Who Benefits from State Corporate Tax Cuts? A Local Labor Market Approach with Heterogeneous Firms: Reply and Further Results*

Juan Carlos Suárez Serrato and Owen Zidar

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Abstract

Suárez Serrato and Zidar (2016) estimate the incidence of state corporate taxes. Malgouyres, Mayer, and Mazet-Sonilhac (2022) highlight two limitations—ignoring effects on firm composition and inconsistently characterizing capital costs. This reply corrects and updates the analysis with new data and methods for estimating effects on profits. We show how reduced-form moments identify incidence and parameters, and update estimates. Across several approaches, we confirm the original finding that firm owners bear a substantial portion of incidence. Our central estimate is that firm owners bear half of the incidence, while workers and landowners bear 35-40 percent and 10-15 percent, respectively.

In Suárez Serrato and Zidar (2016) (SZ hereafter), 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 found that firm owners bear roughly 40 percent of the incidence, while workers and landowners bear 30-35 percent and 25-30 percent, respectively. A few updates and revisions can improve these estimates.

In a recent comment, Malgouyres, Mayer and Mazet-Sonilhac (2022) (MMM-S hereafter) contribute several useful insights. 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 productivity draws

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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 update 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.

However, the criticisms in MMM-S that these two issues impede identification and lead to materially different incidence estimates are too strong. In short, we provide identification results and new evidence that the main finding—firm owners bear a substantial portion of incidence—is actually a bit stronger when incorporating additional data and novel approaches to estimate profit effects. Moreover, in the updated structural model from SZ that only incorporates the two MMM-S refinements, the firm owner incidence share estimate changes by 1.9 percentage points relative to the original version in SZ (i.e., 34.6% versus 36.5%). While particular estimates vary across specifications, our central estimate is that firm owners bear roughly half of the incidence, while workers and landowners bear 35-40 percent and 10-15 percent, respectively.

We make two main points to address the identification concern. MMM-S are correct that the original identification argument when using only business tax shocks is not valid when accounting for the composition margin and the cost of capital consistently. However, we show below that the full model in SZ is identified in the baseline specifications that included Bartik shocks and personal tax shocks. Intuitively, the personal income tax shock acts as a labor supply shock. When personal taxes decrease, people move in and wages decrease. This shift in labor supply identifies the slope of the labor demand curve. The business tax and Bartik shocks shift labor demand and identify the slope of the supply curve. Together with the incidence condition for wages, these moments identify the parameters of the model. We formalize this intuition below.

Second, we develop two new identification approaches to establish that reduced-form effects of business tax changes can be used to identify the effect on firm owners. We do so by adding two empirical outcomes: the labor demand of incumbent firms and local produc-

[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 $\frac{\delta}{\sigma^F}$ (see MMM-S equation 10). SZ did not include the cost of capital difference in the location equation based on the assumption that the 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 $\frac{\delta}{\sigma^F}$ 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.

tivity. Focusing on incumbents addresses the MMM-S concern about the composition of firms changing, and observing firm employment changes for a specific change in unit costs identifies scale effects. In our model, these scale effects govern firm markups and are thus informative about profit impacts. To see how local changes in productivity also identify the effects on profits, note that firms trade off taxes and factor prices against local productivity. The combined effect of taxes and costs of production is therefore a mirror image of the effect of tax cuts on local productivity. Using these insights, we provide two new ways to estimate of the effects of tax cuts on profits and update our reduced-form-incidence estimates.

We use data from the U.S. Census Bureau's Longitudinal Business Database (LBD) and Annual Survey of Manufacturers (ASM) to provide new evidence on the effect of business taxes on the labor demand of incumbent firms and on local productivity. We also update our structural estimation to account for the composition margin, the role of the cost of capital, and our updated identification approach. These approaches provide multiple ways to assess incidence effects. We show results using each approach, a simple average, and a variance-minimizing combination of reduced-form approaches as well as new structural estimates.

Across several approaches, we confirm the original finding that firm owners bear a substantial portion of incidence. Figure 1 plots our estimates of incidence on firm-owners using different approaches. While the 25% estimate for firm owners cited by MMM-S is within the confidence interval of the original estimates, we find that other approaches lead to larger effects on firm owners. Specifically, the reduced-form approach that uses incumbent labor demand changes, the approach that uses productivity changes, and the structural estimates all yield larger incidence on firm owners. Moreover, we do not find that the incidence on firm owners is directly dependent on having a small estimate of the product demand elasticity ε^{PD}, as claimed by MMM-S.

This update proceeds as follows. In section I, we show how to identify incidence and parameters using the reduced-form effects in the original paper and also provide two new ways to identify the effects on firm profits. We then update the structural model to incorporate the two corrections from MMM-S and our approaches to estimate profit effects. In a third framework update—which is orthogonal to the comments from MMM-S—we show how to derive income shares for each of the agents of the model. We use these income shares to compute income-share-weighted incidence estimates. In section II, we describe the new data and reduced-form effects on incumbent employment and local productivity. In section III, we combine these new reduced-form estimates with those from the original paper to estimate incidence using the original approach, the employment approach, and the productivity approach. Across these approaches, we report income-weighted and unweighted incidence estimates. We conclude by discussing these results and those of the updated structural model.

I Updating the Framework

This section shows how to estimate effects of business tax cuts on profits while accounting for firm compositional changes and cost of capital effects.

A Identifying Incidence on Profits using Reduced-Form Effects

A key goal of SZ was to interpret reduced-form effects of state-corporate-tax cuts through the lens of a model to infer effects on profits, π. While profits are not directly observable, the model in SZ makes it possible to express the percentage change in profits with respect to a percentage change in the net-of-business-tax rate $(1-\tau^b)$ as follows:

$$\dot{\pi} = 1 + (1+\varepsilon^{PD})(\gamma\dot{w} - \delta\phi), \tag{1}$$

where γ and δ are the output elasticities of labor and capital, respectively, ε^{PD} is the product demand elasticity, and $\dot{w}$ is the elasticity of local wages with respect to net-of-tax rates. The parameter ϕ is the elasticity of the local cost of capital with respect to the net-of-business-tax rate, i.e., $\rho_c = \frac{\rho}{(1-\tau_c^b)^\phi}$. In the original paper, we set $\phi = 1$, which assumed that when the net-of-tax rate increased by one percent, the local cost of capital decreased by one percent. This expression generalizes and makes more explicit the relationship between the local cost of capital and business taxes.

In equation 1, the first term in the sum is the number 1, which captures the mechanical effect of keeping more profits. The remaining terms in this expression capture the scale effect of a tax cut, which multiplies the percentage change in unit costs of production, $\gamma\dot{w} - \delta\phi$, by one plus the elasticity of product demand, which governs how firm production responds to output price changes and thus, how it responds to cost changes given fixed markups in the model.

We now provide two novel approaches to identify scale and profit effects. The first uses the micro labor demand elasticity, which we refer to as the intensive margin of labor demand to distinguish it from labor demand due to extensive margin location decisions of firms and compositional changes in firm productivity. The second uses the change in productivity at the local level. Both approaches allow us to identify $\dot{\pi}$ without making assumptions on the product demand elasticity ε^{PD}; these approaches also inform the model parameters.

A.1 Setting up the identification argument

Establishing these new ways to identify profit effects requires three inputs.

The first input is the micro labor demand elasticity. 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:

$$L_c^D = E_c \times \underbrace{\left[w_c^{\gamma(\varepsilon^{PD}+1)-1} \rho_c^{\delta(\varepsilon^{PD}+1)} \kappa_0 \left(\exp^{B_c(-\varepsilon^{PD}-1)} \right) \right]}_{\equiv l_c} z_c, \tag{2}$$

where B_c is the common component of firm productivity in location c.[2] E_c is determined by Equation 7 in SZ, which relates the fraction of firms to local costs and taxes.

$$E_c = \frac{\exp\left\{\frac{v_c}{\sigma^F}\right\}}{\sum_{c'} \exp\left\{\frac{v_{c'}}{\sigma^F}\right\}}, \tag{3}$$

where $v_c = \frac{\ln(1-\tau_c^b)}{-(\varepsilon^{PD}+1)} + B_c - \gamma \ln w_c - \delta \ln \rho_c + \frac{\ln \kappa_1}{-(\varepsilon^{PD}+1)}$ is the mean value of locating in c and where κ_1 is a constant.

Taking logs of the intensive margin of local labor demand and derivating gives:

$$\dot{l} = (1+\varepsilon^{PD})(\gamma \dot{w} - \delta \phi) - \dot{w}, \tag{4}$$

where $\dot{l}$ is the micro labor demand elasticity with respect to net-of-business-tax rates. The average percentage change in labor demand for firms in a given area depends on the scale effect of the tax cut and a substitution effect given by $-\dot{w}$.

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:

$$z_c = \mathbb{E}\left[\exp\left\{ -(1+\varepsilon^{PD})\zeta_{jc} \right\} \middle| c \right] = \Gamma\left(1 + (1+\varepsilon^{PD})\sigma^F\right) \times E_c^{(1+\varepsilon^{PD})\sigma^F}, \tag{5}$$

where Γ is the gamma function and σ^F is the dispersion in firm productivity. This setup

[2] 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 $\gamma\left(1 + \varepsilon^{PD} - \frac{1}{\sigma^F}\right) - 1$.

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

$$\dot{z} = (\sigma^F)(1 + \varepsilon^{PD})\dot{E}. \tag{6}$$

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 3 and derivating gives the following expression for the firm location elasticity:

$$\dot{E} = \frac{1}{-(1 + \varepsilon^{PD})}\frac{1}{\sigma^F} - \frac{\gamma}{\sigma^F}\dot{w} + \frac{\delta\phi}{\sigma^F}, \tag{7}$$

which shows how firm location responds to tax changes through mechanical effects and effects on costs. For the results below, it is useful to multiply both sides of this equation by $(\sigma^F)(1 + \varepsilon^{PD})$:

$$(\sigma^F)(1 + \varepsilon^{PD})\dot{E} = -1 - (1 + \varepsilon^{PD})(\gamma\dot{w} - \delta\phi). \tag{8}$$

A.2 Direct approaches for quantifying profit impacts and incidence

We now combine these three ingredients to obtain two new expressions for profit effects in terms of observables.

The first, which we refer to as the "labor approach," uses the fact that the scale effect can be identified by adding the wage effect, $\dot{w}$, to the micro elasticity of labor demand, $\dot{l}$. Equation 4 implies that $\dot{w} + \dot{l} = (1 + \varepsilon^{PD})(\gamma\dot{w} - \delta\phi)$. Combined with equation 1, we can express the effect on profits as the sum of one, the intensive margin labor elasticity, and the wage elasticity:

$$\dot{\pi} = 1 + \dot{l} + \dot{w}. \tag{9}$$

Intuitively, because the scale effect is identified by wage and employment changes along the intensive margin, we can use intensive margin labor and wage changes to determine the impact on profits.[3] Empirically, we use this expression to estimate the impact on profits

[3] Table 1 provides the expression for the scale effect in terms of observables. The result in Equation 9 relies on the assumption of Cobb-Doulgas production. Curtis, Garrett, Ohrn, Roberts and Suárez Serrato (2021) show how to isolate scale and substitution effects using reduced-form effects of taxes and general production functions.

as one plus the sum of the effects on wages and on the intensive margin of labor demand. Notably, this expression does not depend on firm location decisions, $\dot{E}$, the composition margin, $\dot{z}$, the effect of taxes on the local cost of capital, ϕ, or—contrary to claims in MMM-S—the product demand elasticity ε^{PD}.

The second approach for identifying profit effects uses changes in local productivity, $\dot{z}$. We refer to this approach as the productivity approach. Combining Hanemann's result (equation 6) and the expression for firm location (equation 8) yields:

$$\dot{z} = -1 - (1 + \varepsilon^{PD})(\gamma \dot{w} - \delta \phi) = -\dot{\pi}. \tag{10}$$

Intuitively, firms trade off idiosyncratic location-specific differences in productivity with tax and cost considerations. In equilibrium, the tax and cost changes embedded in $\dot{\pi}$ equal the change in the average productivity of firms in a given area. We can therefore use changes in productivity to infer how profit changes as a second empirical approach.

In section III, we conduct a reduced-form estimation of incidence on profits by plugging in the empirical counterparts in equations 9 and 10, which are summarized in Table 1.

B Updating the Structural Model

This section updates the structural model to include these new ways to identify profit effects and to incorporate the composition margin and consistent cost of capital characterization. We then derive new reduced-form expressions, and describe how these reduced-form effects of business taxes identify parameters and incidence.

B.1 Simultaneous equation model

There are six key equations in the updated model that characterize changes in economic activity in location c and year t:

$$(11)\qquad \Delta \ln N_{c,t} = \frac{1}{\sigma^W}(\Delta \ln w_{c,t} - \alpha \Delta \ln r_{c,t}) + \frac{\Delta \ln(1-\tau^i_{c,t})}{\sigma^W} + \frac{\Delta A_{c,t}}{\sigma^W}$$

$$(12)\qquad \Delta \ln N_{c,t} = \Delta \ln E_{c,t} + \Delta \ln l_{c,t} + \Delta \ln z_{c,t}$$

$$(13)\qquad \Delta \ln r_{c,t} = \frac{1}{1+\eta_c}(\Delta \ln N_c + \Delta \ln w_c + \Delta \ln(1-\tau^i_{c,t})) - \frac{\eta_c}{1+\eta_c}\Delta B^h_{c,t} - \frac{\kappa}{(1+\eta_c)}\Delta \ln(1-\tau^i_{c,t})$$

$$(14)\qquad \Delta \ln E_{c,t} = -\frac{\gamma}{\sigma^F}\Delta \ln w_{c,t} + \left(\frac{\delta\phi}{\sigma^F} - \frac{1}{\sigma^F(\varepsilon^{PD}+1)}\right)\Delta \ln(1-\tau^b_{c,t}) + \frac{1}{\sigma^F}\Delta B_{c,t}$$

$$(15)\qquad \Delta \ln l_{c,t} = \big(\gamma(\varepsilon^{PD}+1) - 1\big)\Delta \ln w_{c,t} - (\varepsilon^{PD}+1)\delta\phi\Delta \ln(1-\tau^b_{c,t}) - (\varepsilon^{PD}+1)\Delta B_{c,t}$$

$$(16)\qquad \Delta \ln z_{c,t} = (\sigma^F)(1+\varepsilon^{PD})\Delta \ln E_{c,t}$$

Recall from SZ that equation 11 describes labor supply, which increases with the net-of-personal-tax rate $(1-\tau^i_c)$, 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 12 is the total derivative of local labor demand in equation 2.[4] Equation 13 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).[5] Equation 14 is the firm location equation as in equation 7, 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. Equation 15 is the intensive margin labor demand expression as in equation 2. Finally, equation 16 accounts for the composition margin through Hanemann's equation as in equation 6.

For empirical implementation, we project productivity terms $\Delta B_{c,t}$ and $\Delta B^h_{c,t}$ on Bartik shocks.

$$\Delta B_{c,t} = \varphi \Delta \ln BARTIK_{c,t} + v_{c,t}$$
$$\Delta B^h_{c,t} = \varphi^h \Delta \ln BARTIK_{c,t} + v^h_{c,t}$$

[4]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 11.

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

Concisely, the updated structural form is as follows: $\mathbf{AY}_{c,t} = \mathbf{BZ}_{c,t} + \epsilon_{c,t}$, where

$$\mathbf{Y}_{c,t} = [\Delta \ln N_{c,t}, \Delta \ln w_{c,t}, \Delta \ln r_{c,t}, \Delta \ln E_{c,t}, \Delta \ln l_{c,t}, \Delta \ln z_{c,t}]'$$
$$\mathbf{Z}_{c,t} = \left[\Delta \ln(1-\tau^b_{c,t}) \quad \Delta \ln BARTIK_{c,t} \quad \Delta \ln(1-\tau^i_{c,t})\right],$$

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

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

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

Pre-multiplying by the inverse of the matrix of structural coefficients gives the reduced form:

$$\mathbf{Y}_{c,t} = \underbrace{\mathbf{A}^{-1}\mathbf{B}}_{\equiv \mathbf{C}} \mathbf{Z}_{c,t} + \underbrace{\mathbf{A}^{-1}\epsilon_{c,t}}_{\equiv \mathbf{u}_{c,t}}. \tag{17}$$

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

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

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:

$$\beta_1^W = \left(\frac{\delta\phi}{\sigma^F} - 1 - \frac{1}{\sigma^F(\varepsilon^{PD}+1)}\right)\frac{1}{\varepsilon^{LS}-\varepsilon^{LD}}. \tag{18}$$

Appendix A.1 provides the wage incidence expressions for Bartik, net-of-personal-tax rate, and amenity shocks. Relative to SZ, this system adds the two outcomes below the dashed line: $\Delta\ln l$ and $\Delta\ln z$. Importantly, equation 18 correctly accounts for the composition margin and for the impact of business taxes on the local cost of capital through the term $\frac{\delta\phi}{\sigma^F}$.

B.2 Identifying parameters

The reduced form effect matrix $\mathbf{C}$ yields several insights about identification of structural parameters and profit effects.

Remark 1: Identifying Labor Supply Parameters with Business Taxes. 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

then pin down the housing supply elasticity η. We obtain the preference 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.

Remark 2: Identifying Labor Demand Parameters with Baseline Moments and Shocks. Column 3 of matrix **C** 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 $\varepsilon^{LD} = -\frac{\gamma}{\sigma^F} - 1$.[6] In addition, dividing the effect on the number of establishments β_3^E by the wage effect β_3^W also identifies the contribution of firm entry to labor demand: $\frac{\gamma}{\sigma^F}$. Intuitively, a personal-income-tax cut is a labor supply shock that traces out the slope of labor demand. Finally, under the assumption in SZ that the elasticity of the cost of capital with respect to the net-of-business-tax rate $\phi = 1$, β_1^E can be used to identify the elasticity of product demand ε^{PD}.[7] These arguments show that the parameters of labor demand are identified by the same four outcomes used in SZ in the baseline structural model with three shocks.

Remark 3: Identifying Labor Demand Parameters with Business Tax Shocks and New Moments. SZ argued that business tax moments alone could identify parameters of labor demand by inverting the equation for β_1^W. The corrections by MMM-S show that this argument is not valid. We now show that business taxes alone can identify labor demand parameters when we include two new outcomes: productivity and intensive margin of labor demand. Under the assumption in SZ that $\phi = 1$, the effect on the intensive margin of labor demand (β_1^l) together with the wage effect (β_1^W) identifies ε^{PD}. Similarly, Hanemann's equation 6 and the expression for ($\varepsilon^{PD} + 1$) identifies σ^F.[8] Thus, adding these two outcomes allows for full identification of the model using business-tax shocks alone.

Remark 4: Identifying Incidence on Profits with Business Tax Shocks and New Moments. Column 1 of the matrix **C** validates the arguments in Section A.2. Equation 9 follows by adding β_1^W and β_1^l. Equation 10 is given by the reduced-form effect β_1^z.

Remark 5: Identification of Labor Demand Parameters with All Shocks and New Moments. Column 3 of the matrix **C** shows that personal taxes also identify the elasticity of product demand. Dividing the effect of personal taxes on the intensive margin of labor demand (β_3^l) by the wage effect (β_3^W) identifies the product demand elasticity ε^{PD}. In addition, it is also possible to isolate ε^{PD} after dividing the effect of personal taxes on productivity (β_3^z) by the effect on wages (β_3^W). These results allow us to relax the assumption

[6] 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.

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

[8] In particular, adding β_1^l and β_1^W and diving by $(\gamma\beta_1^W - \delta)$ shows that $(1 + \varepsilon^{PD}) = \frac{\beta_1^l + \beta_1^W}{(\gamma\beta_1^W - \delta)}$. Dividing β_1^z by β_1^E and the expression for $(1 + \varepsilon^{PD})$ shows that $\sigma^F = \frac{\beta_1^z}{\beta_1^E} \frac{(\gamma\beta_1^W - \delta)}{\beta_1^l + \beta_1^W}$.

that $\phi = 1$. Specifically, we can use the effect of business taxes on the intensive margin of labor demand (β_1^l) to solve for ϕ—the effect of business taxes on the cost of capital—as a function of ε^{PD}, β_1^W, and calibrated parameters.[9] Thus, adding additional moments yields over-identifying restrictions on key model parameters and allows us to relax prior assumptions in SZ.

Remark 6: Scale Effect and the Effect on the Cost of Capital ϕ. As we discuss in section I, the scale effect of a business tax cut is given by the product of the percentage change in unit costs of production ($\gamma\beta_1^W - \delta\phi$) and ($\varepsilon^{PD} + 1$). Column 1 of the matrix **C** shows that the scale effect is equal to the sum of the wage effect and the effect on the intensive margin of labor demand, so that $\beta_1^W + \beta_1^l = (\varepsilon^{PD} + 1)(\gamma\beta_1^W - \delta\phi)$. Since we expect that tax cuts would increase wages ($\beta_1^W > 0$) and labor demand ($\beta_1^l > 0$), this expression combined with the restriction that $\varepsilon^{PD} < -1$ implies that $\gamma\beta_1^W - \delta\phi < 0$; that is, we expect business tax cuts to reduce unit costs of production. While this condition may hold when we constrain $\phi = 1$, estimating the parameter ϕ allows the structural model to better fit the data.[10] Importantly, the reduced form expressions for incidence in equations 9 and 10 do not depend on this parameter.

Remark 7: Auxiliary Parameters and Role of Bartik Shock Moments. The auxiliary parameters φ, φ^h, and κ are identified by the baseline outcomes in SZ. Together with the prior arguments, β_3^R identifies κ and β_2^R identifies φ^h. For simplicity we omit the formulas for β_2^N and β_2^W; however, along with prior arguments these moments identify φ. Finally, examining the expressions of β_2^E, β_2^l, and β_2^E shows that the Bartik moments provide additional identifying information for model parameters, including φ, σ^F, and ε^{PD}.

C Income Shares and Income-share-weighted Incidence

Another useful revision—which is orthogonal to the comments from MMM-S—concerns how to weigh the gains to firm owners, workers, and landowners. After computing the benefits to each of these three agents, SZ then compare the benefits to each one of these agents to the simple sum of the total benefits to the three agents. This calculation implicitly assumes that we have one representative agent of each type with equal income. This calculation is useful from the perspective of understanding the identities of the agents that benefit the

[9]Specifically, $(\varepsilon^{PD} + 1) = \frac{\beta_3^z}{\gamma\beta_3^W}$ and thus $\phi = -\frac{\gamma}{\delta}\left(\beta_1^l \frac{\beta_3^W}{\beta_3^z} + \beta_1^W\left(\frac{\beta_3^W}{\beta_3^z} + 1\right)\right)$.

[10]When calibrating $\frac{\delta}{\gamma} = 0.9$ and $\phi = 1$, these restrictions imply that $\dot{w} \leq 0.9$. This relationship holds in the SZ reduced-form results with Bartik controls (e.g., Table 4 Column 2), but does not hold in the reduced-form specification without controls (e.g., Table 4 Column 1). Allowing the elasticity of the cost of capital ϕ to exceed one provides an additional way to rationalize the empirical facts that both wages and employment increase following increases in net-of-business-tax rates and satisfies the assumption that $\varepsilon^{PD} < -1$.

most from a tax cut. However, this calculation does not capture the aggregate gains to all workers relative to all landowners and all firm owners in the economy.

This subsection briefly describes how the income shares relate to our structural parameters. We use these shares to compute aggregate gains for workers, firm owners, and land owners. We provide updated incidence estimates with and without using these income share weights.[11] For transparency, we report both weighted and unweighted results in Section III to show how results change one deviation at time relative to the initial SZ approach.

Consider the three agents in SZ. Workers have income of wN derived from labor earnings. Since workers spend α on housing, landowners receive income of αwN. Firms owners receive profits and returns from capital. Given the CES structure of the model, firm owners' profits are $\pi = \frac{\text{Total Expenditure}}{-\varepsilon^{PD}}$. Returns to capital, ρK, are $\delta\times$ Costs. Costs are $-(\varepsilon^{PD}+1)\pi$.[12]

Assuming that firm owners and landowners spend their earnings in the product market, total expenditure is given by:

$$\text{Total Expenditure} = (1-\alpha)wN + \alpha wN + \pi - (\varepsilon^{PD}+1)\pi\delta = wN + \pi\left(1-(\varepsilon^{PD}+1)\delta\right).$$

Since Total Expenditure $= -\varepsilon^{PD}\pi$, profits are $\pi = \frac{wN}{-(\varepsilon^{PD}+1)(1-\delta)}$. Total income is thus $wN\left[1+\alpha+\frac{1-\delta(\varepsilon^{PD}+1)}{-(\varepsilon^{PD}+1)(1-\delta)}\right]$, which results in the following income shares:

$$\text{(19)} \qquad \underbrace{\frac{1}{1+\alpha+\frac{1-\delta(\varepsilon^{PD}+1)}{-(\varepsilon^{PD}+1)(1-\delta)}}}_{\text{Workers}}, \quad \underbrace{\frac{\alpha}{1+\alpha+\frac{1-\delta(\varepsilon^{PD}+1)}{-(\varepsilon^{PD}+1)(1-\delta)}}}_{\text{Land Owners}}, \quad \text{and} \quad \underbrace{\frac{\frac{1-\delta(\varepsilon^{PD}+1)}{-(\varepsilon^{PD}+1)(1-\delta)}}{1+\alpha+\frac{1-\delta(\varepsilon^{PD}+1)}{-(\varepsilon^{PD}+1)(1-\delta)}}}_{\text{Firm Owners}}.$$

This expression shows that profits depend on the product demand elasticity. Appendix Figure C.1 illustrates how these shares vary with this elasticity.

II New Data on Employment and Productivity

A Adding the Intensive Margin Labor Response $\dot{l}$

We use confidential micro data from the U.S. Census Bureau's Longitudinal Business Database (LBD) over the 1980-2010 period to compute changes in incumbent labor demand at the establishment level. The LBD links U.S. Census records on private business activity to create consistent establishment identifiers across time (Chow, Fort, Goetz, Goldschlag, Lawrence,

[11]We thank David Albouy for suggesting that we clarify this point and for initial suggestions on how to do so.

[12]This expression follows from the facts that sales equal costs plus profits, and that sales equal $-(\varepsilon^{PD})\pi$.

Perlman, Stinson and White, 2021). Specifically, we identify all establishments that were in operation prior to changes in business taxes, and compute the log difference in employment across ten-year periods for each establishment that was in operation in the previous sample year. We then take the average of this change for the subset of incumbent establishments in each CONSPUMA-year.

B Adding the Compositional Margin $\dot{z}$

To implement the second approach that adds $\dot{z}$, we use productivity data. Unfortunately, establishment-level productivity measures are not readily available across all industries. Instead, we restrict attention for this outcome to manufacturing plants in the U.S. Census Bureau's Annual Survey of Manufactures (ASM). The ASM collects detailed information on plant-level inputs and outputs, which is used to construct measures of total factor productivity (TFP), following Cunningham, Foster, Grim, Haltiwanger, Pabilonia, Stewart and Wolf (2022).[13] We then calculate average TFP among sampled plants in each CONSPUMA-year, and define the percent change in TFP across ten-year sample periods as the log difference in average TFP.

Table 2 shows the reduced-form effects (analogous to those in SZ Table 4) for the original four outcomes as well as these two new outcomes. It provides three panels. The first shows the reduced-form effects of net-of-business-tax rates, the second adds Bartik controls, and the third adds net-of-personal-tax-rate controls. The first two panels re-report the estimates from SZ Table 4 for the original four outcomes. The main new results are for incumbent labor demand in Column 5 and local productivity in Column 6. The table shows that following a business tax cut, establishment-level employment of incumbent establishments increases by 1.2 percentage points. The specification that also includes Bartik shocks results in a similar point estimate of 1.03 and a slightly larger standard error. For productivity, the empirical results show that local TFP does decline following business tax cuts, which is in line with the theory of the composition margin. The point estimate in Panel A is -2.5, which through the lens of the model, suggests that profits increase by 2.5 percentage points. This estimate, however, is somewhat imprecise on its own.

[13] A common challenge in estimating productivity is that output is often measured in terms of revenue rather than in terms of quantities for most industries. To cover most industries in the manufacturing sector, we rely on a measure of revenue productivity.

III New Incidence and Parameter Estimates

A Review of MMS-S Approach to Estimation

MMM-S calibrate the incidence of state-corporate-tax cuts using two of the SZ reduced-form estimates (on wages and rents) as well as calibrated values of output elasticities and the product demand elasticity ε^{PD}. They then use these inputs to produce MMM-S Table 1, which shows estimated impacts on workers, landowners, and firm owners and respective incidence shares. They find that the share of incidence on firm owners is closer to 25% (than to the 40% initially reported). This specific calculation is correct (though MMM-S swap the labels for workers and landowners).[14] Although they motivate this calculation based on identification concerns regarding ε^{PD}, we showed that one can estimate firm owner incidence without calibrating ε^{PD} using two approaches for identifying profit impacts. Taking these new firm incidence expressions to the data reveal that firm owners bear a larger share that is closer to SZ's original estimates. We now describe these results in detail.

B Estimates Using Reduced-Form Approaches

This subsection presents estimates of incidence using reduced-form effects under three different approaches for estimating profit effects enumerated in Table 1. Table 3 reports the results.[15]

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 estimates the effect on firm owners as $1 + \beta_1^l + \beta_1^W$. The second column uses the productivity approach in which the effect on profits equals $-\beta_1^z$. The third column reports the approach in MMM-S Table 1 that calibrates scale effects (and therefore uses wage impacts alone) to estimate profit impacts. 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.[16] Intuitively,

[14]Comparing SZ Table 5 and MMM-S Table 1 reveals that the impact on landowners and workers should be 1.17 and 1.1, not visa versa as in Table 1 of MMM-S. The shares should also be swapped.

[15]We report the analogous results using reduced-form estimates in the specifications with Bartik controls, and Bartik plus personal tax controls in Tables B.1 and B.2, respectively.

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

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 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 Table 3, which shows the estimates when estimating profit effects as $1+\gamma(\varepsilon^{PD}+1)\left(\beta^W - \frac{\delta}{\gamma}\right)$. This expression from SZ is the same specification reported in MMM-S Table 1. When calibrating the output elasticity to be $\varepsilon^{PD} = -2.5$, firm owner profits increase by 0.876 percent, which amounts to 28% of the equal-weighted incidence. Column 6 shows the same approach but when $\varepsilon^{PD} = -5$. Both sets of estimates match those in MMM-S. The new estimates in Column (1), (2), (4), (5), (7) and (8), however, result in larger estimated impacts on profits, yielding firm owner incidence shares that range between 41% and 62%.[17]

The incumbent labor demand estimate 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 decreasing since $\left(\beta^W - \frac{\delta}{\gamma}\right) > 1$.[18] 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%. Finally, the optimal combination of estimates in Column (5) yields an estimate of 41%. 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 of the incidence. In particular, the inverse-variance weighted average estimate of 50% for firm owners, 38% for workers, and 12% for land owners is from Column (5).

Figure 1 plots the share of incidence for firm owners across four different approaches

[17]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.

[18]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 unit costs decline, which is consistent with these new profit approaches.

and different values of the product demand elasticity.[19] Each of the four approaches change one thing at a time relative to the approach in MMM-S. "Calibrated (MMM-S)" replicates the approach in MMM-S, which uses the profit expression in equation 1, i.e., $\dot{\pi} = 1 + (1 + \varepsilon^{PD})(\gamma\beta_1^W - \delta\phi)$ along with the other reduced-form moments. "Micro Labor Demand" uses the $\dot{\pi} = 1 + \beta_1^l + \beta_1^W$ approach to compute profits. "TFP" uses the $\dot{\pi} = -\beta_1^z$ approach. 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 one in MMM-S, and it is the only one that is decreasing with the product demand elasticity. 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). Second, these estimates can be thought of being "centered" around the MMM-S calibration since we are only changing one thing at a time (either how we calibrate ε^{PD} or how we estimate π). The point is that out of several possible methods, the MMM-S approach gives the lowest incidence to firm owners and is more sensitive to the product demand elasticity than the other approaches.

C 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.[20] Tables 4 and 5 update SZ Tables 6 and 7 by providing new results for parameter estimates and incidence, respectively.

Table 4 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 sets $\phi = 1$ as in SZ. Specifically, it uses the elements of the matrix of reduced-form effects $\mathbf{C}$ above the horizontal dashed line from equation 17. Column (2) uses only the business tax shocks and includes the incumbent labor and TFP outcomes, i.e., it uses the elements of the matrix of reduced-form effects $\mathbf{C}$ to the left 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 (3), but instead calibrates ϕ at a lower value than its estimate in Column (3). Column (5), (6), and (7) use the full model with six-outcomes and three

[19] Appendix Figure C.2 is the analogous figure using income-share-weighted estimates.

[20] We find the structural parameters that minimize the distance between the moments $\mathbf{m}(\boldsymbol{\theta})$ given by the matrix $\mathbf{C}$ above and the reduced form effects $\hat{\boldsymbol{\beta}}$ by solving: $\hat{\boldsymbol{\theta}} = \arg\min_{\boldsymbol{\theta}\in\boldsymbol{\Theta}} \; [\hat{\boldsymbol{\beta}} - \mathbf{m}(\boldsymbol{\theta})]'\mathbf{W}^{-1}[\hat{\boldsymbol{\beta}} - \mathbf{m}(\boldsymbol{\theta})]$, where $\mathbf{W}$ is a weighting matrix that uses the inverse variance of the moments $\boldsymbol{\beta}$ along the diagonal.

shocks, estimates 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 0.21 or about one-quarter of worker dispersion of 0.81. In SZ Table 6 Column (1), firm dispersion was 0.27, which is about one-third as large as worker dispersion of 0.83. We find that worker dispersion exceeds firm dispersion in most specifications like in SZ.[21] 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.

Table 5 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 Table 4, 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.[22] The equal-weighted share of incidence for firm owners ranges from 35% to 65%. 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 as it uses the same outcomes, shocks, and calibration values as SZ Table 7 Column (1). Comparing the share of incidence in Column (1) to the same calibration in SZ Table 7 shows that the estimates are less than 2 percentage points apart (34.6% versus 36.5%). When weighting the Column (1) estimates by income shares, the firm-owner estimate is 45.8%. The estimates in Column (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%.

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.[23] Column

[21] The exceptions are the specification in Column (2), which only uses business tax shocks (and thus only 6 moments overall), and the specification with a large housing expenditure share of 0.65 in Column (5).

[22] 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 income-share-weighted result in Column (1), which is slightly less precise.

[23] In Column (3), we estimate that ϕ equals 9.6, implying that business tax cuts have a substantial impact

(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% 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 update 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 MMM-S Table 1—does not). Moreover, in the updated model, the 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.[24] 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 Table 3 does not depend on estimates of effective labor supply and demand elasticities or product demand elasticities, and yet gives similar incidence results.

IV Concluding Discussion

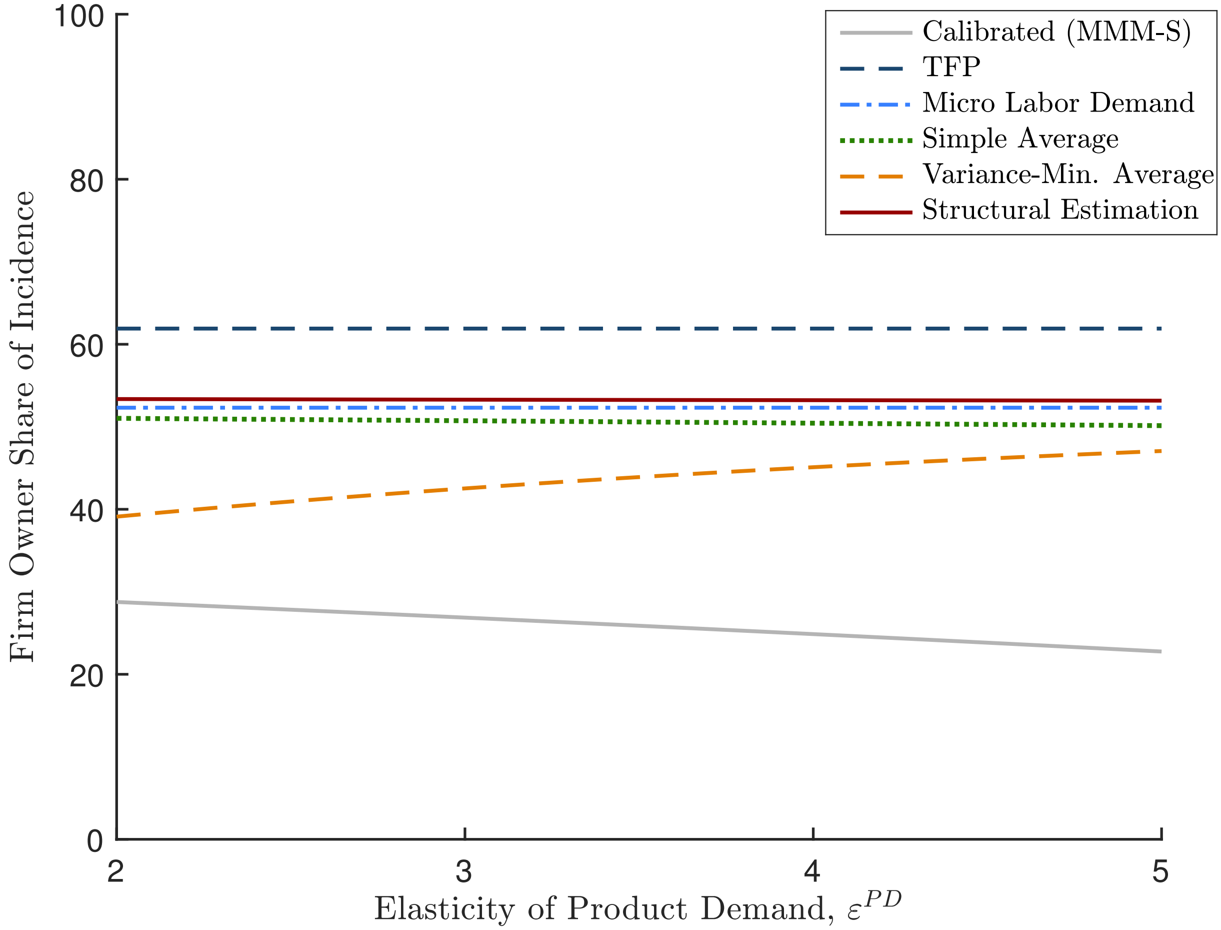
This update to SZ addresses concerns about incorporating effects on firm composition of entrants and consistently characterizing the cost of capital. MMM-S provided valuable insights that improved the analysis of tax incidence by highlighting these two issues. We are grateful

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}.

[24] 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.

that their insights helped improve our understanding of this important question. MMM-S's claims about identification and incidence estimates were too strong, however. We showed 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. Most importantly, we found that incorporating these insights into our empirical analysis confirmed our 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 promising ways to continue to improve the analysis of business tax incidence.

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. Each of the reduced-form approaches change one thing at a time relative to the approach in MMM-S. "Calibrated (MMM-S)" replicates the approach in MMM-S, which uses the profit expression in equation 1, i.e., $\dot{\pi} = 1 + (1 + \varepsilon^{PD})(\gamma\dot{w} - \delta\phi)$ along with the other reduced-form moments in SZ. "Micro Labor Demand" uses the $\dot{\pi} = 1 + \dot{l} + \dot{w}$ approach to compute profits along with other reduced-form moments. "TFP" uses the $\dot{\pi} = -\dot{z}$ 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 MMM-S, 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 Table 5 to show results using a continuous range of product demand elasticity values.

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 Calibration Approach (After-tax Profit)	$1 + \gamma(\varepsilon^{PD} + 1)(\dot{w}_c - \frac{\delta}{\gamma})$	$1 + \gamma(\varepsilon^{PD} + 1)(\beta^W - \frac{\delta}{\gamma})$
Firm Owners Labor Approach (After-tax Profit)	$1 + \dot{l} + \dot{w}$	$1 + \beta^l + \beta^W$
Firm Owners TFP Approach (After-tax Profit)	$-\dot{z}$	$-\beta^z$

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 shows how reduced-form estimates $\boldsymbol{\beta}^{\text{Business Tax}} = \left[\beta^W, \beta^N, \beta^R, \beta^E, \beta^l, \beta^z\right]'$ map to the incidence on welfare of workers, landowners, and firm-owners at the local level. Note that we calibrate the housing expenditure share (α), the ratio of the capita to labor output elasticities (δ/γ), and the product demand elasticity ε^{PD}. In addition, we can also use other moments to identify productivity dispersion as well as the product demand elasticity. See section B.2 for additional discussion.

Table 2: Effects of Business Tax Cuts on Local Economic Activity Over 10 Years

	(1) Population	(2) Wages	(3) Rents	(4) Number of Establishments	(5) Intensive Margin Labor Demand	(6) TFP
	N	w	r	E	l	z
Panel A						
Δ ln net-of-business-tax rate	4.275***	1.451	1.172	4.074**	1.240	-2.492
	(1.651)	(0.943)	(1.435)	(1.824)	(0.802)	(2.519)
Panel B						
Δ ln net-of-business-tax rate	3.744**	0.777	0.323	3.354**	1.028	-3.171
	(1.484)	(0.820)	(1.366)	(1.428)	(0.836)	(2.517)
Bartik	0.439**	0.557***	0.702***	0.595***	0.174**	0.560**
	(0.188)	(0.083)	(0.265)	(0.192)	(0.075)	(0.263)
Panel C						
Δ ln net-of-business-tax rate	1.516	1.534	1.857	1.749	1.766	-4.017
	(1.926)	(1.124)	(1.571)	(1.549)	(1.109)	(5.180)
Bartik	0.446**	0.554***	0.697***	0.600***	0.172**	0.563**
	(0.184)	(0.079)	(0.259)	(0.190)	(0.071)	(0.264)
Δ ln net-of-personal-tax rate	1.731	-0.588	-1.192	1.247	-0.573	0.657
	(1.254)	(0.732)	(1.180)	(1.428)	(0.770)	(2.558)
Observations	1,470	1,470	1,470	1,470	1,470	1,470

Notes: This table extends analysis Table 4 in SZ by adding two outcomes: incumbent employment at the establishment level in Column 5 and local TFP in Column 6. The data are decade changes from 1980-1990, 1990-2000, and 2000-2010 for 490 county-groups (CONSPUMAs). Panels A,B, and C shows the reduced-form effects of net-of-business-tax rates, net-of-business-tax rates and Bartik shocks, and net-of-business-tax rates, Bartik shocks, and net-of-personal-tax rates, respectively.

Table 3: Estimates of Economic Incidence Using Reduced-Form Effects

	(1) Intensive Margin Labor Demand	(2) TFP	(3) Calibrating Product Demand	(4) Average of (1),(2),(3)	(5) Weighted Avg. of (1),(2),(3)	(6) Calibrating Product Demand	(7) Average of (1),(2),(6)	(8) Weighted Avg. of (1),(2),(6)
Panel A. Calibrated parameters								
Output elasticity γ	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150
Housing share α	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
Elasticity of product demand ε^{PD}	-2.500	-2.500	-2.500	-2.500	-2.500	-5.000	-5.000	-5.000
Panel B. Incidence								
Landowners	1.172	1.172	1.172	1.172	1.172	1.172	1.172	1.172
	(1.435)	(1.435)	(1.435)	(1.435)	(1.435)	(1.435)	(1.435)	(1.435)
Workers	1.099*	1.099*	1.099*	1.099*	1.099*	1.099*	1.099*	1.099*
	(0.593)	(0.593)	(0.593)	(0.593)	(0.593)	(0.593)	(0.593)	(0.593)
Firm Owners	3.691*	2.492	0.876	2.353*	1.575	0.669	2.284*	2.020*
	(1.920)	(2.519)	(1.221)	(1.220)	(1.067)	(1.641)	(1.257)	(1.209)
Panel C. Shares of Incidence								
Landowners	0.197	0.246	0.372	0.253	0.305	0.399	0.257	0.273
	(0.144)	(0.257)	(0.299)	(0.206)	(0.244)	(0.371)	(0.214)	(0.225)
Workers	0.184***	0.231*	0.349**	0.238***	0.286**	0.374	0.241***	0.256***
	(0.060)	(0.132)	(0.175)	(0.083)	(0.112)	(0.234)	(0.089)	(0.099)
Firm Owners	0.619***	0.523	0.278	0.509**	0.409	0.228	0.501**	0.471**
	(0.125)	(0.337)	(0.350)	(0.208)	(0.253)	(0.499)	(0.224)	(0.237)
Test of standard view (p-value)	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000
Panel D. Income Weighted Shares of Incidence								
Landowners	0.072	0.094	0.155	0.097	0.121	0.201	0.143	0.150
	(0.061)	(0.116)	(0.165)	(0.095)	(0.121)	(0.196)	(0.129)	(0.134)
Workers	0.226***	0.292	0.486*	0.303***	0.378**	0.629**	0.446***	0.468***
	(0.064)	(0.197)	(0.269)	(0.107)	(0.154)	(0.280)	(0.124)	(0.134)
Firm Owners	0.702***	0.614**	0.359	0.600***	0.501**	0.170	0.412**	0.383**
	(0.080)	(0.288)	(0.377)	(0.162)	(0.227)	(0.388)	(0.180)	(0.190)
Test of standard view (p-value)	0.000	0.000	0.018	0.000	0.000	0.134	0.000	0.000

Notes: This table uses reduced-form effects to estimate incidence using the expressions in Table 1. Each column uses a different approach for estimating firm owner profits using reduced-form effects of net-of-business taxes on local outcomes as in SZ Table 5. Column 1 uses the intensive margin labor demand approach to estimate profit effects. Column 2 uses the productivity approach. Column 3 uses the approach that calibrates the product demand elasticity to scale up wage effects net of capital costs. Column 4 reports the equal-weighted average of these approaches. Column 5 weights each of these three approaches by the inverse variance to put more weight on more precisely estimated profit effects. Column 6 also uses the calibration approach but with a more responsive product demand elasticity. Column 7 and 8 take the simple average and inverse-variance weighted averages of Columns 1, 2, and 6, respectively.

Table 4: Minimum Distance Estimates of Structural Parameters

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Calibrated parameters							
Output elasticity γ	0.150	0.150	0.150	0.150	0.150	0.150	0.150
Housing share α	0.300	0.300	0.300	0.300	0.650	0.300	0.300
Elasticity of product demand ε^{PD}	-2.500	-2.500	-2.500	-2.500	-2.500	-4.000	-5.000
Estimated parameters							
Idiosyncratic location	0.210**	0.402**	0.554***	0.539***	0.557***	0.276***	0.207***
productivity dispersion σ^F	(0.089)	(0.176)	(0.128)	(0.103)	(0.123)	(0.065)	(0.049)
Idiosyncratic location	0.812***	0.206	1.022	0.974	0.355	1.027	1.034
preference dispersion σ^W	(0.308)	(0.199)	(0.722)	(0.597)	(0.480)	(0.743)	(0.759)
Elasticity of housing	0.974	2.666	0.527	0.376	1.193	0.529	0.528
supply η	(1.307)	(3.948)	(1.205)	(1.347)	(1.681)	(1.209)	(1.210)
Specification Details							
Number of Outcomes	4	6	6	6	6	6	6
Incumbent Labor and TFP Outcomes	No	Yes	Yes	Yes	Yes	Yes	Yes
Business Tax Shocks	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bartik and Personal Tax Shocks	Yes	No	Yes	Yes	Yes	Yes	Yes
Number of Moments	12	6	18	18	18	18	18

Notes: This table extends analysis in Panel A of SZ Table 6 using the updated model with two additional $\dot{l}$ and $\dot{z}$ outcomes (i.e., using equation 17). Column (1) uses the four outcomes in SZ with the updated model and $\phi = 1$ as in SZ. Specifically, it uses the elements of the matrix of reduced-form effects **C** above the horizontal dashed line from equation 17. Column (2) uses only the business tax shocks and includes the incumbent labor and TFP outcomes, i.e., it uses the elements of the matrix of reduced-form effects **C** to the left the vertical dashed line. Column (3) uses the full six-outcome model with all three shocks and estimates the cost of capital elasticity ϕ. Column (4) uses the same specification as (3), but instead calibrates ϕ at a lower value than its estimate in Column (3). Column (5), (6), and (7) use the full model with six-outcomes and three shocks, estimated ϕ, and show the results for different values of calibrated parameters.

Table 5: Estimates of Economic Incidence Using Estimated Structural Parameters

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. Incidence							
Calibrated parameters							
Output elasticity γ	0.150	0.150	0.150	0.150	0.150	0.150	0.150
Housing share α	0.300	0.300	0.300	0.300	0.650	0.300	0.300
Elasticity of product demand ε^{PD}	-2.500	-2.500	-2.500	-2.500	-2.500	-4.000	-5.000
Estimated incidence							
Wages $\tilde{w}$	1.088**	1.026	1.315	1.159***	1.145	1.315	1.316
	(0.472)	(0.800)	(1.080)	(0.239)	(1.091)	(1.094)	(1.102)
Landowners $\tilde{r}$	1.036	1.172	1.428	1.395	1.086	1.425	1.424
	(0.910)	(1.435)	(1.464)	(1.388)	(1.131)	(1.459)	(1.457)
Workers $\tilde{w} - \alpha\tilde{r}$	0.777**	0.674	0.886	0.741***	0.439	0.887	0.889
	(0.311)	(0.511)	(0.837)	(0.255)	(0.674)	(0.851)	(0.860)
Firm owners $\tilde{\pi}$	0.958***	3.195**	2.644	2.359***	2.824	2.631	2.626
	(0.106)	(1.421)	(1.636)	(0.054)	(1.718)	(1.648)	(1.655)
Elasticity of labor supply ε^{LS}	0.879***	3.190	0.660	0.656	1.080	0.657	0.653
	(0.310)	(2.965)	(0.406)	(0.433)	(0.905)	(0.415)	(0.419)
Elasticity of labor demand ε^{LD}	-1.715***	-1.373***	-1.271***	-1.278***	-1.269***	-1.544***	-1.726***
	(0.305)	(0.163)	(0.062)	(0.053)	(0.060)	(0.128)	(0.173)
Panel B. Share of Incidence							
Landowners $\tilde{r}$	0.374*	0.233	0.288	0.310	0.250	0.288	0.288
	(0.206)	(0.170)	(0.185)	(0.231)	(0.172)	(0.185)	(0.185)
Workers $\tilde{w} - \alpha\tilde{r}$	0.281***	0.134**	0.179**	0.165*	0.101	0.179**	0.180**
	(0.102)	(0.065)	(0.089)	(0.093)	(0.111)	(0.090)	(0.090)
Firm owners $\tilde{\pi}$	0.346**	0.634***	0.533***	0.525***	0.649***	0.532***	0.532***
	(0.154)	(0.135)	(0.115)	(0.143)	(0.114)	(0.114)	(0.114)
Test of standard view (p-value)	0.038	0.000	0.000	0.000	0.002	0.000	0.000
Panel C. Income-Share Weighted Share of Incidence							
Landowners $\tilde{r}$	0.155	0.086	0.111	0.122	0.183	0.152	0.167
	(0.115)	(0.075)	(0.089)	(0.116)	(0.138)	(0.120)	(0.132)
Workers $\tilde{w} - \alpha\tilde{r}$	0.387***	0.165**	0.230***	0.216***	0.114	0.316***	0.348***
	(0.103)	(0.066)	(0.083)	(0.080)	(0.119)	(0.113)	(0.124)
Firm owners $\tilde{\pi}$	0.458***	0.750***	0.659***	0.662***	0.703***	0.532***	0.484***
	(0.135)	(0.073)	(0.059)	(0.051)	(0.095)	(0.066)	(0.066)
Test of standard view (p-value)	0.113	0.000	0.001	0.000	0.004	0.020	0.038
Specification Details							
Number of Outcomes	4	6	6	6	6	6	6
Incumbent Labor and TFP Outcomes	No	Yes	Yes	Yes	Yes	Yes	Yes
Business Tax Shocks	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bartik and Personal Tax Shocks	Yes	No	Yes	Yes	Yes	Yes	Yes
Number of Moments	12	6	18	18	18	18	18

Notes: This table extends analysis SZ Table 7 using the updated model with additional labor $\dot{l}$ and productivity $\dot{z}$ outcomes (i.e., using equation 17). Column (1) uses the four outcomes in SZ with the updated model and $\phi = 1$ as in SZ. Specifically, it uses the elements of the matrix of reduced-form effects $\mathbf{C}$ above the horizontal dashed line from equation 17. Column (2) uses only the business tax shocks and includes the incumbent labor and TFP outcomes, i.e., it uses the elements of the matrix of reduced-form effects $\mathbf{C}$ to the left the vertical dashed line. Column (3) uses the full six-outcome model with all three shocks and estimates the cost of capital elasticity ϕ. Column (4) uses the same specification as (3), but instead calibrates ϕ at a lower value than its estimate in Column (3). Column (5), (6), and (7) use the full model with six-outcomes and three shocks, estimated ϕ, and show the results for different values of calibrated parameters.

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Appendix For Online Publication

A Theory Appendix

A.1 Wage Incidence of Bartik, Tax, and Amenity Shocks

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

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

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.

B Appendix Tables

Table B.1: Estimates of Economic Incidence Using Reduced-Form Effects with Bartik Controls

	(1) Intensive Margin Labor Demand	(2) TFP	(3) Calibrating Product Demand	(4) Average of (1),(2),(3)	(5) Weighted Avg. of (1),(2),(3)	(6) Calibrating Product Demand	(7) Average of (1),(2),(6)	(8) Weighted Avg. of (1),(2),(6)
Panel A. Calibrated parameters								
Output elasticity γ	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150
Housing share α	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
Elasticity of product demand ε^{PD}	-2.500	-2.500	-2.500	-2.500	-2.500	-5.000	-5.000	-5.000
Panel B. Incidence								
Landowners	0.323	0.323	0.323	0.323	0.323	0.323	0.323	0.323
	(1.366)	(1.366)	(1.366)	(1.366)	(1.366)	(1.366)	(1.366)	(1.366)
Workers	0.680	0.680	0.680	0.680	0.680	0.680	0.680	0.680
	(0.521)	(0.521)	(0.521)	(0.521)	(0.521)	(0.521)	(0.521)	(0.521)
Firm Owners	2.805	3.171	1.028	2.334*	1.650	1.074	2.350*	2.072*
	(1.857)	(2.517)	(1.217)	(1.224)	(1.068)	(1.617)	(1.262)	(1.213)
Panel C. Shares of Incidence								
Landowners	0.085	0.077	0.159	0.097	0.122	0.155	0.096	0.105
	(0.296)	(0.304)	(0.564)	(0.355)	(0.441)	(0.577)	(0.356)	(0.386)
Workers	0.179*	0.163	0.335	0.204*	0.256	0.327	0.203*	0.221*
	(0.100)	(0.121)	(0.276)	(0.112)	(0.161)	(0.309)	(0.116)	(0.133)
Firm Owners	0.737***	0.760**	0.506	0.700**	0.622	0.517	0.701**	0.674*
	(0.247)	(0.347)	(0.552)	(0.339)	(0.421)	(0.644)	(0.349)	(0.376)
Test of standard view (p-value)	0.000	0.000	0.050	0.000	0.000	0.092	0.000	0.000
Panel D. Income Weighted Shares of Incidence								
Landowners	0.029	0.026	0.056	0.033	0.042	0.077	0.053	0.057
	(0.106)	(0.108)	(0.222)	(0.129)	(0.166)	(0.299)	(0.203)	(0.217)
Workers	0.201**	0.183	0.393	0.231*	0.295*	0.542	0.373**	0.400**
	(0.091)	(0.146)	(0.310)	(0.122)	(0.177)	(0.363)	(0.164)	(0.182)
Firm Owners	0.770***	0.791***	0.551	0.736***	0.663**	0.381	0.574**	0.543**
	(0.118)	(0.216)	(0.421)	(0.193)	(0.267)	(0.492)	(0.255)	(0.275)
Test of standard view (p-value)	0.000	0.000	0.113	0.000	0.000	0.419	0.001	0.004

Notes: This table uses reduced-form effects to estimate incidence using the expressions in Table 1 using the reduced-form specification with Bartik controls. Each column uses a different approach for estimating firm owner profits using reduced-form effects of net-of-business taxes on local outcomes as in SZ Table 5. Column 1 uses the intensive margin labor demand approach to estimate profit effects. Column 2 uses the productivity approach. Column 3 uses the approach that calibrates the product demand elasticity to scale up wage effects net of capital costs. Column 4 reports the equal-weighted average of these approaches. Column 5 weights each of these three approaches by the inverse variance to put more weight on more precisely estimated profit effects. Column 6 also uses the calibration approach but with a more responsive product demand elasticity. Column 7 and 8 take the simple average and inverse-variance weighted averages of Columns 1, 2, and 6, respectively.

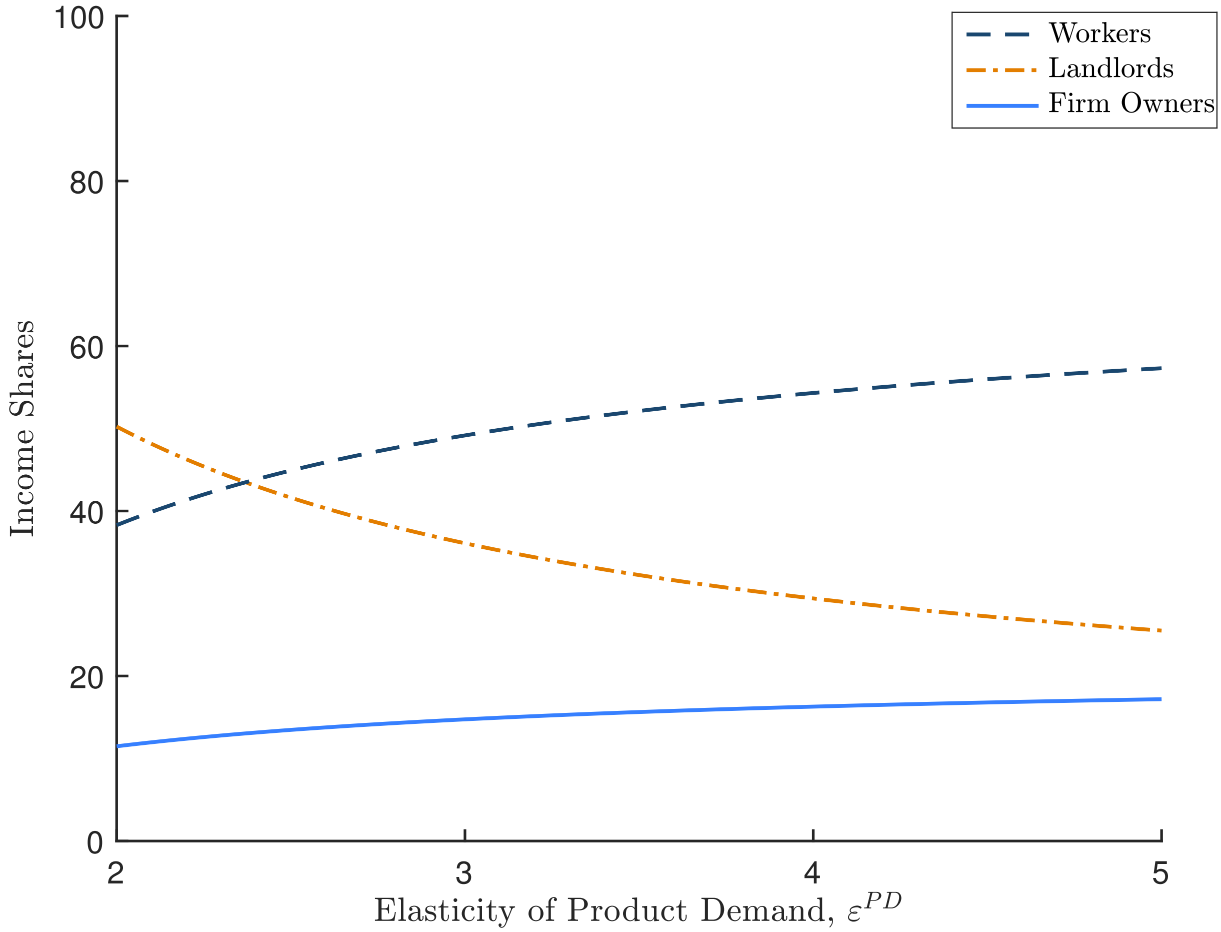
Table B.2: Estimates of Economic Incidence Using Reduced-Form Effects with Bartik and Personal Tax Controls

	(1) Intensive Margin Labor Demand	(2) TFP	(3) Calibrating Product Demand	(4) Average of (1),(2),(3)	(5) Weighted Avg. of (1),(2),(3)	(6) Calibrating Product Demand	(7) Average of (1),(2),(6)	(8) Weighted Avg. of (1),(2),(6)
Panel A. Calibrated parameters								
Output elasticity γ	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150
Housing share α	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
Elasticity of product demand ε^{PD}	-2.500	-2.500	-2.500	-2.500	-2.500	-5.000	-5.000	-5.000
Panel B. Incidence								
Landowners	1.857	1.857	1.857	1.857	1.857	1.857	1.857	1.857
	(1.571)	(1.571)	(1.571)	(1.571)	(1.571)	(1.571)	(1.571)	(1.571)
Workers	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977
	(0.844)	(0.844)	(0.844)	(0.844)	(0.844)	(0.844)	(0.844)	(0.844)
Firm Owners	4.300*	4.017	0.857	3.058	1.453	0.620	2.979	1.956
	(2.301)	(5.180)	(1.229)	(2.034)	(1.154)	(1.681)	(2.036)	(1.359)
Panel C. Shares of Incidence								
Landowners	0.260*	0.271	0.503*	0.315	0.433*	0.538	0.320	0.388*
	(0.136)	(0.281)	(0.263)	(0.204)	(0.227)	(0.338)	(0.211)	(0.215)
Workers	0.137*	0.143	0.265	0.166*	0.228	0.283	0.168	0.204
	(0.072)	(0.127)	(0.189)	(0.100)	(0.148)	(0.235)	(0.104)	(0.132)
Firm Owners	0.603***	0.586	0.232	0.519**	0.339	0.179	0.512**	0.408*
	(0.113)	(0.366)	(0.308)	(0.219)	(0.239)	(0.451)	(0.231)	(0.232)
Test of standard view (p-value)	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Panel D. Income Weighted Shares of Incidence								
Landowners	0.101	0.106	0.239	0.128	0.193	0.308	0.195	0.232
	(0.064)	(0.133)	(0.188)	(0.105)	(0.143)	(0.219)	(0.143)	(0.153)
Workers	0.177**	0.186	0.419	0.224*	0.339	0.540	0.342**	0.406**
	(0.083)	(0.190)	(0.300)	(0.135)	(0.209)	(0.328)	(0.172)	(0.201)
Firm Owners	0.722***	0.708**	0.341	0.649***	0.467*	0.152	0.464**	0.362*
	(0.082)	(0.298)	(0.391)	(0.185)	(0.262)	(0.398)	(0.215)	(0.217)
Test of standard view (p-value)	0.000	0.000	0.031	0.000	0.002	0.134	0.000	0.010

Notes: This table uses reduced-form effects to estimate incidence using the expressions in Table 1 using the reduced-form specification with Bartik and personal tax controls. Each column uses a different approach for estimating firm owner profits using reduced-form effects of net-of-business taxes on local outcomes as in SZ Table 5. Column 1 uses the intensive margin labor demand approach to estimate profit effects. Column 2 uses the productivity approach. Column 3 uses the approach that calibrates the product demand elasticity to scale up wage effects net of capital costs. Column 4 reports the equal-weighted average of these approaches. Column 5 weights each of these three approaches by the inverse variance to put more weight on more precisely estimated profit effects. Column 6 also uses the calibration approach but with a more responsive product demand elasticity. Column 7 and 8 take the simple average and inverse-variance weighted averages of Columns 1, 2, and 6, respectively.

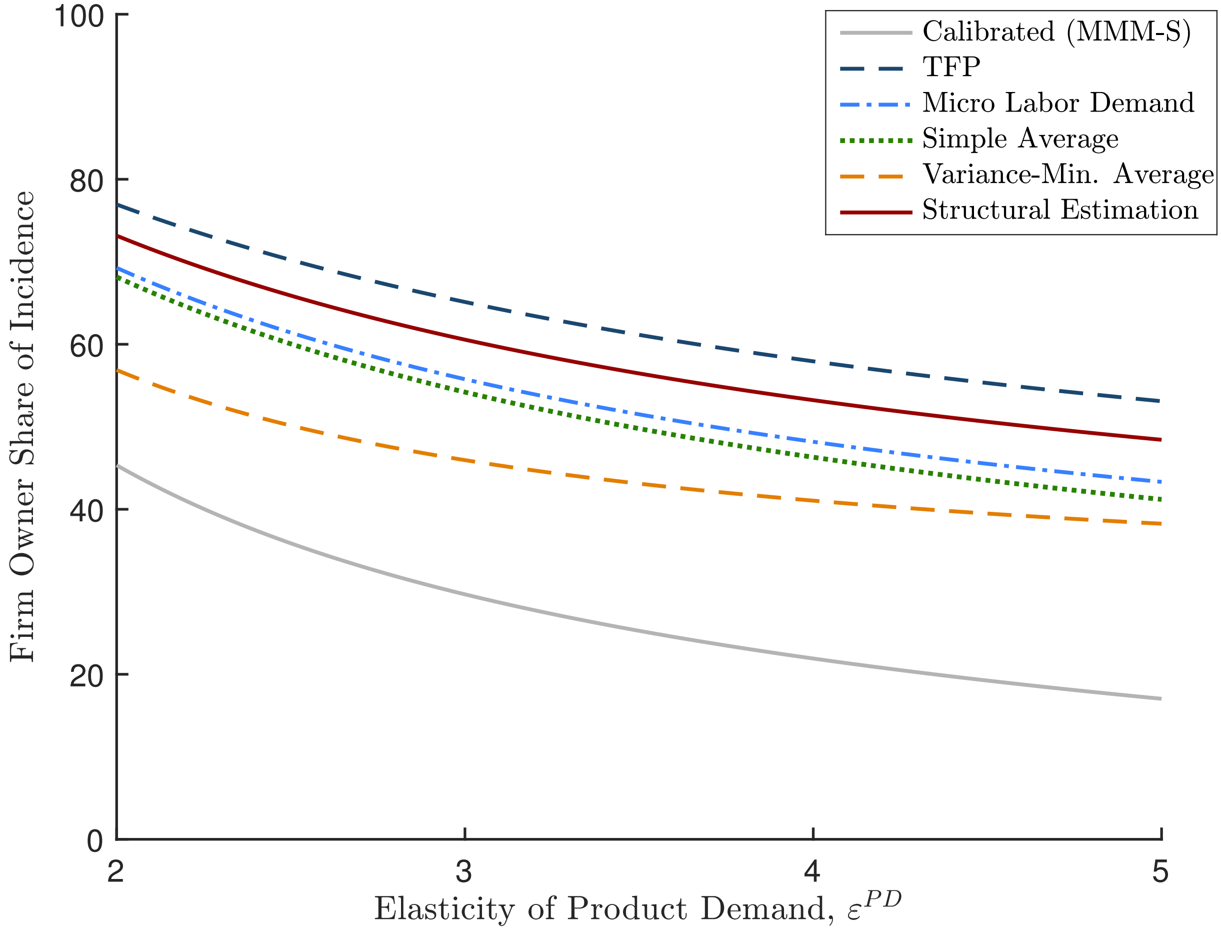
C Appendix Figures

Figure C.1: Income Shares and the Product Demand Elasticity



Notes: This figure plots income shares for workers, firm owners, and land owners for different values of the product demand elasticity.

Figure C.2: Firm Owners' Share of Incidence across Approaches Using Income Share Weights



Notes: This figure plots the income-share weighted incidence for firm owners across different approaches and different values of the product demand elasticity. It reports the same specifications as Figure 1, but with income-share weights.