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Who Benefits from State Corporate Tax Cuts? A Local Labor Market Approach with Heterogeneous Firms: Further Results[†]

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Who benefits from local business tax cuts? To answer this question, Suárez Serrato and Zidar (2016)—henceforth, SZ—used a model to estimate how much firm owners benefitted relative to workers and landowners. SZ inferred the profit effects on firm owners from mechanical changes in the cost of capital and estimated changes in wages. This paper develops and implements two novel approaches for inferring profit effects from other sources of variation: changes in the labor demand of incumbent firms and changes in local productivity.

To do so, we extend our framework in SZ in three ways. First, we show how to identify profit effects using these new reduced-form effects. The detailed identification results are derived in the online Appendix A.1. Second, we update the structural model to incorporate these additional approaches to estimate profit effects. The updated model, which is detailed in the online Appendix A.2, also correctly accounts for the effects of taxes on the composition of firms and the cost of capital, and allows for more flexible responses of the local cost of capital to changes in business taxes.[1] Third, we show how to derive income shares for each of the agents of the model. We use the income shares derived in the online Appendix A.3 to compute income-share-weighted incidence estimates.

We extend the empirical analysis in SZ with new data from the US Census Bureau's Longitudinal Business Database (LBD) and Annual Survey of Manufacturers (ASM). We first provide new evidence on the effect of business taxes on the labor demand of incumbent firms (see online Appendix B.1) and on local total factor productivity (TFP; see online Appendix B.2). Then we use these reduced-form estimates to estimate the effects on profits.

Our first main finding is that these reduced-form results lead to somewhat larger estimated effects on firm owners. The strategy that identifies firm owners' incidence using the reduced-form effect on labor demand of incumbent firms delivers an estimate of 61.9 percent (SE = 11 percent). The second strategy that uses the effects of business taxes on local productivity (TFP) yields an estimate of the firm owner share of 52.3 percent (SE = 34 percent).

Our second main finding is that our extended structural model that incorporates these new moments delivers an estimate for firm owners of 53.3 percent (SE = 12 percent). In the main text, we discuss how these results vary using different parameterizations, weighting approaches, and specifications. Overall, our central estimate is

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[1] Malgouyres, Mayer, and Mazet-Sonilhac (2023) correctly observe that SZ do not account for the compositional margin, which is the effect of tax changes on average idiosyncratic firm productivity. They also note that SZ were inconsistent in terms of whether or not the cost of capital ρ varied across locations. Suárez Serrato and Zidar (2023) show that accounting for the composition margin and cost of capital in the baseline SZ structural model has very modest effects on incidence estimates.

TABLE 1—IDENTIFICATION OF LOCAL INCIDENCE ON WELFARE AND STRUCTURAL PARAMETERS

Panel A. Local incidence

Stakeholder (benefit)	Incidence	Identified by
Workers (Disposable income)	$\dot{w} - \alpha \dot{r}$	$\beta^W - \alpha \beta^R$
Landowners (Housing costs)	$\dot{r}$	β^R
Firm owners (after-tax profit)		
1. Calibration	$1 + \gamma\left(\varepsilon^{PD} + 1\right)\left(\dot{w}_c - \frac{\delta}{\gamma}\phi\right)$	$1 + \gamma\left(\varepsilon^{PD} + 1\right)\left(\beta^W - \frac{\delta}{\gamma}\phi\right)$
2. Micro labor demand	$1 + \dot{l} + \dot{w}$	$1 + \beta^l + \beta^W$
3. TFP	$-\dot{z}$	$-\beta^z$

Panel B. Structural parameters

Worker mobility	Firm mobility	Housing supply	Product demand
$\sigma^W = \frac{\beta^W - \alpha\beta^R}{\beta^N}$	$\sigma^F = \frac{\beta^z}{\beta^E}\frac{1}{1+\varepsilon^{PD}}$	$\eta = \frac{\beta^N + \beta^W}{\beta^R} - 1$	$\varepsilon^{PD} = \frac{\beta^l + \beta^W}{(\gamma\beta^W - \delta\phi)} - 1$

Notes: This table summarizes identification results. Panel A shows how reduced-form estimates $\beta^{BusinessTax} = \left[\beta^W, \beta^N, \beta^R, \beta^E, \beta^l, \beta^z\right]'$ on wages β^W, population β^N, rental costs β^R, number of firms β^E, incumbent labor demand β^l, and local TFP β^z map to the incidence on welfare of workers, landowners, and firm owners at the local level. Panel B lists identification results for the dispersion of workers preferences σ^W, the dispersion of firm productivity σ^F, the elasticity of housing supply η, and the product demand elasticity ε^{PD}. Note that we calibrate the housing expenditure share α, the ratio of the capital to labor output elasticities δ/γ, and the product demand elasticity ε^{PD}. We also consider calibrated and estimated values of the cost of capital elasticity ϕ. In addition, we can also use other moments to identify productivity dispersion as well as the product demand elasticity. See Section A.2 in the online Appendix for additional discussion.

that firm owners bear roughly half the incidence, while workers and landowners bear 25–40 percent and 10–25 percent, respectively.

I. New Incidence and Parameter Estimates

A. *Estimates Using Reduced-Form Approaches*

This subsection presents estimates of incidence using reduced-form effects under three different approaches for estimating profit effects. Panel A of Table 1 summarizes our identification results that link economic incidence to reduced-form effects of business tax changes on six outcomes.

Online Appendix Table B2 reports the results.[2] For a given column, we report the calibrated values, the estimated effect on each of the three agents in the model, the equal-weighted incidence as in SZ, and the income-share-weighted incidence in the bottom panel. We report both weighted and unweighted incidence results to show how estimates change when changing one thing at a time.

The first column uses our incumbent labor demand approach to estimate the effect on firm owners. The second column uses the productivity approach. The third column reports the approach that calibrates scale effects (and therefore uses wage impacts alone) to estimate profit impacts. As in SZ, we assume that the cost of capital elasticity with respect to business taxes $\phi = 1$. The fourth column takes a simple average of the profit estimates in columns 1–3. The fifth column is a weighted average of the estimates in the first three columns that uses inverse variance weights to minimize the variance of the profit effect estimate.[3] Intuitively, this approach puts less than one-third weight on less precise estimates and more weight on more precise estimates.

In the sixth column, we use the calibration approach with a more responsive product demand elasticity of $\varepsilon^{PD} = -5$. The last two

[2] We report the analogous results using reduced-form estimates in the specifications with Bartik controls and Bartik plus personal tax controls in online Appendix Tables C1 and C2, respectively.

[3] Letting $\hat{\Sigma}$ be the estimated covariance of the three profit effect estimates, the weights $\left(\hat{\Sigma}^{-1}1\right)/\left(1'\hat{\Sigma}^{-1}1\right)$ yield the linear combination of the profit estimates with minimum variance (e.g., Song and Schmeiser 1988).

columns report the simple average and inverse-variance-weighted average of the first two columns and that of column 6. Note that only columns 3 and 6 depend on the calibrated values of ε^{PD} for estimating incidence and shares, but all of the income-weighted shares depend on ε^{PD} since it affects the income-share weights. These tables follow the spirit of Table 5 in SZ but with new approaches for estimating effects on profits.

Consider first column 3 in online Appendix Table B2, which shows the estimates when estimating profit effects as $1+\gamma\left(\varepsilon^{PD}+1\right)\left(\beta^{W}-\delta/\gamma\right)$, where γ and δ are the output elasticities of labor and capital, respectively. When calibrating the output elasticity to be $\varepsilon^{PD}=-2.5$, firm owner profits increase by 0.876 percent, which amounts to 28 percent of the equal-weighted incidence. Column 6 shows the same approach but when $\varepsilon^{PD}=-5$. The new estimates in columns 1, 2, 4, 5, 7, and 8, however, result in larger estimated impacts on profits, yielding firm owner incidence shares that range between 34 percent and 62 percent.[4]

The estimate based on the incumbent labor demand in column 1 substantially exceeds the estimate in column 3. In the data, the fact that incumbent firms are expanding employment suggests that unit costs are declining and are thus leading to larger firm scale and higher profits. In contrast, the calibration approach in column 3 suggests that unit costs are increasing since $\left(\beta^{W}-\delta/\gamma\right)>0$.[5] Using different variation from productivity changes, column 2 also shows larger profit increases. When combining the estimates by taking a simple average in column 4, the equal-weighted incidence share on firm owners is 51 percent. Finally, the optimal combination of estimates in column 5 yields an estimate of 34 percent. When we use the baseline calibration of $\varepsilon^{PD}=-2.5$, the income-share-weighted estimates increase the share on firm owners, whereas the $\varepsilon^{PD}=-5$ income-share incidence estimates are a bit smaller. The central estimate from this exercise is that firm owners get about half the incidence. In particular, the inverse-variance-weighted average estimate of 43 percent for firm owners, 43 percent for workers, and 14 percent for land owners is from column 5.

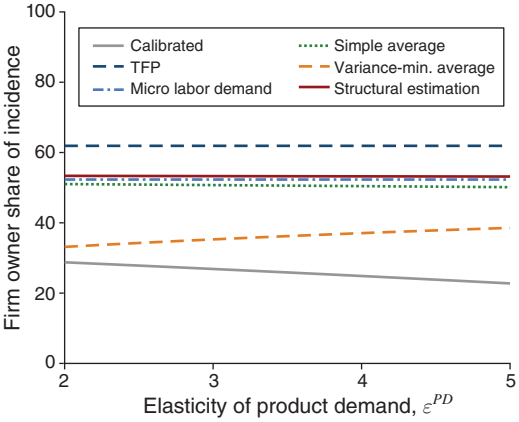

FIGURE 1. FIRM OWNERS' SHARE OF INCIDENCE ACROSS APPROACHES AND SPECIFICATIONS

Notes: This figure plots the share of incidence for firm owners across different approaches and different values of the product demand elasticity. "Calibrated" uses the profit expression in equation (A.1) in the online Appendix—that is, $\hat{\pi}=1+\left(1+\varepsilon^{PD}\right)(\gamma\dot{w}-\delta\phi)$—along with the other reduced-form moments in SZ. "Micro labor demand" uses the $\hat{\pi}=1+\dot{l}+\dot{w}$ approach to compute profits along with other reduced-form moments. "TFP" uses the $\hat{\pi}=-\dot{z}$ approach along with other reduced-form moments without the Bartik controls. "Simple average" takes the equal-weighted average of these three approaches. "Variance-min. average" is a weighted average where the weights are the inverse variance of the these three reduced-form approaches (i.e., calibrated, micro labor demand, and TFP). Note that the expression for the variance of the profit estimate depends on the product demand elasticity. As a consequence, the inverse variance weights depend on the product demand elasticity. The structural estimation line expands our estimates from the structural model in online Appendix Table B4 to show results using a continuous range of product demand elasticity values.

Figure 1 plots the share of incidence for firm owners across four different approaches and different values of the product demand elasticity.[6] "Calibrated" uses the first profit expression listed in Table 1 along with the other

[4] Formal conventional view tests, which evaluate the joint hypothesis that the share of incidence for workers equals 100 percent and the share for firm owners equals 0 percent, are rejected in all specifications other than column 6, which is a bit less precise.

[5] Note that this unit cost effect depends on the specification. When conditioning on Bartik shocks in Table 4, column 2 of SZ, the wage estimates suggest that unit costs decline, which is consistent with these new profit approaches.

[6] Online Appendix Figure C2 is the analogous figure using income-share-weighted estimates.

reduced-form moments. As in online Appendix Table B2 and SZ, this line assumes that the cost of capital elasticity $\phi = 1$. "Micro labor demand" uses the second approach to compute profits, and "TFP" uses the last approach listed in Table 1. The "simple average" specification takes an equal-weighted average of these three approaches to estimate profits, and the "variance-min." specification uses inverse variance weights to put more weight on precise estimates of profits.

A few insights emerge. First, the lowest estimate for firm owners is the calibrated approach, and it is the only one that is decreasing with the product demand elasticity. Second, the others are either flat (do not depend on ε^{PD}) or are increasing (because the more elastic product demand affects the inverse variance weights). In short, out of several possible methods, the calibration approach gives the lowest incidence to firm owners and is more sensitive to the product demand elasticity than the other approaches.

B. *Estimates Using Structural Approach*

As in our original paper, we support the reduced-form estimates by bringing in additional moments to discipline our estimates. We follow the approach in SZ, Section VI (see SZ, equation (22)) by estimating the structural parameters using a classical minimum distance estimator.[7] Online Appendix Tables B3 and B4 update SZ Tables 6 and 7 by providing new results for parameter estimates and incidence, respectively.

Online Appendix Table B3 provides parameter estimates that update SZ Table 6, panel A using the refined model. Column 1 uses the four outcomes in SZ with the updated model and continues to set $\phi = 1$. Specifically, it uses the elements of the matrix of reduced-form effects C above the horizontal dashed line and to the left of the vertical dashed line from equation (A.17). Column 2 uses only the business tax shocks and includes the incumbent labor and TFP outcomes; that is, it uses the elements of the matrix of reduced-form effects C to the left of the vertical dashed line and estimates the cost of capital elasticity ϕ. Column 3 uses the full six-outcome model with all three shocks. Column 4 uses the same specification as column 3 but instead calibrates ϕ at a lower value. Columns 5, 6, and 7 use the full model with six outcomes and three shocks, estimate ϕ, and show the results for different values of calibrated parameters.

Each column provides an estimate for a given set of calibrated parameter values as in SZ Table 6. In column 1, we find similar dispersion in firm productivity and a similar degree of relative dispersion to SZ. Specifically, firm productivity dispersion is 0.12, about one-half of worker dispersion of 0.24. In SZ Table 6, panel B, column 1, firm dispersion was also 0.12, while worker dispersion was 0.19. We find that worker dispersion exceeds firm dispersion in most specifications, like in SZ.[8] The housing supply elasticities are still estimated imprecisely, likely reflecting in part the heterogeneity in housing supply elasticities across regions in the United States. Our view of these estimates is that they are most informative when evaluated in the context of the resulting effective labor demand and labor supply elasticities, which we report in the next table.

Online Appendix Table B4 presents the impacts on land owners, workers, and firm owners and incidence shares following SZ Table 7. Panel A reports estimates of incidence as well as effective local labor supply and demand elasticities, panel B gives the equal-weighted share of incidence, and panel C gives the income-share-weighted shares of incidence. Using the same column ordering as online Appendix Table B3, each column lists the calibrated values at the top of the table and the specification details at the bottom.

Panel B shows that firm owners enjoy substantial increases in profits in the updated model.[9]

[7] We find the structural parameters θ that minimize the distance between the moments $m(\theta)$ given by the matrix C above and the reduced form effects $\hat{\beta}$ by solving $\hat{\theta} = \arg\min_{\theta\in\Theta}\left[\hat{\beta} - m(\theta)\right]' W^{-1}\left[\hat{\beta} - m(\theta)\right]$, where W is a weighting matrix that uses the inverse variance of the moments β. The estimation constrains $\sigma^F, \sigma^W > 0$ since they represent dispersion measures. We also ensure a positive housing supply elasticity and a positive rental price elasticity of productivity by assuming that $\eta > 0$ and $\varphi^h \leq 0$.

[8] The exceptions are the specification in column 2, which only uses business tax shocks (and thus only six moments overall) and the specification with a large housing expenditure share of 0.65 in column 5.

[9] Formal conventional view tests, which evaluate the joint hypothesis that the share of incidence for workers equals 100 percent and the share for firm owners equals 0 percent, are rejected in all specifications other than the

The equal-weighted share of incidence for firm owners ranges from 33 percent to 65 percent. We report different versions of the structural estimates to isolate the effects of updating the framework and adding the new approaches to estimate profit effects. Column 1 is the closest to the original model in SZ and is comparable to SZ Table 7, column 4. The share of incidence to firm owners in column 1 is 33.0 percent, relative to the same calibration in SZ Table 7 that yields a value of 44.7 percent. When weighting the column 1 estimates by income shares, the firm owner estimate is 45.2 percent. The estimates in columns 2 and 3 show the influence of the two new approaches for estimating profit impacts: they give a larger share to firm owners than column 1. In particular, the business tax shock specification in column 2 gives almost two-thirds of incidence to firm owners, and the full model with three shocks and six outcomes in column 3 gives them a little over half the incidence at 53.3 percent.

Column 4 calibrates ϕ at a smaller value than is estimated in column 3 and illustrates that the value of ϕ is not driving the firm owner incidence result to be larger.[10] Column 5 uses a larger value of the housing expenditure share, and the last two columns use more elastic product demand. The results from the last two columns are striking: the firm owner incidence is around 50 percent even in a setting in which $\varepsilon^{PD} = -4$ or $\varepsilon^{PD} = -5$. One point to consider when thinking about the role of ε^{PD} in SZ and in this paper is that this elasticity also influences the effect on wages, and the structural approach incorporates this interdependence (whereas changing ε^{PD} without changing wages—as in the reduced-form calibration approach—does not). Moreover, in the updated model, there are multiple ways to identify profits (e.g., via $\dot{l}$ and via $\dot{z}$) that do not depend directly on ε^{PD}. This feature helps the model reduce the sensitivity of profit estimates to this parameter.

Firm owners bear a lot of incidence in the structural model partly because of low estimated labor supply elasticities. Relative to effective local labor demand elasticities, local labor supply is less responsive to wage fluctuations.[11] The estimates of local labor elasticities are slightly smaller in absolute value than those in SZ Table 6, and this result partly reflects the influence of adding the composition margin ($\dot{z}$) moment. Economically, adding the composition margin to the model means that local labor demand is lower than it would be if entering firms were as productive as incumbents. Since the entrants have lower productivity, local labor demand is lower and this force influences the estimates of the responsiveness of firms and workers. This compositional margin is a strong force in this model. Although it is correct to include in the original SZ model, this force is influential and a bit hard to fit quantitatively. In future work, one could explore relaxing the strength of this part of the model by adding dynamic adjustment in the labor market or other frictions or sources of heterogeneity. Doing so would likely fit the moments better.

That said, the reduced-form evidence from online Appendix Table B2 does not depend on estimates of effective labor supply and demand elasticities or product demand elasticities yet gives similar incidence results.

II. Concluding Discussion

This paper shows that there are several ways to identify profit effects (from firm composition effects and productivity changes) as well as identify parameters in the original SZ. We found that incorporating these insights into our empirical analysis supported the bottom-line finding that firm owners bear a substantial portion of incidence. These updates strengthened this bottom line by providing multiple sources of corroborating evidence as well as an overall average effect that was a bit larger than the original estimate. Incorporating richer models of firm heterogeneity and labor market frictions provide

income-share-weighted result in column 1, which is slightly less precise.

[10] In column 3, we estimate that ϕ equals 9.6, implying that business tax cuts have a substantial impact on the local cost of capital. As discussed above, for a local business tax cut to lower unit costs of production and be consistent with firm expansion, it must be that $\delta\phi > \gamma\dot{w}$. In column 4, we calibrate $\phi = 8$ to illustrate that allowing for larger values of ϕ does not boost the share going to firm owners. Note also that the estimate of ϕ is around half as large in columns 6 and 7, where we use larger values for ε^{PD}.

[11] The exception is the specification with only business taxes in column 2, which is consistent with the patterns in the original SZ Table 7, column 4, which also reported a relatively large labor supply estimate in the business tax only specification.

promising ways to continue to improve the analysis of business tax incidence.

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