesis. P-values are corrected for the multiple comparisons problem using the procedure suggested by Benjamini and Yakuteli (2001). SoleProp is an indicator for a sole proprietorship. Partner is an indicator for partnerships. EmpSmall is an indicator for being within the SME classification small based on employees, EmpMed for being medium sized and EmpLarge for being classified as a large company. UNC1-UNC4 are self-reported uncertainty categories with respect to future revenues based on a 5-point Likert scale. Categories UNC1 and UNC2 correspond to very low and low uncertainty, whereas UNC3 and UNC4 represent high and very high uncertainty. The reference category is medium uncertainty. Liq and Prof constitute indicators for having experienced a negative liquidity or profitability impact due to the Corona crisis. Manuf, Const, Trade, and Serv are indicator variables for operating in the manufacturing, construction, trade or service industry respectively based on 1-digit WZ08 industry classification.

Table B9: OLS Regressions Tax Decrease

	Comp.	Jobs	Payout	Ret. Earnings	Prices	Invest.	Tax Plan.	Other	Debt
Intercept	0.187 (0.014)	0.142 (0.012)	0.105 (0.011)	0.203 (0.017)	0.018 (0.005)	0.290 (0.018)	0.017 (0.005)	0.051 (0.012)	0.003 (0.005)
	p=0.000	p=0.000	p=0.000	p=0.000	p=1.000	p=0.000	p=1.000	p=0.128	p=1.000
SoleProp	−0.055 (0.012)	−0.028 (0.010)	0.014 (0.012)	−0.006 (0.017)	0.014 (0.007)	−0.012 (0.016)	0.004 (0.006)	0.010 (0.012)	−0.006 (0.004)
	p=0.005	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
Partner	−0.036 (0.010)	−0.025 (0.010)	0.048 (0.011)	−0.010 (0.014)	−0.008 (0.004)	−0.004 (0.014)	−0.001 (0.004)	0.000 (0.009)	0.002 (0.004)
	p=0.737	p=1.000	p=0.036	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
EmpSmall	0.047 (0.010)	0.041 (0.008)	−0.031 (0.007)	−0.036 (0.011)	−0.003 (0.004)	0.021 (0.011)	0.001 (0.004)	−0.030 (0.006)	−0.002 (0.003)
	p=0.005	p=0.007	p=0.036	p=0.983	p=1.000	p=1.000	p=1.000	p=0.010	p=1.000
EmpMed	−0.003 (0.015)	0.037 (0.014)	−0.025 (0.014)	−0.060 (0.018)	−0.011 (0.004)	0.046 (0.020)	−0.009 (0.004)	0.026 (0.017)	−0.001 (0.006)
	p=1.000	p=1.000	p=1.000	p=0.983	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
EmpLarge	−0.050 (0.023)	−0.008 (0.025)	−0.055 (0.017)	−0.018 (0.047)	0.008 (0.022)	0.160 (0.052)	−0.019 (0.005)	0.002 (0.031)	−0.009 (0.003)
	p=1.000	p=1.000	p=0.749	p=1.000	p=1.000	p=1.000	p=0.843	p=1.000	p=1.000
UNC1	−0.002 (0.023)	−0.004 (0.021)	0.041 (0.025)	−0.028 (0.028)	0.004 (0.011)	−0.016 (0.029)	−0.002 (0.007)	0.001 (0.018)	−0.003 (0.002)
	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
UNC2	0.013 (0.019)	0.005 (0.016)	0.023 (0.019)	0.006 (0.022)	−0.007 (0.004)	−0.016 (0.020)	−0.002 (0.006)	−0.011 (0.012)	0.000 (0.004)
	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
UNC3	0.006 (0.010)	0.001 (0.009)	−0.023 (0.009)	−0.007 (0.013)	0.005 (0.004)	0.008 (0.013)	0.009 (0.005)	−0.004 (0.008)	0.001 (0.004)
	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
UNC4	−0.014 (0.011)	−0.007 (0.010)	−0.032 (0.010)	−0.006 (0.014)	0.016 (0.005)	0.002 (0.014)	0.008 (0.005)	0.012 (0.010)	0.005 (0.005)
	p=1.000	p=1.000	p=0.737	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
Manuf	−0.010 (0.012)	−0.036 (0.011)	−0.022 (0.010)	−0.014 (0.015)	0.002 (0.005)	0.064 (0.016)	0.004 (0.006)	0.004 (0.011)	0.000 (0.004)
	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=0.225	p=1.000	p=1.000	p=1.000
Const	0.001 (0.018)	−0.010 (0.016)	−0.018 (0.015)	−0.001 (0.019)	0.011 (0.010)	−0.023 (0.021)	0.003 (0.007)	0.022 (0.017)	0.001 (0.006)
	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
Trade	−0.014 (0.012)	−0.036 (0.011)	−0.002 (0.011)	0.013 (0.016)	0.007 (0.005)	0.007 (0.015)	0.001 (0.005)	0.016 (0.011)	0.010 (0.006)
	p=1.000	p=0.983	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
Serv	0.013 (0.011)	−0.026 (0.009)	0.025 (0.010)	0.024 (0.013)	−0.004 (0.004)	−0.037 (0.013)	−0.001 (0.004)	−0.008 (0.008)	0.002 (0.004)
	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
CR81	0.022 (0.011)	−0.001 (0.009)	0.006 (0.009)	0.033 (0.013)	−0.006 (0.005)	−0.041 (0.013)	−0.002 (0.005)	−0.011 (0.009)	−0.006 (0.004)
	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
CR82	0.003 (0.012)	−0.011 (0.010)	0.022 (0.011)	0.026 (0.014)	−0.003 (0.005)	−0.030 (0.015)	−0.002 (0.005)	−0.003 (0.010)	0.001 (0.006)
	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
CR83	0.000 (0.014)	−0.001 (0.012)	0.002 (0.012)	0.032 (0.018)	0.001 (0.006)	−0.048 (0.018)	0.009 (0.007)	−0.002 (0.012)	−0.002 (0.006)
	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
MNE	−0.019 (0.008)	0.017 (0.008)	0.011 (0.007)	−0.003 (0.011)	0.000 (0.004)	−0.012 (0.011)	0.000 (0.004)	−0.007 (0.007)	0.003 (0.003)
	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000	p=1.000
Num.Obs.	3077	3077	3077	3077	3077	3077	3077	3077	3077
R2	0.028	0.023	0.048	0.011	0.017	0.026	0.006	0.015	0.006
R2 Adj.	0.022	0.017	0.042	0.005	0.011	0.020	0.000	0.009	0.000
AIC	−602.5	−1315.9	−1534.0	810.5	−5788.3	675.9	−5631.2	−1776.2	−6462.9
BIC	−475.8	−1189.3	−1407.3	937.1	−5661.6	802.6	−5504.5	−1649.5	−6336.2

Table B9: OLS Regressions Tax Decrease *(continued)*

	Comp.	Jobs	Payout	Ret. Earnings	Prices	Invest.	Tax Plan.	Other	Debt
RMSE	0.22	0.19	0.19	0.27	0.09	0.27	0.10	0.18	0.08

Note:
This table presents OLS results for regressions of stated incidence outcomes on a set of control variables for the tax decrease group. Robust standards are given in parenthesis. P-values are corrected for the multiple comparisons problem using the procedure suggested by Benjamini and Yakuteli (2001). SoleProp is an indicator for a sole proprietorship. Partner is an indicator for partnerships. EmpSmall is an indicator for being within the SME classification small based on employees, EmpMed for being medium sized and EmpLarge for being classified as a large company. UNC1-UNC4 are self-reported uncertainty categories with respect to future revenues based on a 5-point Likert scale. Categories UNC1 and UNC2 correspond to very low and low uncertainty, whereas UNC3 and UNC4 represent high and very high uncertainty. The reference category is medium uncertainty. Liq and Prof constitute indicators for having experienced a negative liquidity or profitability impact due to the Corona crisis. Manuf, Const, Trade, and Serv are indicator variables for operating in the manufacturing, construction, trade or service industry respectively based on 1-digit WZ08 industry classification.