This is a detailed description of how one solves this model for the (dis) equilibrium price l
PH and PL, and the optimal wage,W, for a choice of the Bernoulli distribution of, MH, MI
and X. This only deals with the method when efficiency wages are inoperative because it
simpler. The extension to efficiency wage behavior is straightforward, if tedious.The analy
begins in the neighborhood of the deterministic solution, which is not a competitive equilil
but rather lays on the upward sloped section of the supply of labor below the competitive
equilibrium. It is important to recognize that all the relevant functions are monotonic in th
variables of interest.

When X=0 approximately, the problem is considerably more complex because equations (
and (20) for aggregate supply and aggregate demand must be solved simultaneously with t
optimal choice of the nominal wage by all firms (equation 16). Equations (19) and (20) ar
the production function (equation 11), can be used to eliminate Y and L in terms of MH, M
X, W, PH, and PL. One must recognize that MH>Me>ML and PH>Pe>PL and begin near
X=0. In this event MH will generate a W/PH that is close to the deterministic solution fo
firms and intersect the upward sloped section of the labor supply curve.

Case A is the case when both W/PH and W/PL are on the upperward sloped section of the
supply of labor.

$$E\Pi(W) := (X)\cdot\left[\left(\frac{W}{\theta\cdot PL}\right)^{\frac{\theta}{(\theta-1)}} - \frac{W}{PL}\cdot\left[\frac{W}{(\theta\cdot PL)}\right]^{\frac{1}{(\theta-1)}}\right] + (1-X)\cdot\left[\left(\frac{W}{PH(X)}\right)^{(\theta\cdot\psi)} - \frac{\quad}{PH}\right.$$

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$$\frac{d}{dW}E\Pi(W) \rightarrow X\cdot\left[\left(\frac{W}{\theta\cdot PL}\right)^{\frac{\theta}{\theta-1}}\cdot\frac{\theta}{(\theta-1)\cdot W} - \frac{1}{PL}\cdot\left(\frac{W}{\theta\cdot PL}\right)^{\frac{1}{\theta-1}} - \frac{1}{PL}\cdot\frac{\left(\frac{W}{\theta\cdot PL}\right)^{\frac{1}{\theta-1}}}{\theta-1}\right] +$$

$$0 = \frac{d}{dW}E\Pi(W)\ \text{solve}, W \rightarrow$$

No symbolic solution was found.

Now solve (19) and (20) for PL in terms of ML and W and PH in terms of MH and W, and substitute into the optimal W equation above.

$$PH := \left[(1-k)\cdot MH\cdot W^{-(\theta\cdot\psi)} \right]^{\frac{1}{(1-\theta\cdot\psi)}} \qquad PL := [(1-k)\cdot ML]^{1-\theta}\cdot\left(\frac{W}{\theta}\right)^{\theta}$$

$k := .5$ $\quad\theta := .6$ $\quad\psi := .9$ $\quad X := .2$ $\quad Lo := .5$

$ML := 1.5$ $\quad Me := 3.685$ $\quad MH(X) := \frac{(Me - X\cdot ML)}{(1-X)}$ $\quad MH(X) = 4.231$

$$E\Pi(W) := (X)\cdot\left[\left[\frac{W}{\theta\cdot[(1-k)\cdot ML]^{1-\theta}\cdot\left(\frac{W}{\theta}\right)^{\theta}}\right]^{(\theta\cdot\psi)} - \frac{W}{\theta\cdot[(1-k)\cdot ML]^{1-\theta}\cdot\left(\frac{W}{\theta}\right)^{\theta}}\cdot\left[- \ \theta\right.\right.$$

$$root\left(\frac{d}{dW}E\Pi(W), W\right) \rightarrow$$

This can be because it is too complex or because the profit function is too flat and there is a large range of wages that generate the same exp. profit. This is graphed below.

$$root\left(\frac{d}{dW}E\Pi(W), W\right) = 1.032$$

$W := .90, .901 .. 1.2$

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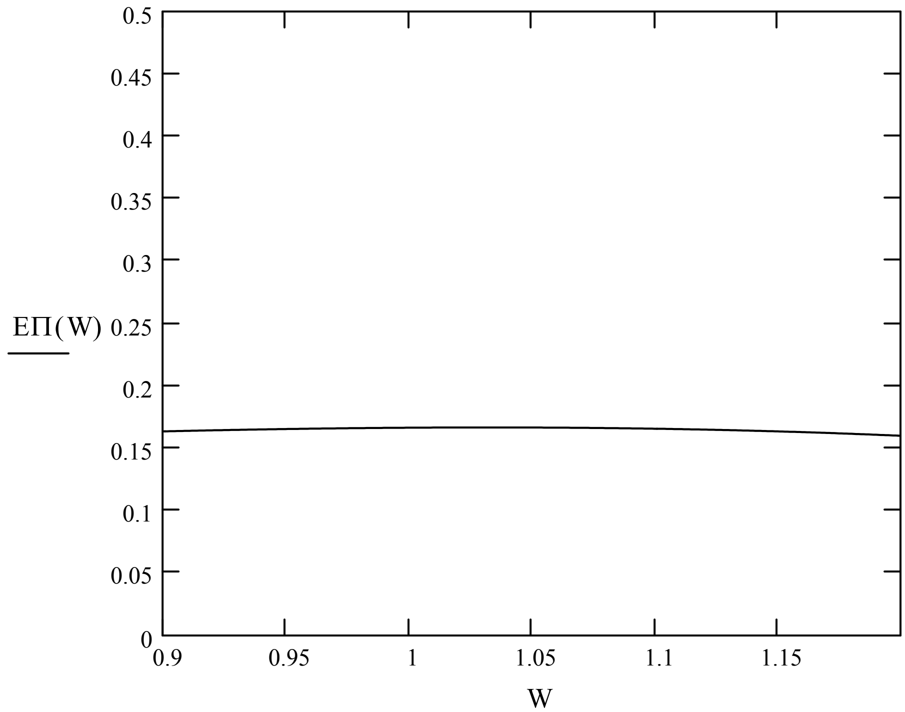

$W := 1$ $\quad \text{root}\left(\frac{d}{dW}E\Pi(W), W\right) = 1.034$ $\quad E\Pi(W) = 0.166$

$W := \text{root}\left(\frac{d}{dW}E\Pi(W), W\right)$ $\quad W = 1.034$ This is the optimal wage.

$$PL := [(1-k)\cdot ML]^{1-\theta}\cdot\left(\frac{W}{\theta}\right)^{\theta} \qquad PH(X) := \left[(1-k)\cdot\frac{MH(X)}{W^{(\theta\cdot\psi)}}\right]^{\frac{1}{(1-\theta\cdot\psi)}}$$

$\frac{W}{PL} = 0.837$ $\quad PL = 1.235$ $\quad wc := (Lo)^{(\theta-1)}\cdot(\theta)$ $\quad wc = 0.792$

This verifies that we have the recession case for ML/PL.

$PH(X) = 4.905$ $\quad Pe := X \cdot PL + (1 - X) \cdot PH(X)$ $\quad Pe = 4.171$ $\quad wk := (Lo)^{\frac{1}{\psi}}$

$\frac{W}{Pe} = 0.248$ $\quad \frac{W}{PH(X)} = 0.211$ $\quad wk = 0.463$

$LH(X) := \left(\frac{W}{PH(X)}\right)^{\psi}$ $\quad LH(X) = 0.246$

This verifies that we are on the supply of labor for MH/PH.

$LL := \left[\frac{W}{(\theta \cdot PL)}\right]^{\frac{1}{(\theta - 1)}}$ $\quad LL = 0.435$ $\quad LL^{\theta} = 0.607$ $\quad YL := (1 - k) \cdot \frac{ML}{PL}$

$YH(X) := (1 - k) \cdot \frac{MH(X)}{PH(X)}$ $\quad YL = 0.607$

$YH(X) = 0.431$ $\quad LH(X)^{\theta} = 0.431$ $\quad wm := 0.396$

$U := \frac{(Lo - LL)}{Lo}$

$U = 0.129$ Unemployment of 13% is generated.

$$\frac{W}{H(X)}\cdot\left(\frac{W}{PH(X)}\right)^{\psi}\Bigg]$$

$$(1-X)\cdot\left[\left(\frac{W}{PH(X)}\right)^{\theta\cdot\psi}\cdot\theta\cdot\frac{\psi}{W}-\frac{1}{PH(X)}\cdot\left(\frac{W}{PH(X)}\right)^{\psi}-\frac{1}{PH(X)}\cdot\left(\frac{W}{PH(X)}\right)^{\psi}\cdot\psi\right]$$

$$\ldots\frac{W}{\cdots\left[(1-k)\cdot ML\right]^{1-\theta}\cdot\left(\frac{W}{\theta}\right)^{\theta}}\Bigg]^{\psi}\Bigg]+(1-X)\cdot\left[\left[\frac{W}{\left[(1-k)\cdot\frac{MH(X)}{W^{(\theta\cdot\psi)}}\right]^{\frac{1}{(1-\theta\cdot\psi)}}}\right]^{\theta\cdot\psi}-\frac{\cdots}{\left[(1-k)\cdot\frac{M\cdots}{W\cdots}\right.}\right.$$

$$\left. \frac{W}{\left[\frac{MH(X)}{W^{(\theta\cdot\psi)}}\right]^{\frac{1}{(1-\theta\cdot\psi)}}} \cdot \left[\frac{W}{\left[(1-k)\cdot\frac{MH(X)}{W^{(\theta\cdot\psi)}}\right]^{\frac{1}{(1-\theta\cdot\psi)}}}\right]^{\psi} \right]$$