Calculations for Appendix

▪ Performance Pay

▪ The profit function (17) is

In[1]:= $\text{prof} = p\,(\rho\,x + (1-\rho)\,y) - \rho\,w - (1-\rho)\,\frac{y}{x}\,w - c;$

$\rho = q\left(1 + \mu\,\text{Log}\left[\frac{w}{W}\right]\right);$

▪ Its derivative with respect to w is

In[3]:= $\text{Dprof} = D[\text{prof}, w];$
$W = w;$

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General::spell1 :
 Possible spelling error: new symbol name "Dprof" is similar to existing symbol "prof". More…
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In[5]:= $\text{solution} = \text{Solve}[\{\text{Dprof} == 0, \text{prof} == 0\}, \{w, p\}]$

Out[5]= $\left\{\left\{w \to -\frac{-c\,q\,x^2\,\mu + c\,q\,x\,y\,\mu}{(q\,x + y - q\,y)^2},\ p \to -\frac{-c\,q\,x - c\,y + c\,q\,y - c\,q\,x\,\mu + c\,q\,y\,\mu}{(q\,x + y - q\,y)^2}\right\}\right\}$

▪ Check that expression (18) is correct

In[6]:= $\text{Simplify}\left[-\frac{-c\,q\,x^2\,\mu + c\,q\,x\,y\,\mu}{(q\,x + y - q\,y)^2} == c\,q\,x\,\mu\,\frac{x - y}{(q\,x + (1-q)\,y)^2}\right]$

Out[6]= True

In[22]:= Clear[W]

▪ Wage Compression

▪ The Lagrangean is

In[23]:=

$$L = q\left(1 + \mu\,\text{Log}\left[\frac{w}{W}\right]\right)(p\,x - w) + (1-q)\left(1 + \mu\,\text{Log}\left[\frac{v}{V}\right]\right)(p\,y - v) - c - \lambda\left(q\,\text{Log}\left[\frac{w}{W}\right] + (1-q)\,\text{Log}\left[\frac{v}{V}\right]\right);$$

▪ The derivatives are

In[24]:= $\text{DLw} = D[L, w]$

Out[24]= $-\frac{q\,\lambda}{w} + \frac{q\,(-w + p\,x)\,\mu}{w} - q\left(1 + \mu\,\text{Log}\left[\frac{w}{W}\right]\right)$

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In[13]:= DLv = D[L, v]
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Out[13]= $-\frac{(1-q)\,\lambda}{v}+\frac{(1-q)\,(-v+p\,y)\,\mu}{v}-(1-q)\left(1+\mu\,\mathrm{Log}\left[\frac{v}{V}\right]\right)$