Notes on Monopsony Model of Gender Wage Gaps

R.L. Oaxaca
University of Arizona

1 Classical Monopsony

Monopsony power exists whenever an employer faces an upward sloping labor supply curve. In a classical competitive labor market each firm faces an infinitely elastic (horizontal) labor supply curve at the market wage. The textbook case of monopsony is based on the work of Joan Robinson (1938) in which the labor market is dominated by a single employer. Robinson applied the monopsony model to gender wage gaps among equally productive men and women. If the labor supply of women to the firm/market is less elastic than that of the men, the monopsonist maximizes profits by paying women less than the men.

2 Modern Dynamic Monopsony

The traditional view of monopsony has not been very applicable because the labor market is generally not characterized by the dominance of a single employer. A modern view of the labor market is associated with the work of Alan Manning (2003). In this model labor markets are characterized by search frictions, costly search, and competition among employers. Because of frictions in the labor market, firms face upward sloping labor supply curves. Therefore, otherwise seemingly competitive firms have potential monopsony power.

3 Micro-economics of Monopsony

A measure of monopsony power is defined by the Pigouvian Exploitation Index (PEI):

$$PEI = \frac{MRP_L - w}{w},$$

where $MRP_L = MR\text{x}MP_L$ is the marginal revenue product of labor.

Let $C = wL + rK$ represent the cost equation for the firm. Marginal labor cost (MLC) is obtained as follows:

$$\begin{aligned}
MLC &= \frac{\partial C}{\partial L} \\
&= \frac{\partial (wL)}{\partial L} \\
&= w + L\frac{\partial w}{\partial L} \\
&= (w)\left(1 + \frac{L}{w}\frac{\partial w}{\partial L}\right) \\
&= (w)\left(1 + \frac{1}{\frac{w}{L}\frac{\partial L}{\partial w}}\right) \\
&= (w)\left(1 + \frac{1}{\eta_{L^s \cdot w}}\right),
\end{aligned}$$

where $\eta_{L^s \cdot w} > 0$ is the elasticity of labor supply to the firm.

The profit maximizing condition is to hire labor up to the point where

$$\begin{aligned}
MRP_L &= MLC \\
&= (w)\left(1 + \frac{1}{\eta_{L^s \cdot w}}\right).
\end{aligned}$$

. Upon substitution for MRP_L in the PEI formula, we obtain a very simple expression:

$$
\begin{aligned}
PEI &= \frac{(w)\left(1+\frac{1}{\eta_{L^s \cdot w}}\right) - w}{w} \\
&= \frac{1}{\eta_{L^s \cdot w}}.
\end{aligned}
$$

In a perfectly competitive labor market, $\eta_{L^s \cdot w} = \infty$, so that $PEI = 0$ because $MRP_L = MLC = w$.

4 Gender Wage Gaps

In a simplified setting we can think of the cost equation as

$$
C = w_m L_m + w_f L_f + rK,
$$

where w_m and w_f are wages for males and females, and L_m and L_f are the employments of males and females. The marginal labor costs for males and females are given by

$$
\begin{aligned}
MLC_m &= \frac{\partial C}{\partial L_m} \\
&= \frac{\partial \left(w_m L_m\right)}{\partial L_m} \\
&= w_m + L_m \frac{\partial w_m}{\partial L_m} \\
&= (w_m)\left(1 + \frac{1}{\eta_{L_m^s \cdot w_m}}\right)
\end{aligned}
$$

and

$$\begin{aligned}
MLC_f &= \frac{\partial C}{\partial L_f} \\
&= \frac{\partial \left(w_f L_f\right)}{\partial L_f} \\
&= w_f + L_f \frac{\partial w_f}{\partial L_f} \\
&= (w_f)\left(1 + \frac{1}{\eta_{L_f^s \cdot w_f}}\right).
\end{aligned}$$

Profit maximization requires that the marginal labor costs for men and women be equated to the marginal product of labor ($MLC_m = MLC_f = MRP_L$):

$$MLC_m = MLC_f$$

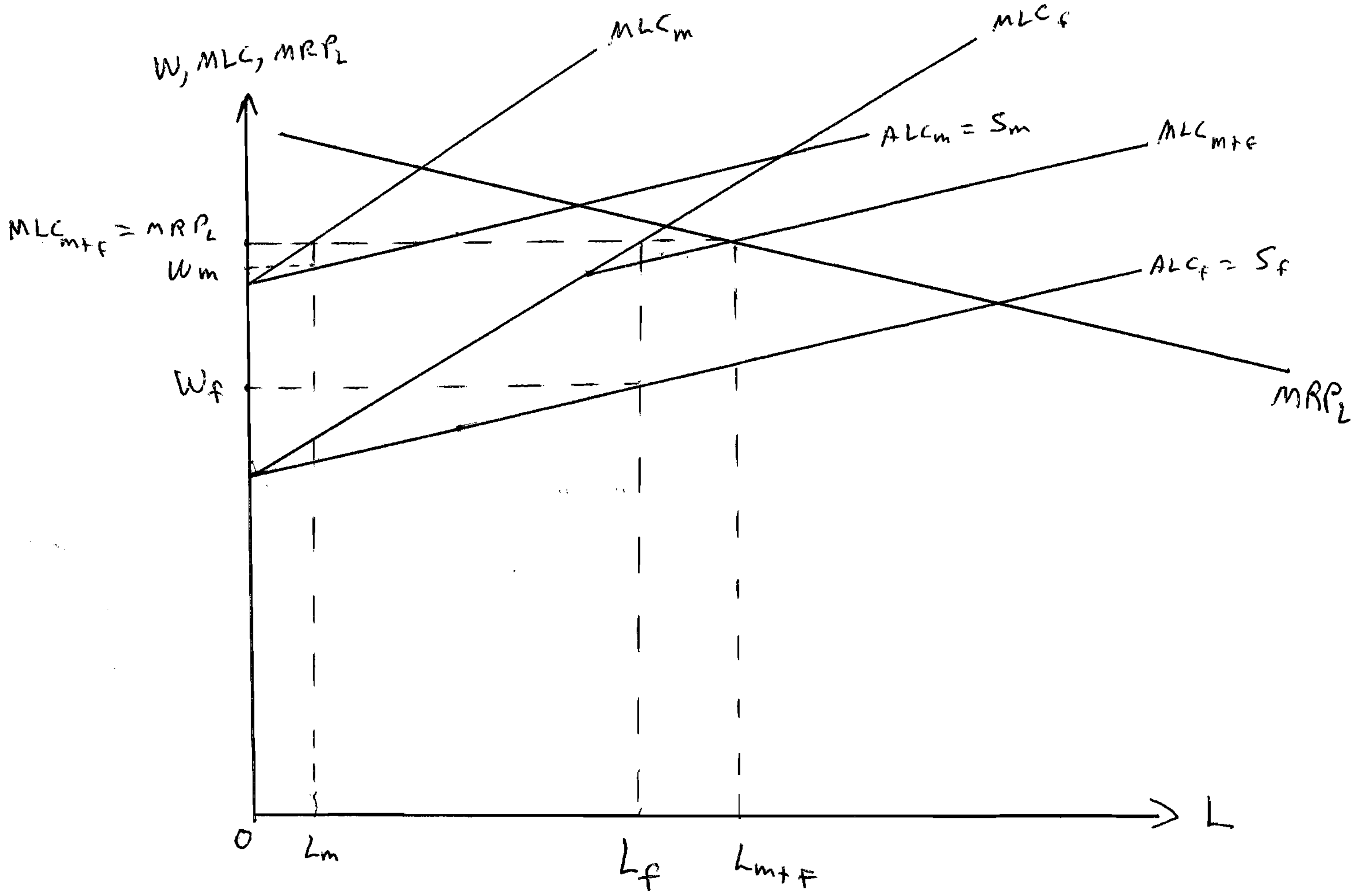
$\Rightarrow$

$$(w_m)\left(1 + \frac{1}{\eta_{L_m^s \cdot w_m}}\right) = (w_f)\left(1 + \frac{1}{\eta_{L_f^s \cdot w_f}}\right)$$

$\Rightarrow$

$$\frac{w_m}{w_f} = \frac{1 + \dfrac{1}{\eta_{L_f^s \cdot w_f}}}{1 + \dfrac{1}{\eta_{L_m^s \cdot w_m}}} > 1$$

if $0 < \eta_{L_f^s \cdot w_f} < \eta_{L_m^s \cdot w_m}$.



MONOPSONY MODEL OF GENDER WAGE GAPS

Gender discrimination arising from monopsony power can be measured as

$$D = \frac{w_m}{w_f} - 1$$

$$= \frac{1 + \frac{1}{\eta_{L_f^s \cdot w_f}}}{1 + \frac{1}{\eta_{L_m^s \cdot w_m}}} - 1$$

$$= \frac{\eta_{L_m^s \cdot w_m} - \eta_{L_f^s \cdot w_f}}{\left(\eta_{L_f^s \cdot w_f}\right)\left(\eta_{L_m^s \cdot w_m} + 1\right)}$$

for $MP_{L_m} = MP_{L_f}$.

In the more general case in which worker heterogeneity would yield gender differences in marginal productivity in the absence of discrimination, the gender wage gap can be expressed in terms of the classic decomposition framework:

$$\frac{w_m}{w_f} = \left(\frac{MP_{L_m}}{MP_{L_f}}\right)(D+1)$$
$$= \left(\frac{MP_{L_m}}{MP_{L_f}}\right)\left(\frac{1 + \frac{1}{\eta_{L_f^s \cdot w_f}}}{1 + \frac{1}{\eta_{L_m^s \cdot w_m}}}\right)$$

$\Rightarrow$

$$ln\,(G+1) = ln(Q+1) + ln(D+1),$$

where $ln\,(G+1) = ln\left(\frac{w_m}{w_f}\right)$, $ln(Q+1) = ln\left(\frac{MP_{L_m}}{MP_{L_f}}\right)$, and $ln(D+1) = ln\left(\frac{1+\frac{1}{\eta_{L_f^s \cdot w_f}}}{1+\frac{1}{\eta_{L_m^s \cdot w_m}}}\right)$, $G = \frac{w_m}{w_f} - 1$, $Q = \frac{MP_{L_m}}{MP_{L_f}} - 1$, and $D = \frac{\eta_{L_m^s \cdot w_m} - \eta_{L_f^s \cdot w_f}}{\left(\eta_{L_f^s \cdot w_f}\right)\left(\eta_{L_m^s \cdot w_m} + 1\right)}$.