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Monopsony Amplifies Distortions from Progressive Taxes†

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A growing number of studies argue that monopsony is pervasive across countries and industries (Berger, Herkenhoff, and Mongey 2022; Lamadon, Mogstad, and Setzler 2022; Yeh, Macaluso, and Hershbein 2022). These studies typically report that workers' wages are marked down 20 to 30 percent below their marginal revenue product, indicating significant monopsony power. A separate literature on taxation measures income tax progressivity and—in competitive labor market environments—computes optimal tax progressivity (e.g., Heathcote, Storesletten, and Violante 2017—henceforth, HSV).[1]

In this paper, we argue that these two literatures interact in a meaningful way. Greater tax progressivity lowers the labor supply elasticities perceived by firms, exacerbating monopsony power and contributing to wider wage markdowns. The intuition is simple. The center of the monopsonist's problem is the labor supply curve. A monopsonist that faces a very inelastic labor supply curve understands that wage cuts will result in much smaller employment losses. They exploit this to lower wages and lower their wage bill without sacrificing much productive output.

In the context of this paper, firms understand that when taxes are progressive, a cut in pretax wages reduces posttax wages by disproportionately less. Thus, tax progressivity acts to lower the elasticity of labor input with respect to the pretax wage that the firm has to pay. This contributes to wider markdowns.

The source of monopsony power is the imperfect substitutability of jobs from the worker's perspective. When jobs are imperfect substitutes and firm productivity is heterogeneous, another consequence of tax progressivity is labor misallocation. High productivity firms pay higher wages, but the posttax wages received by these workers are disproportionately smaller than the pretax wages paid. Higher paying firms attract fewer workers because tax progressivity flattens the posttax wage distribution.

We provide a simple theoretical framework for examining these issues. Importantly it contains none of the *benefits* of progressive taxes. Workers are homogeneous, so progressive taxes do not redistribute. Workers face no risk, so progressive taxes do not provide insurance. This allows us to focus on the novel *costs* of progressive taxes. We leave it to future work to put these new costs head-to-head with previously understood benefits.

We first establish these mechanisms in an environment with homogeneous firms. We extend these results to heterogeneous firms where the additional misallocation force is present. We then quantify these forces under standard parameter values. Misallocation and lower labor supply elasticity effects induced by progressive taxes significantly lower output. A change in progressivity from 0.10 to 0.20—which spans various estimates for the United States—reduces output by 2 percent.

I. Theory

The economy is static and features a unit measure of identical households with a continuum of workers within each, a continuum of firms indexed by $j \in [0,1]$, and a government. Each worker works at a single firm and their labor income is taxed by the government. If a firm pays a pretax wage w_j, the household receives $\lambda w_j^{1-\tau}$ in posttax labor income. Taxes

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[1] A small set of papers studies optimal taxation in noncompetitive labor markets. Mousavi (2022) and Hummel (2023) are closest to this paper. Cahuc and Laroque (2014) (see references therein); Bagger, Moen, and Vejlin (2021); and Hurst et al. (2022) study taxation in frictional search environments.

fund government spending G, although our assumptions will imply that we do not need to incorporate the government budget constraint.

A representative household distributes labor across a continuum of firms indexed by $j \in [0,1]$. The pretax wage per worker at each firm is taken as given by the household and is denoted w_j. The posttax wage per worker $\tilde{w}_j = \lambda w_j^{1-\tau}$, as in HSV. The household also receives income from firm profits, which are rebated lump sum. The household chooses C and n_j to maximize

$$\log\left(C - \frac{1}{\bar{\varphi}^{1/\varphi}} \frac{N^{1+1/\varphi}}{1 + 1/\varphi}\right),$$

$$N = \left(\int n_j^{\frac{\eta+1}{\eta}} dj\right)^{\frac{\eta}{\eta+1}}$$

subject to $C = \int \lambda w_j^{1-\tau} n_j dj + \Pi$.[2] Consumption goods produced by firms are perfect substitutes and sell at a price $p_j = P$, which we normalize to one. The household faces a convex disutility in total labor N, which is determined by the distribution of labor across firms, n_j. Allocating more workers to firm j incurs more disutility on the margin, requiring higher compensation. Firms experience this as an upward-sloping labor supply curve.

Define the aggregate wage index W by the following expression:

$$(1) \qquad \lambda W^{1-\tau} N = \int \lambda w_j^{1-\tau} n_j dj.$$

Under linear taxes $(\tau = 0)$, this is a standard wage index. Under $\tau > 0$, W has the interpretation of the aggregate pretax wage index. Combining this definition with first order conditions for C and n_j, household optimal labor supply is determined by

$$(2) \qquad n_j = \left(\frac{w_j}{W}\right)^{(1-\tau)\eta} N,$$

$$(3) \qquad W = \left[\int_j w_j^{(1-\tau)(1+\eta)} dj\right]^{\frac{1}{(1-\tau)(1+\eta)}},$$

$$(4) \qquad N = \bar{\varphi}\left(\lambda W^{1-\tau}\right)^{\varphi}.$$

[2] By removing wealth effects on labor supply, the preferences of Greenwood, Hercowitz, and Huffman (1988)—henceforth, GHH—allow output, wages, and employment to be determined independently of consumption and the government budget constraint.

Equation (4) is a standard optimality condition for labor supply under progressive taxes: higher progressivity distorts labor supply by reducing the after-tax wage on the margin.

The equilibrium wage index that enters this expression is also distorted by the presence of progressive taxes. The household optimally allocates labor across firms to equate marginal disutilities of work to *posttax* wages; hence the wage index is formed using *posttax* wages. Progressivity causes the gap between pre- and posttax wages to widen at higher wage firms, which is encoded into the wage index via lower weight on the pretax wages of high wage firms. This can also be seen in the first equation, which gives the labor supply curve to firm j. On the margin, higher pretax wages increase posttax wages with an elasticity of $(1 - \tau)$, and since the household cares about posttax wages, raising the pretax wage reallocates workers with a lower elasticity.

From equation (2) we can derive the elasticity of labor supply that the firm faces under the assumption that the firm is monopsonistically competitive (i.e., it is small and hence its effect on W is zero). The elasticity of labor supply to firm j is given by

$$(5) \qquad \varepsilon_j = \frac{\partial \log n_j}{\partial \log w_j} = \eta(1 - \tau).$$

Higher progressivity directly lowers the elasticity of the firm's labor supply curve. In an imperfectly competitive labor market, the firm internalizes this effect, and hence tax progressivity will directly shape the distribution of *pretax* wages.

Firms operate a constant returns to scale production technology $y_j = z_j n_j$. They take as given the labor supply curves of households and aggregates W and N and solve

$$(6) \qquad \pi_j = \max_{w_j} z_j n_j - w_j n_j$$

subject to

$$(7) \qquad n_j = \left(\frac{w_j}{W}\right)^{(1-\tau)\eta} N.$$

Firm optimality implies the wage

$$(8) \quad w_j = \mu z_j, \; \mu = \frac{\varepsilon}{\varepsilon + 1}, \; \varepsilon = (1 - \tau)\eta.$$

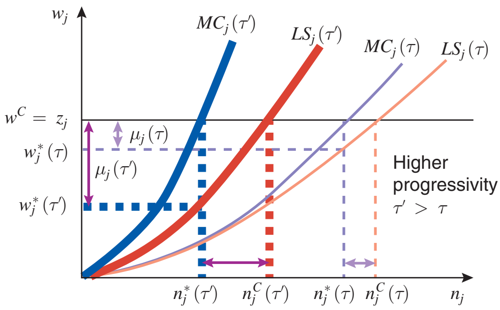

Figure 1. Effect of Progressive Taxes on Firms' Optimal Pretax Wage (w_j) and Employment (n_j)

The firm cares about the *pretax* wage and understands that on the margin, as it increases its wage, the *posttax* wage that is received by workers increases at the lower rate of $(1 - \tau)$. From the perspective of the firm, labor supply is less elastic with respect to pretax wages. Progressive taxes make hiring more expensive on the margin, so the firm does less of it in equilibrium, which is achieved with a lower wage.

Figure 1 illustrates the partial-equilibrium effects of increasing tax progressivity to $\tau' > \tau$, holding W and N fixed. Steeper tax progressivity reduces the firm's perceived labor supply elasticity. They pay wages at wider markdowns, and the gap between the competitive (efficient) and monopsonistic allocations widen. The distortionary effects of tax progressivity are internalized and then amplified by the monopsonist.

To derive simple analytical expressions, we first assume firms are homogeneous: $z_j = Z$. Under Greenwood, Hercowitz, and Huffman 1988 (GHH) preferences, the following conditions characterize labor demand, labor supply, and output:[3]

$$(9) \qquad W = \mu Z, \quad \mu = \frac{(1-\tau)\eta}{(1-\tau)\eta + 1},$$

$$(10) \qquad N = \bar{\varphi}\left(\lambda W^{1-\tau}\right)^{\varphi}, \text{ and}$$

$$(11) \qquad Y = ZN.$$

[3] The government budget constraint is $G = WN - \lambda W^{1-\tau} N$. Without other fiscal adjustments, changes in taxes change G. Via the resource constraint $(Y = C + G)$, this changes C. In the case without GHH preferences, this would shift labor supply via wealth effects. Hence, GHH preferences allow us to solve for output without considering G.

In terms of primitives, output is therefore

$$Y = \underbrace{\left[\frac{(1-\tau)\eta}{(1-\tau)\eta + 1}\right]^{\varphi(1-\tau)}}_{\text{Monopsony}} \underbrace{\bar{\varphi}\lambda^{\varphi} Z^{1+\varphi(1-\tau)}}_{\text{Competitive}}.$$

The *Competitive* term is obtained if we solve the above equations under $W = Z$, and hence firms have no wage-setting power. Progressive taxes show up in the competitive term for standard reasons: higher Z produces a higher pretax W, but the posttax wage received by households is distorted downward, reducing household labor supply.

The *Monopsony* term reduces output due to firms' decisions to restrict demand as they internalize the increasing marginal cost of hiring workers. Part of this comes from preferences via η. Part of this comes from policy via τ. Absent progressive taxes, this term is $\left[\eta/(\eta+1)\right]^{\varphi}$. With progressive taxes, labor supply elasticities to firms are lower, markdowns are wider, and this term is smaller, reducing output for any Z.

We draw two symmetric conclusions. First, progressive taxes amplify the inefficiencies associated with labor market power. Under monopsony, increasing τ reduces the monopsony term, reducing output. Second, monopsony amplifies the inefficiencies associated with progressive taxes. Under progressive taxes, wage-setting power introduces an additional wedge between output and what would obtain under linear taxes.

We now add firm heterogeneity. A first result is to show how progressive taxes distort allocations when jobs are imperfect substitutes, even when firms act competitively. This is reminiscent of results in Scheuer and Werning (2017). In our case, however, there is no worker heterogeneity, but the allocation is nonetheless distorted. A second result is to show how the associated loss is amplified under monopsony.

Suppose that firms are heterogeneous in their productivity, $z_j \sim F(z)$. As they are infinitesimal, firms still pay the same markdown μ on their marginal product of labor, $w_j = \mu z_j$.

The same three equations as above determine $\{Y, W, N\}$, with an additional expression for aggregate TFP, Z,

$$(12) \qquad Z = \left[\int z_j^{\frac{(1+\eta)(1-\tau)}{1+\eta(1-\tau)}} dj\right]^{\frac{1+\eta(1-\tau)}{(1+\eta)(1-\tau)}}.$$

Progressive taxes now have three roles: (i) the standard distortion visible in equation (10), (ii) the new distortion introduced in the previous section through which progressivity widens markdowns (equation (9)), and (iii) an additional distortion in terms of the allocation of labor across firms. This is absent if jobs are perfect substitutes, as all labor goes to the highest productivity firm. When jobs are imperfect substitutes, and progressivity taxes wages more at high wage, high productivity firms, the allocation of employment is distorted away from these firms. This reduces aggregate total factor productivity Z, equation (12), as higher τ down-weights higher z_j's. This is clear from a second order approximation of Z,[4]

$$\log Z = E[\log z_j] + \underbrace{\frac{(1+\eta)(1-\tau)}{1+\eta(1-\tau)}}_{\text{Decreasing in } \tau} \operatorname{var}(\log z_j).$$

Fixing $\eta < \infty$, more productivity dispersion raises TFP. However, as taxes become more progressive, the gains from greater productivity dispersion are mitigated. In the limit, as taxes become fully progressive and $\tau \to 1$, productivity dispersion is irrelevant: after-tax wages at productive and unproductive firms are equalized, and there are no allocative efficiency gains from productivity dispersion.

Note that this additional distortion occurs with or without the wage-setting power of firms. If firms are competitive, $\mu = 1$, and Z is unchanged. The result also holds without worker heterogeneity or sorting. Higher productivity workers sorting into higher productivity firms would compound this TFP loss. Scheuer and Werning (2017) study sorting and competitive labor markets from a theoretical perspective. However, in Scheuer and Werning (2017), employment at each firm is limited to one worker—that is, a one-to-one assignment problem. Here, employment at each firm has an intensive margin, but all workers do not work in one firm due to imperfect substitutability.

[4] We approximate $\log Z$ and $\log z_j$ around $E[\log z_j]$.

II. Illustrative Quantification

We take a simple approach to quantifying the potential of efficiency losses from misallocation and markdowns induced by tax progressivity. Estimates of the progressivity of taxes τ range from 0.05 and 0.25. Consider the baseline economy to be one with $\bar{\tau}$ equal to 0.15. Then solving the above equations in log deviations $\hat{x} = \log(X(\tau)/X(\bar{\tau}))$, we have

$$\hat{y} = [1 + \varphi(1-\bar{\tau})]\hat{z} + \varphi(1-\bar{\tau})\hat{\mu}.$$

Note that $\hat{\mu}$ captures monopsony distortions, whereas $\hat{z}$ is independent of monopsony power. In that sense, productivity losses from tax progressivity are not affected by the presence of monopsonists. However, monopsony power exacerbates the distortions of progressive taxation as evidence by the negative dependence of $\hat{\mu}$ on tax progressivity.

We keep the direct role of $\bar{\tau}$ in this equation constant at 0.15 and increase τ in the expressions for Z (equation (12)) and μ (equation (9)). We keep $E[\log z_j]$ and $\operatorname{var}(\log z_j)$ fixed. This causes a decline in productivity ($\hat{z} < 0$) and widening markdown ($\hat{\mu} < 0$).

Working in log deviations reduces free parameters. We do not have to specify λ, G, $\bar{\varphi}$, or $E[\log z_j]$. The only inputs are (i) φ, which we set to a standard value for the Frisch elasticity of labor supply of 0.75; (ii) $\operatorname{var}(\log z_j)$, which we set to capture a 40 percent standard deviation of log productivity, consistent with Syverson (2004); and (iii) η for which we consider three values $\eta \in \{3, 5, 7\}$, corresponding to markdowns of $\mu \in \{0.75, 0.83, 0.88\}$. These markdowns are within the range reported by Berger, Herkenhoff, and Mongey (2022) and Yeh, Macaluso, and Hershbein (2022).

Figure 2, Panel A shows that changes in progressivity within the empirical range can move output by up to 6 percent.[5] Effects are larger when labor supply is less elastic across firms ($\eta = 3$).[6]

[5] The value of $\bar{\tau} = 0.15$ is not important with similar results obtained for $\bar{\tau}$ of either 0.05 or 0.25.

[6] The response of markdowns is smaller when ε is high. Note that $\partial\mu/\partial\varepsilon = 1/(\varepsilon+1)^2$. As $\varepsilon \to \infty, \partial\mu/\partial\varepsilon \to 0$. Greater progressivity lowers the labor supply elasticity ε, but markdowns are less responsive when the initial perceived labor supply elasticity is high. Also note that the overall responsiveness of markdowns to taxes is decreasing in the

Although not pictured here, it should be clear that effects are larger when productivity is more dispersed. Doubling the standard deviation of $\log z_j$ under $\eta = 3$ amplifies the decline in output across $\tau = 0.05$ and $\tau' = 0.25$ from 6 percent to around 10 percent.

The markdown effect via μ is larger than the misallocation effect via Z; however, both are large relative to the welfare gains that are common in quantitative optimal tax exercises in competitive labor markets. As an example, suppose such an exercise that did not factor in monopsony and firm heterogeneity found that increasing progressivity from 0.15 to 0.20 was optimal and increased welfare by 1 percent. Factoring in firm heterogeneity and monopsony under $\eta = 5$ would reduce output by 1 percent. The negative effects via the allocation of workers across firms and wider markdowns could wipe out most of these gains (Figure 2, Panel A).

From this simple exercise, we conclude that studying the role of monopsony and firm heterogeneity in mitigating the welfare gains from higher progressivity is an important avenue of future research.

III. Conclusion

Standard motives for progressive taxes are redistribution and insurance. Our economy has homogeneous workers in a unitary household and no idiosyncratic risk. Hence, a government in the model that we have studied would have zero motivation to pursue progressive taxes, but in richer economies where these motives exist, we claim that the economic forces documented in this paper would still be operative.

In continuing work, we study this issue in a Bewley economy with consumption, savings, borrowing constraints and individual decisions over which firm to work at and how many hours to work. Workers make individual decisions, and supply labor to a single firm rather than the "large household" setup in this paper. Progressivity increases a firms marginal costs on both the hiring (extensive) and hours (intensive) margin. Under homogeneous firms and competitive labor markets, this rich economy nests leading frameworks used to quantify optimal tax

labor supply elasticity η: $\partial\mu/\partial\tau = -\eta/\left[\eta(1-\tau)+1\right]$,[2] which similarly goes to zero as η approaches ∞.

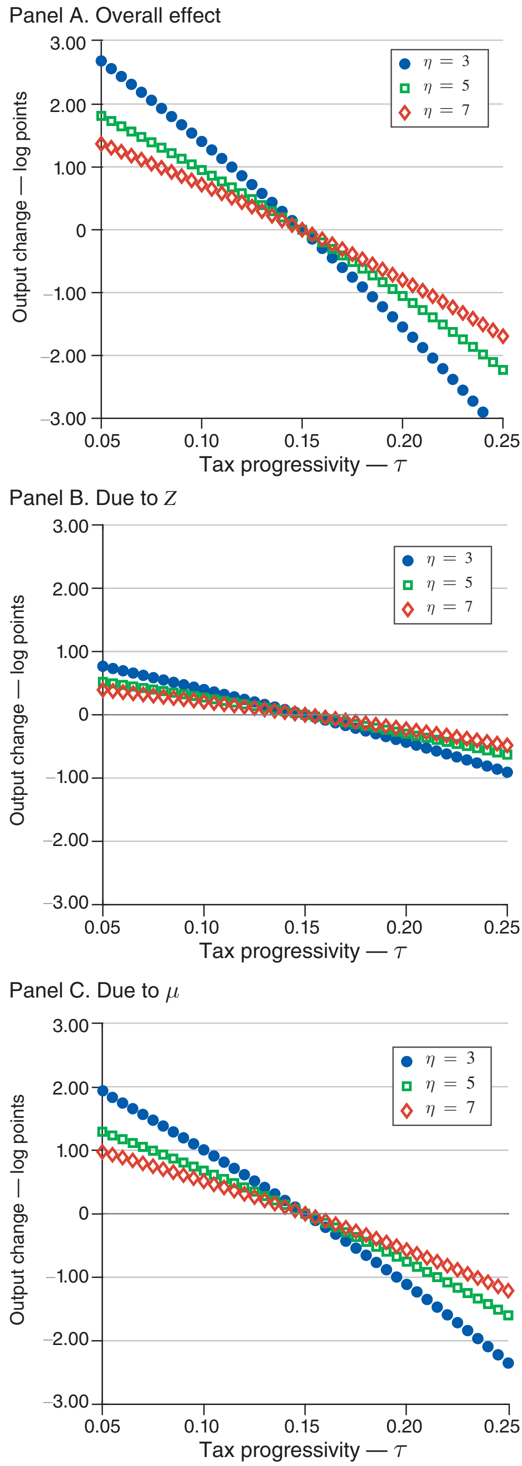

Figure 2. Effect of Progressive Taxes on Output via Misallocation and Markdowns

progressivity (e.g., HSV). Hence, we can quantify the extent to which firm heterogeneity and wage-setting power reduce optimal progressivity in a leading quantitative framework.

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