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

By Juan Carlos Suárez Serrato and Owen Zidar*

In Suárez Serrato and Zidar (2016), we estimate the incidence of state corporate taxes. Malgouyres, Mayer, and Mazet-Sonilhac (2023) highlight two errors, ignoring effects on firm composition and characterizing capital costs inconsistently. This reply corrects the structural model and corresponding incidence estimates. The incidence results are similar to the originally reported estimates and the confidence intervals widen for some estimates. In the corrected structural model, the firm owner incidence share estimate changes by 1.6 percentage points relative to the original version (i.e., 38.1 percent versus 36.5 percent). The worker share estimate is 35.0 percent. Landowners bear the remaining 26.8 percent. (*JEL* H22, H25, H32, H71, R23, R51)

In Suárez Serrato and Zidar (2016) (hereafter, SZ), we estimated the incidence of state corporate taxes on the welfare of workers, landowners, and firm owners using variation in state corporate tax rates and apportionment rules. We used two approaches to estimate incidence: a reduced-form approach, which identified welfare effects using four reduced-form effects of business taxes on local economic outcomes, and a structural approach, which identified underlying parameters using these outcomes as well as the effects of local productivity shocks. We found that firm owners bear roughly 40 percent of the incidence, while workers and landowners bear 30–35 percent and 25–30 percent, respectively.

In a recent comment, Malgouyres, Mayer, and Mazet-Sonilhac (2023) (hereafter, MMM-S) contribute several useful insights and show that two corrections can improve these estimates. First, they correctly observe that the SZ model does not account for the compositional margin, which is the effect of tax changes on average idiosyncratic firm productivity. Intuitively, after a tax cut, firms with marginal

*Suárez Serrato: Stanford GSB (email: jc@jcsuarez.com); Zidar: Princeton University (email: ozidar@princeton.edu). Esther Duflo was the coeditor for this article. The companion paper "Who Benefits from State Corporate Tax Cuts? A Local Labor Market Approach with Heterogeneous Firms: Further Results" (Suárez Serrato and Zidar 2023a) contains additional analysis and further identification and empirical results. We thank Daniel Garrett, Eric Ohrn, Daniel Xu, and Tim (Qian) Zhang for helpful comments. We thank Emily Bjorkman and Kevin Roberts for outstanding research assistance. This work is supported by National Science Foundation under grant 1752431. Any views expressed are those of the authors and not those of the US Census Bureau. The Census Bureau's Disclosure Review Board and Disclosure Avoidance Officers have reviewed this information product for unauthorized disclosure of confidential information and have approved the disclosure avoidance practices applied to this release. This research was performed at a Federal Statistical Research Data Center under FSRDC project 1667. (CBDRB-FY23-P1667-R10338)

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productivity draws will enter, so one needs to account for changing firm composition when analyzing the labor market effects of local tax changes. We agree, and believe that MMM-S's comment provides valuable work that shows the need to correct the mapping from reduced-form coefficients to incidence to account for the compositional margin. Second, MMM-S highlight that SZ were inconsistent in terms of whether or not the cost of capital ρ varied across locations.[1] We agree, and believe that MMM-S's treatment of the establishment location expression is correct and useful.

Incorporating these corrections into the model affects the incidence calculations in the two approaches of SZ: (i) reduced-form estimation and (ii) structural estimation, which is not investigated by MMM-S. In this reply, we analyze how incorporating the two MMM-S corrections affect the structural model, show that the model parameters are identified by tax shocks used in SZ, and provide corrected incidence estimates.

Table 1 summarizes the incidence share to firm owners from a state corporate tax cut across three different approaches. Our main finding is that in the corrected structural model from SZ that incorporates the two MMM-S points, the firm owner incidence share estimate changes by 1.6 percentage points relative to the original version in SZ. Specifically, while SZ report a value of 36.5 percent (SE $=$ 17 percent) in column 1 of their Table 7, column 2 of Table 1 reports a corrected estimate of 38.1 percent (SE $=$ 18 percent), showing that incorporating these changes does not have substantial quantitative implications for incidence.

Columns 3 and 4 of Table 1 implement the calibration approach proposed by MMM-S. Column 3 reports the MMM-S estimate of a 27.8 percent (SE $=$ 21 percent) incidence share to firm owners.[2] The calibration in MMM-S is conceptually correct and uses sensible parameters that we used in SZ. However, this calibration approach is sensitive to only one imprecise estimate of wage effects that varies across specifications. For example, column 4 of Table 1 shows that controlling for the Bartik shock in the wage estimate—i.e., using estimates from SZ Table 4, column 2 instead of the specification without controls in column 1—results in a firm owner estimate of 50.6 percent (SE $=$ 47 percent).

Given the imprecision of the estimates, we develop two new strategies for reduced-form identification of incidence shares in a companion paper (Suárez Serrato and Zidar 2023a). Column 6 of Table 1 reports that the first 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). Column 7 shows that a 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). In Suárez Serrato and Zidar (2023a), we extend the structural model in this paper to also incorporate these new moments, which yields a more precise estimate

[1] In the establishment location equation, the cost of capital in SZ is ρ for every c, but in the firm owner profit expression, the local business tax affects firm owners by changing the cost of capital. The MMM-S update to the establishment location equation correctly includes δ/σ^F (see MMM-S equation (10)). SZ did not include the cost of capital difference in the location equation based on the assumption that renting capital cost the same amount in all locations. However, this exclusion was inconsistent with the effects on firm owners and should have included the δ/σ^F term as an additional margin through which taxes affect firm location (in addition to the direct effects of keep rates on after-tax profits). This update corrects this error and provides updated estimates.

[2] MMM-S report this estimate in their Table 1, column 2.

TABLE 1—FIRM OWNERS' SHARE OF INCIDENCE ACROSS APPROACHES AND SPECIFICATIONS (PERCENT)

	Structural		MMM-S calibration		Reduced-form		
	SZ Table 7, column 1	Corrected	No controls	Bartik controls	SZ Table 5, column 1	Micro labor demand	TFP
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Share	36.5	38.1	27.8	50.6	42.0	61.9	52.3
SE	(16.8)	(18.1)	(21.5)	(46.9)	(12.0)	(10.8)	(33.7)

Notes: This table reports the share of incidence for firm owners across different approaches. "SZ Table 7, column 1" presents the original estimate from the structural analysis in SZ. Column 2 reports the new structural estimate. "MMM-S, no controls" replicates the approach in MMM-S (their Table 1, column 2). Column 4 uses the same MMM-S approach but instead of using the reduced-form estimates in SZ Table 4, column 2 instead of column 1. "SZ Table 5, column 1" presents the original reduced-form estimate. Columns 6 and 7 report estimates from Suárez Serrato and Zidar (2023a).

of the share of firm owners' incidence of 53.3 percent (SE = 12 percent). Along with the results in this paper, these estimates confirm the original finding in SZ that firm owners bear a significant fraction of the incidence from state business tax cuts.

The rest of this reply describes how we correct the structural model, provides new structural estimates of parameters and incidence, and compares them to prior estimates and those in MMM-S.

I. Correcting the Structural Model

This section corrects the structural model to incorporate the composition margin and consistent cost of capital characterization.

A. *Preliminaries*

Incorporating these two corrections requires three inputs.

The first input is the expression for local labor demand. Recall that equation (8) in SZ characterizes local labor demand for location c. It is the product of three terms: an extensive margin term that accounts for firm location (E_c), the average idiosyncratic productivity of firms in the location (z_c), and the intensive margin (l_c), which relates costs and average labor demand of firms in the area:

$$(1) \qquad L_c^D = E_c \times \underbrace{\left\{ w_c^{\gamma(\varepsilon^{PD}+1)-1} \rho_c^{\delta(\varepsilon^{PD}+1)} \kappa_0 \left[\exp\left(B_c\left(-\varepsilon^{PD}-1\right)\right)\right]\right\}}_{\equiv l_c} z_c,$$

where w_c are local wages, ρ_c is the local cost of capital, γ and δ are the output elasticities of labor and capital, respectively, ε^{PD} is the product demand elasticity, B_c is the common component of firm productivity in location c, and κ_0 is a constant.[3]

[3] The local labor demand elasticity is $\varepsilon^{LD} = -\frac{\gamma}{\sigma^F} - 1$. SZ did not account for the composition margin, which resulted in an elasticity of $\gamma\left(1 + \varepsilon^{PD} - \frac{1}{\sigma^F}\right) - 1$.

E_c is determined by equation (7) in SZ, which relates the fraction of firms to the average value of locating there, v_c, which depends on local costs and taxes:

$$E_c = \frac{\exp\left(\frac{v_c}{\sigma^F}\right)}{\sum_{c'} \exp\left(\frac{v_{c'}}{\sigma^F}\right)}. \tag{2}$$

The second input relates average idiosyncratic productivity for firms in the local area, z_c, to the share of firms in the local area, E_c. Recall that each firm chooses its location by maximizing its total value $v_c + \zeta_{jc}$, where ζ_{jc} is firm j's idiosyncratic, location-specific productivity in location c. The assumption that the ζ_{jc}'s are i.i.d. with a Type 1 Extreme Value distribution implies that

$$z_c = \mathbb{E}\left[\exp\left(-\left(1 + \varepsilon^{PD}\right)\zeta_{jc}\right) \middle| c\right] = \Gamma\left(1 + \left(1 + \varepsilon^{PD}\right)\sigma^F\right) \times E_c^{\left(1+\varepsilon^{PD}\right)\sigma^F},$$

where Γ is the gamma function and σ^F is the dispersion in firm productivity. This setup delivers the result from Hanemann (1984) that MMM-S highlight, which relates z_c and E_c. In particular, taking logs and derivatives shows that the elasticity of local firm productivity with respect to the net-of-business-tax rate is $\dot{z} = \left(\sigma^F\right)\left(1 + \varepsilon^{PD}\right)\dot{E}$. Since $\varepsilon^{PD} < -1$, average local productivity declines as tax cuts attract a larger number of firms with lower levels of productivity.

The third input relates firm location to cost changes. Taking logs of equation (2) and derivating gives the following expression for the firm location elasticity:

$$\dot{E} = \frac{\dot{v}_c}{\sigma^F} = \frac{1}{-\left(1 + \varepsilon^{PD}\right)} \frac{1}{\sigma^F} - \frac{\gamma}{\sigma^F}\dot{w} + \frac{\delta}{\sigma^F}, \tag{3}$$

which shows how tax changes impact firm location through mechanical and cost effects.[4]

B. *Simultaneous Equation Model*

There are four key equations that characterize changes in economic activity in location c and year t:

$$\Delta \ln N_{c,t} = \frac{1}{\sigma^W}\left(\Delta \ln w_{c,t} - \alpha \Delta \ln r_{c,t}\right) + \frac{\Delta \ln\left(1 - \tau^i_{c,t}\right)}{\sigma^W} + \frac{\Delta A_{c,t}}{\sigma^W}, \tag{4}$$

$$\Delta \ln N_{c,t} = \Delta \ln E_{c,t} + \Delta \ln l_{c,t} + \Delta \ln z_{c,t}, \tag{5}$$

$$\Delta \ln r_{c,t} = \frac{\Delta \ln N_c + \Delta \ln w_c + \Delta \ln\left(1 - \tau^i_{c,t}\right)}{1 + \eta_c} - \frac{\eta_c}{1 + \eta_c}\Delta B^h_{c,t} - \frac{\kappa}{\left(1 + \eta_c\right)}\Delta \ln\left(1 - \tau^i_{c,t}\right), \tag{6}$$

$$\Delta \ln E_{c,t} = -\frac{\gamma}{\sigma^F}\Delta \ln w_{c,t} + \left[\frac{\delta}{\sigma^F} - \frac{1}{\sigma^F\left(\varepsilon^{PD} + 1\right)}\right]\Delta \ln\left(1 - \tau^b_{c,t}\right) + \frac{1}{\sigma^F}\Delta B_{c,t}. \tag{7}$$

[4] As we discuss in footnote 1, this equation includes the term δ/σ^F, which is erroneously omitted in SZ.

Recall from SZ that equation (4) describes labor supply, which increases with the net-of-personal-tax rate $(1 - \tau_c^i)$, real wages, and amenities (A_c). The responsiveness to these labor supply shifters depends on the dispersion of idiosyncratic-location preferences σ^W. Real wages depend on the housing expenditure share α and the cost of housing $r_{c,t}$. Equation (5) is the total derivative of local labor demand in equation (1).[5] Equation (6) describes equilibrium rental prices in the local housing market, which depend on the elasticity of housing supply (η) and productivity in the housing sector (B^h).[6] Equation (7) is the firm location equation as in equation (3), and also includes the productivity shifter B_c. The sensitivity of firm location to profit shifters depends on the dispersion of idiosyncratic-location productivity σ^F.

For empirical implementation, we project productivity terms $\Delta B_{c,t}$ and $\Delta B_{c,t}^h$ on Bartik shocks (i.e., $\Delta B_{c,t} = \varphi \Delta \ln BARTIK_{c,t} + v_{c,t}$ and $\Delta B_{c,t}^h = \varphi^h \times \Delta \ln BARTIK_{c,t} + v_{c,t}^h$). Since equations (4)–(7) are a system of linear equations, we can solve for the reduced-form effects of taxes and Bartik shocks on local outcomes. We summarize these reduced-form expressions in the following matrix (see Appendix A.A1 for a derivation):

$$\begin{array}{c} \text{Business Taxes} \qquad\qquad \text{Bartik Shock} \qquad\qquad \text{Personal Taxes} \\ \left[\begin{array}{c:c:c} \varepsilon^{LS}\beta_1^W & \varepsilon^{LS}\beta_2^W + \dfrac{\alpha\eta_c}{\sigma^W(1+\eta_c)+\alpha}\varphi^h & \varepsilon^{LD}\beta_3^W \\ \beta_1^W & \beta_2^W & \beta_3^W \\ \dfrac{1+\varepsilon^{LS}}{1+\eta}\beta_1^W & \dfrac{1+\varepsilon^{LS}}{1+\eta_c}\beta_2^W - \dfrac{\varphi^h\sigma^W\eta_c}{\sigma^W(1+\eta_c)+\alpha} & \dfrac{(1+\varepsilon^{LS})}{1+\eta_c}\beta_3^W + \dfrac{1+(1-\kappa)\sigma^W}{\sigma^W(1+\eta_c)+\alpha} \\ -\dfrac{1}{\sigma^F(\varepsilon^{PD}+1)} - \dfrac{\gamma\beta_1^W - \delta}{\sigma^F} & -\dfrac{1}{\sigma^F}(\gamma\beta_2^W - \varphi) & -\dfrac{\gamma}{\sigma^F}\beta_3^W \end{array}\right] \end{array} \begin{array}{c} \text{Outcomes} \\ \Delta \ln N \\ \Delta \ln w \\ \Delta \ln r \\ \Delta \ln E \end{array},$$

where the labor demand elasticity $\varepsilon^{LD} = -\frac{\gamma}{\sigma^F} - 1$ and the labor supply elasticity $\varepsilon^{LS} = \frac{1+\eta-\alpha}{\sigma^W(1+\eta)+\alpha}$. Each element of this matrix represents the reduced-form effects of changes in a given outcome to one of the three shocks. For example, the effect of net-of-business-tax rates on local population (β_1^N) equals the effective local labor supply ε^{LS} times the effect on local wages (β_1^W). The wage incidence of net-of-business-tax rates is given by:

$$\beta_1^W = \left[\frac{\delta}{\sigma^F} - 1 - \frac{1}{\sigma^F(\varepsilon^{PD}+1)}\right]\frac{1}{\varepsilon^{LS} - \varepsilon^{LD}}. \tag{8}$$

Appendix A.A2 provides the wage incidence expressions for Bartik and the net-of-personal-tax rate. This matrix yields insights about identification of structural parameters.

As in SZ, the labor supply parameters are identified by the effects of the business tax in the first column. Dividing β_1^N by β_1^W identifies ε^{LS}. Together with the effect on rents β_1^R, ε^{LS} and β_1^W pin down the housing supply elasticity η. We obtain the preference

[5] This expression includes the composition margin and is equivalent to the wage incidence expression in SZ equation (16) when equated to the labor supply expression in equation (4).

[6] As in SZ, κ governs the impact of personal taxes on housing supply.

dispersion parameter σ^W by solving the equation for ε^{LS}. Intuitively, a business tax cut is a labor demand shock that traces out the supply of workers and housing.

In terms of labor demand, column 3 of this matrix shows that dividing the effect of net-of-personal-tax rate on population β_3^N by its effect on wages β_3^W identifies $\varepsilon^{LD} = -\frac{\gamma}{\sigma^F} - 1$.[7] In addition, dividing the effect on the number of establishments β_3^E by the wage effect β_3^W identifies the contribution of firm entry to labor demand: γ/σ^F. Intuitively, a personal-income-tax cut is a labor supply shock that traces out the slope of labor demand. Finally, β_1^E can be used to identify the elasticity of product demand ε^{PD}.[8] These arguments show that the baseline structural model with three shocks identifies the labor demand parameters.

II. New Incidence and Parameter Estimates

We follow the approach in SZ, Section VI (see SZ, equation 22) by estimating the structural parameters using a classical minimum distance estimator.[9] Table 2 updates SZ Tables 6 and 7 by providing new results for parameter estimates and incidence, respectively. For brevity, we only report the specification that corresponds to column 1 and refer the reader to our companion paper, Suárez Serrato and Zidar (2023a), for additional analysis and results.

Panel B of Table 2 provides parameter estimates that update SZ Table 6, panel A. We find similar dispersion in firm productivity, and a similar degree of relative dispersion to SZ.[10] These estimates are most informative when evaluated in the context of the resulting effective labor demand and labor supply elasticities. While both estimates are similar, the labor supply elasticity decreased from 0.78 to 0.74 (SE $=$ 0.39), and the labor demand elasticity decreased in absolute value from -1.77 to -1.68 (SE $=$ 0.23). Relatively less elastic local labor supply and slightly less elastic labor demand estimates help explain why our estimates on firm owners increase slightly.

Panel C of Table 2 presents the impacts on land owners, workers, and firm owners and incidence shares following SZ Table 7. Relative to the originally reported estimates, the incidence on wages increases from 0.94 to 1.08 (SE $=$ 0.45). The incidence on landowners falls from 1.11 to 0.68 (SE $=$ 1.04). Together, these effects result in incidence on workers that increased from 0.61 to 0.88 (SE $=$ 0.37). Firm owner incidence decreases from 0.99 to 0.96 (SE $=$ 0.10).

Column 3 shows the estimates from the calibration approach reported in MMM-S. Specifically, it shows estimates when estimating profit effects as

[7] Recall that our measure of business taxes includes a component of personal-income taxes for pass-through owners, so this result uses non-business-tax variation that can shift local labor supply.

[8] Specifically, column 1 implies that $\varepsilon^{PD} = \frac{-1}{\sigma^F \beta_1^E + (\gamma \beta_1^W - \delta)} - 1$ and column 3 that $\sigma^F = \frac{\beta_3^W}{\gamma \beta_3^E}$.

[9] We find the structural parameters that minimize the distance between the moments $\mathbf{m}(\boldsymbol{\theta})$ given by the matrix $\mathbf{C}$ in Appendix A.A1 and the reduced-form effects $\hat{\boldsymbol{\beta}}$ by solving: $\hat{\boldsymbol{\theta}} = \arg\min_{\boldsymbol{\theta} \in \Theta} [\hat{\boldsymbol{\beta}} - \mathbf{m}(\boldsymbol{\theta})]' \mathbf{W}^{-1} [\hat{\boldsymbol{\beta}} - \mathbf{m}(\boldsymbol{\theta})]$, where $\mathbf{W}$ is a weighting matrix that uses the inverse variance of the moments $\boldsymbol{\beta}$. The estimation constrains σ^F, $\sigma^W > 0$, $\eta > 0$, and $\varphi^h \leq 0$.

[10] Specifically, firm productivity dispersion is 0.22 or about one-fifth of worker dispersion of 1.10. In SZ Table 6, column 1, firm dispersion was 0.28, which is about one-third as large as worker dispersion of 0.83. The housing supply elasticities are still estimated imprecisely, likely reflecting in part the heterogeneity in housing supply elasticities across regions in the United States.

TABLE 2—ESTIMATED MODEL PARAMETERS AND ECONOMIC INCIDENCE

	SZ Tables 6 and 7 column 1 (1)	Structural estimation (2)	Calibrating product demand (3)
Panel A. Calibrated parameters			
Output elasticity γ	0.150	0.150	0.150
Housing share α	0.300	0.300	0.300
Elasticity of product demand ε^{PD}	−2.500	−2.500	−2.500
Panel B. Estimated parameters			
Idiosyncratic location productivity dispersion σ^F	0.277 (0.138)	0.222 (0.076)	
Idiosyncratic location preference dispersion σ^W	0.829 (0.282)	1.101 (0.541)	
Elasticity of housing supply η	0.513 (1.417)	1.791 (4.018)	
Elasticity of labor supply ε^{LS}	0.780 (0.386)	0.738 (0.386)	
Elasticity of labor demand ε^{LD}	−1.766 (0.269)	−1.677 (0.232)	
Panel C. Incidence			
Wages $\tilde{w}$	0.944 (0.408)	1.084 (0.449)	
Landowners $\tilde{r}$	1.111 (1.119)	0.675 (1.038)	1.172 (1.435)
Workers $\tilde{w} - \alpha\tilde{r}$	0.611 (0.293)	0.881 (0.368)	1.099 (0.593)
Firm owners $\tilde{\pi}$	0.990 (0.092)	0.959 (0.101)	0.876 (0.212)
Panel D. Share of incidence			
Landowners $\tilde{r}$	0.410 (0.263)	0.268 (0.315)	0.372 (0.263)
Workers $\tilde{w} - \alpha\tilde{r}$	0.225 (0.134)	0.350 (0.183)	0.349 (0.114)
Firm owners $\tilde{\pi}$	0.365 (0.168)	0.381 (0.181)	0.278 (0.215)
Test of standard view (p-value)	0.000	0.118	0.000

Notes: Panel B extends analysis in SZ (panel A of Table 6) using the updated model. Panel C extends analysis in SZ Table 7. Column 1 reports corresponding estimates from SZ. Column 2 reports corrected structural estimates. Column 3 reports estimated incidence using the calibration approach in MMM-S. See Suárez Serrato and Zidar (2023a) for additional specifications and model estimates that incorporate new data moments.

$1 + \gamma\left(\varepsilon^{PD} + 1\right)\left(\beta^W - \delta/\gamma\right)$, where γ is the output elasticity of labor, ε^{PD} is the product demand elasticity, δ is the output elasticity of capital, and β^W is the estimated effect of local business tax changes on local wages. The worker incidence estimate in the calibration approach is less precise; the estimate is 1.01 (SE $=$ 0.59). Similarly, the calibration approach estimate for profits is also less precise. The estimate is 0.88 with a standard error of 0.21, that is roughly twice as large as the estimate from the structural model.

Economically, the incidence on firm owners is smaller than in column 2 because the reduced-form effect on wages is slightly larger than the model prediction. Indeed, the reduced-form estimate on wages implies that the unit costs of production increase following a business tax cut since $\hat{\beta}^W > \delta/\gamma = 0.9$. In other words, local wages more than offset the mechanical decrease in the cost of capital. In column 4 of Table 1, we find larger estimates on firm owners because controlling for Bartik shocks reduces the estimated wage effects to a level below δ/γ. As MMM-S note, when $\hat{\beta}^W > \delta/\gamma$, the incidence to firm owners decreases with larger product demand elasticities ε^{PD} in absolute value. However, when unit costs fall, as in the case with Bartik controls, this result no longer holds. In Suárez Serrato and Zidar (2023a), we provide reduced-form strategies that do not depend on the product demand elasticity and estimate structural models that allow unit costs to adjust more flexibly.

Panel D reports the resulting shares of incidence. Relative to the estimate in SZ, the land owner share falls from 41.0 percent to 26.8 percent (SE $=$ 32 percent, with a 95 percent confidence interval of -35 to 89 percent), the worker share increases from 22.5 percent to 35.0 percent (SE $=$ 18 percent, with a 95 percent confidence interval of -1 to 71 percent), and the firm owner estimate increases slightly by 1.6 percentage points from 36.5 percent to 38.1 percent (SE $=$ 18 percent, with a 95 percent confidence interval of 3 to 74 percent). In the MMM-S calibration, firm owner profits increase by 0.876 percent in panel C, which amounts to 28 percent of the incidence (SE $=$ 21.5 percent, with a 95 percent confidence interval of -14 to 70 percent).

III. Concluding Discussion

This correction to SZ addresses concerns about incorporating effects on firm composition of entrants and consistently characterizing the cost of capital. MMM-S provided valuable insights that improved the analysis of tax incidence by highlighting these two issues. We are grateful that their insights helped improve our understanding of this important question. We found that incorporating these insights into our empirical analysis had a minor (i.e., 1.6 percentage points) effect on our incidence estimates for firm owners, which decreased slightly from 36.5 percent to 38.1 percent. The point estimates for the worker share and landowner share are also similar to those reported in SZ—they are 35.0 and 26.8 percent, respectively—though the confidence intervals for the incidence shares are wide. In our companion paper, Suárez Serrato and Zidar (2023a), we show how the reduced-form effects of business tax shocks can identify model parameters and economic incidence when incorporating effects on the labor demand of incumbent firms and local productivity. Incorporating additional data and novel approaches to estimate profit effects increases precision and corroborates the main finding in SZ—firm owners bear a substantial portion of incidence.

Appendix A. Theory Appendix

A1. *Derivation of Structural and Reduced Forms*

After substituting the expressions for the intensive margin and local productivity into equation (5), the structural form of the model in equations (4)–(7) is as follows: $\mathbf{A}\mathbf{Y}_{c,t} = \mathbf{B}\mathbf{Z}_{c,t} + \epsilon_{c,t}$, where

$$\mathbf{Y}_{c,t} = \left[\Delta \ln N_{c,t}, \Delta \ln w_{c,t}, \Delta \ln r_{c,t}, \Delta \ln E_{c,t}\right]',$$

$$\mathbf{Z}_{c,t} = \left[\Delta \ln\left(1 - \tau^{b}_{c,t}\right), \Delta \ln BARTIK_{c,t}, \Delta \ln\left(1 - \tau^{i}_{c,t}\right)\right]',$$

and where $\mathbf{A}$ and $\mathbf{B}$ take the following form:

$$\mathbf{A} = \begin{bmatrix} 1 & -\frac{1}{\sigma^{W}} & +\frac{\alpha}{\sigma^{W}} & 0 \\ 1 & -\left[\gamma\left(\varepsilon^{PD}+1\right)-1\right] & 0 & -1\left(-\sigma^{F}\left(\varepsilon^{PD}+1\right)\right) \\ -\frac{1}{1+\eta_c} & -\frac{1}{1+\eta_c} & 1 & 0 \\ 0 & \frac{\gamma}{\sigma^{F}} & 0 & 1 \end{bmatrix},$$

$$\mathbf{B} = \begin{bmatrix} 0 & 0 & \frac{1}{\sigma^{w}} \\ -\left(\varepsilon^{PD}+1\right)\delta & -\left(\varepsilon^{PD}+1\right)\varphi & 0 \\ 0 & \frac{-\eta_c}{1+\eta_c}\varphi^{h} & \frac{1-\kappa}{1+\eta_c} \\ \frac{\delta}{\sigma^{F}} - \frac{1}{\sigma^{F}\left(\varepsilon^{PD}+1\right)} & \frac{\varphi}{\sigma^{F}} & 0 \end{bmatrix}.$$

Pre-multiplying by the inverse of the matrix of structural coefficients gives the expression,

$$\mathbf{Y}_{c,t} = \underbrace{\mathbf{A}^{-1}\mathbf{B}}_{\equiv \mathbf{C}}\mathbf{Z}_{c,t} + \underbrace{\mathbf{A}^{-1}\epsilon_{c,t}}_{\equiv \mathbf{u}_{c,t}}. \tag{A1}$$

The matrix of reduced-form effects $\mathbf{C}$ can be expressed as follows:

Business Taxes	Bartik Shock	Personal Taxes	Outcomes
$\varepsilon^{LS}\beta^{W}_{1}$	$\varepsilon^{LS}\left(\beta^{W}_{2} + \frac{\alpha\eta_c}{1+\eta_c-\alpha}\varphi^{h}\right)$	$\varepsilon^{LD}\beta^{W}_{3}$	$\Delta \ln N$
β^{W}_{1}	β^{W}_{2}	β^{W}_{3}	$\Delta \ln w$
$\frac{1+\varepsilon^{LS}}{1+\eta}\beta^{W}_{1}$	$\frac{1+\varepsilon^{LS}}{1+\eta_c}\beta^{W}_{2} - \frac{\sigma^{W}}{\sigma^{W}(1+\eta_c)+\alpha}\varphi^{h}$	$\frac{\left(1+\varepsilon^{LS}\right)}{1+\eta_c}\beta^{W}_{3} + \frac{1+(1-\kappa)\sigma^{W}}{\sigma^{W}(1+\eta_c)+\alpha}$	$\Delta \ln r$
$-\frac{1}{\sigma^{F}\left(\varepsilon^{PD}+1\right)} - \frac{\gamma\beta^{W}_{1}-\delta}{\sigma^{F}}$	$-\frac{1}{\sigma^{F}}\left(\gamma\beta^{W}_{2}-\varphi\right)$	$-\frac{\gamma}{\sigma^{F}}\beta^{W}_{3}$	$\Delta \ln E$

A2. *Wage Incidence of Bartik, Tax, and Amenity Shocks*

The full expression for the reduced-form effects on local wages is given by

$$\begin{aligned}\Delta \ln w_{c,t} = & \underbrace{\left[\frac{\delta}{\sigma^F} - 1 - \frac{1}{\sigma^F\left(\varepsilon^{PD}+1\right)}\right]\frac{1}{\varepsilon^{LS}-\varepsilon^{LD}}}_{\equiv \beta_1^W}\Delta \ln\left(1-\tau_{c,t}^b\right) \\ & + \underbrace{\left\{\frac{1}{\sigma^F}\frac{\varphi}{\varepsilon^{LS}-\varepsilon^{LD}} - \frac{\alpha\eta_c}{\left[\sigma^W(1+\eta_c)+\alpha\right]}\frac{\varphi^h}{\varepsilon^{LS}-\varepsilon^{LD}}\right\}}_{\equiv \beta_2^W}\Delta \ln BK_{c,t} \\ & + \underbrace{\left\{-\frac{(1+\eta_c)+\alpha(\kappa-1)}{\left[\sigma^W(1+\eta_c)+\alpha\right]}\frac{1}{\varepsilon^{LS}-\varepsilon^{LD}}\right\}}_{\equiv \beta_3^W}\Delta \ln\left(1-\tau_{c,t}^i\right) \\ & + \underbrace{\frac{-(1+\eta_c)}{\left[\sigma^W(1+\eta_c)+\alpha\right]}\frac{1}{\varepsilon^{LS}-\varepsilon^{LD}}}_{\equiv \beta_4^W}\bar{A}_{c,t}.\end{aligned}$$

The effect of the Bartik shock on wages β_2^W combines two channels. The first term is the effect on the mean productivity term B_c, which depends on the labor demand and supply elasticities and the dispersion of location-specific productivities. The second term accounts for the effect on the housing productivity term B_c^h.

The effect of personal tax changes on wages β_3^W also combines two channels. The first term captures the logic that lower tax rates are an amenity for workers and is identical to β_4^W. The second term (including the terms $\alpha(\kappa-1)$) captures the impact of local personal tax rates on the supply of housing. When $\kappa = 1$, the housing supply effect cancels out with the direct housing demand channel, so that only the amenity component remains.

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