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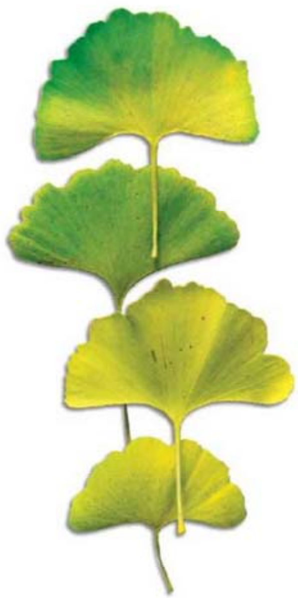

Chapter 14

Labor

Monopsonist : a single buyer of Factor input

example : a company in town

competitive
monopsony

Factor Market

Buyers : firms

Sellers : Owners of factor inputs (let's say workers)

Competitive
Monopoly

Product Market

Buyers : Consumer

Sellers : Firms

Demand for a factor input is "derived demand."

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Chapter Outline

- The Perfectly Competitive Firm's Short-Run Demand for Labor
- The Perfectly Competitive Firm's Long-Run Demand for Labor
- The Market Demand Curve for Labor
- An Imperfect Competitor's Demand for Labor
- The Supply of Labor
- The Noneconomist's Reaction to the Labor Supply Model
- The Market Supply Curve
- Monopsony
- Minimum Wage Laws
- ~~Labor Unions~~
- ~~Discrimination in the Labor Market~~
- ~~Statistical Discrimination~~
- ~~The Internal Wage Structure~~
- ~~Winner-Take-All Markets~~

- ~~Winner-Take-All Markets~~

A Perfectly Competitive Firm's Demand for Labor

- ***Value of marginal product (VMP):*** the value, at current market price, of the extra output produced by an additional unit of input.

$VMP_L = MP_L \cdot P$

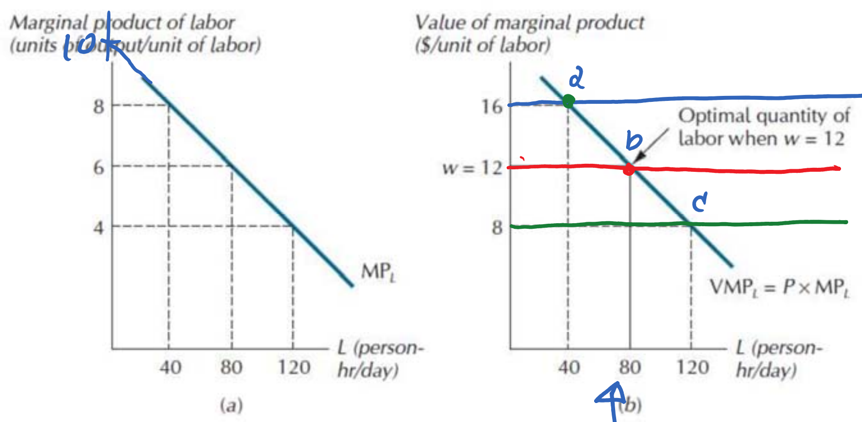
- The hiring rule for the firm is to choose that amount of labor for which the wage rate is equal to the VMP

$\Rightarrow \boxed{VMP_L = w}$

IF $VMP_L > w$, hire more L

IF $VMP_L < w$, hire less L

Figure 14.1: The Competitive Firm's Short-Run Demand for Labor



$P = 2$

SUPPLY CURVE OF LABOR FACING BY A FIRM

$w = 16$

$w = 12$

$w = 8$

(a) If $w = 16$, $L = 40$

(b) If $w = 12$, $L = 80$

(c) If $w = 8$, $L = 120$

(= Demand curve for labor, actually)

$$VMP_L = P \cdot MP_L = 2 \cdot \left(10 - \frac{1}{20} L\right)$$

$$= 20 - \frac{1}{10} L$$

When $w = 12$,

the quantity demanded for labor is

$\boxed{w = VMP_L}$ → Hiring Rule

$$12 = 20 - \frac{1}{10} L$$

$$\boxed{L^* = 80}$$

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Math note

$$\max_L \pi(L) = TR - TC$$

$$= P \cdot Q(L) - w \cdot L$$

F.O.C: $\dfrac{d\pi}{dL} = 0$

$$\frac{d\pi}{dL} = P \cdot \frac{dQ(L)}{dL} - w \cdot \frac{dL}{dL} = 0$$

$$\frac{d\pi}{dL} = P \cdot \frac{dQ(L)}{dL} - w \cdot \frac{dL}{dL} = 0$$

$$= P \cdot MP_L - w \cdot 1 = 0$$

Therefore, $\boxed{VMP_L = w}$ Profit maximizing condition for hiring a factor input.

Let's find a match between Factor mkt and Good mkt...

Recall that $VMP_L = P \cdot MP_L = w$

So $$P = \frac{w}{MP_L} = \frac{w}{\frac{dQ}{dL}} = w \cdot \frac{\Delta L}{\Delta Q}$$

$$= \frac{\Delta w \cdot L}{\Delta Q} = \frac{\Delta VC}{\Delta Q} = MC \text{ !!!}$$

$$\boxed{P = MC}$$

$\boxed{VMP_L = w}$ $\equiv$ $\boxed{P = MC}$

in factor mkt — equivalent as — in output mkt

"TWO SIDES OF THE SAME COIN"

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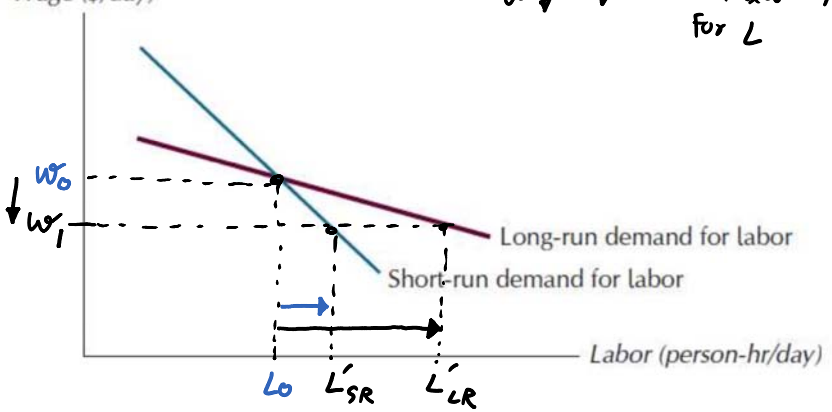
Labor Demand in the Long-Run

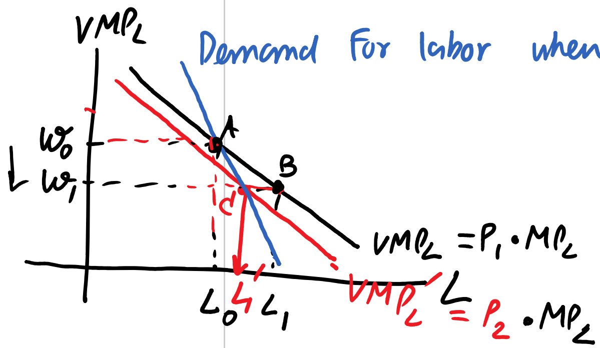
- The firm's demand for labor will tend to be more elastic the more elastic the demand is for its product.

- The firm's demand for labor will tend to be more elastic the more it is able to substitute the services of labor for those of other inputs.

Figure 14.2: Short and Long-Run Demand Curves for Labor

$w \downarrow \rightarrow$ quantity demanded for $L \uparrow \rightarrow Q \uparrow \rightarrow P \downarrow \rightarrow VMP_L \downarrow$





Demand for labor when price of good decreases as a result of more outputs in the mkt

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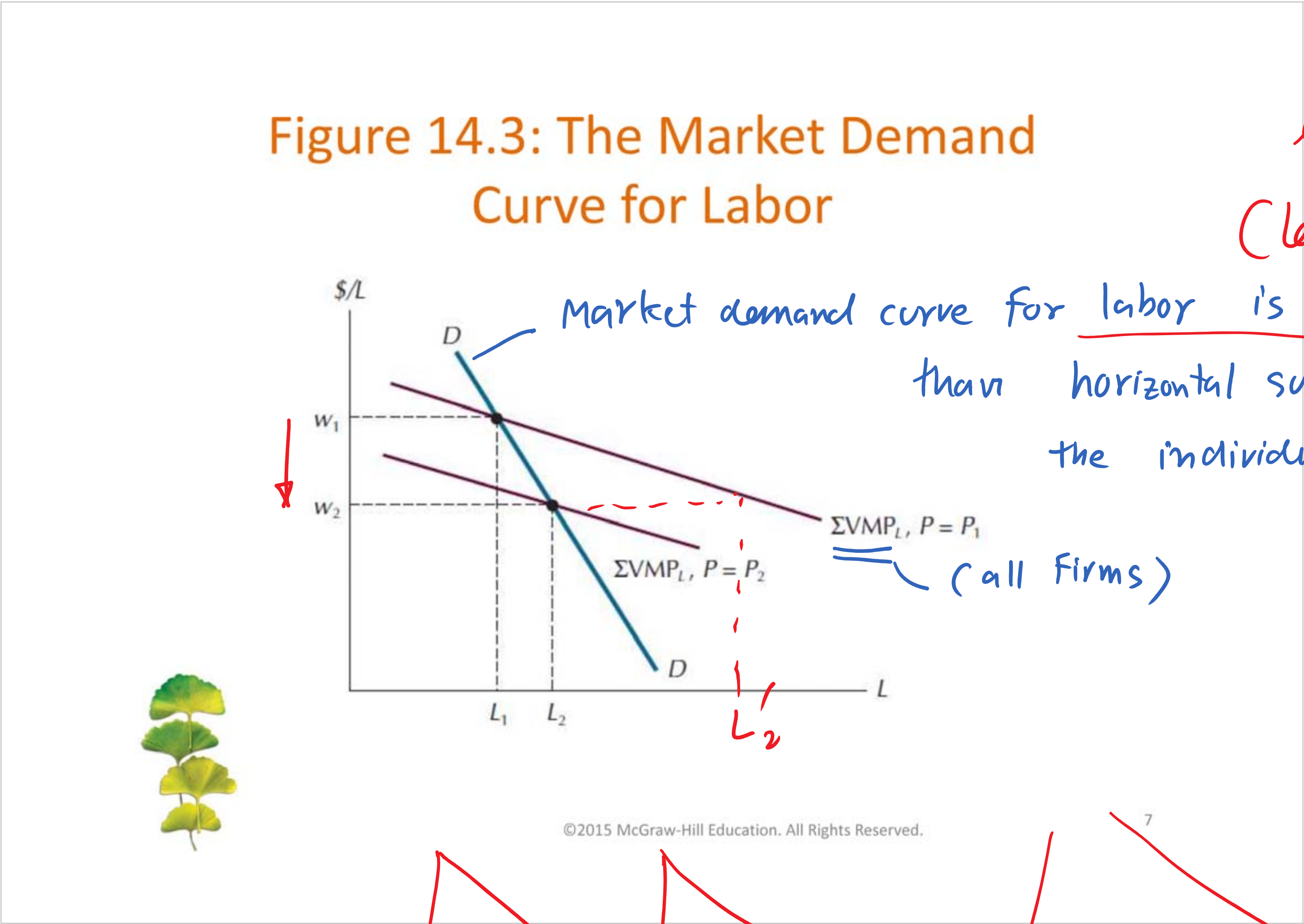
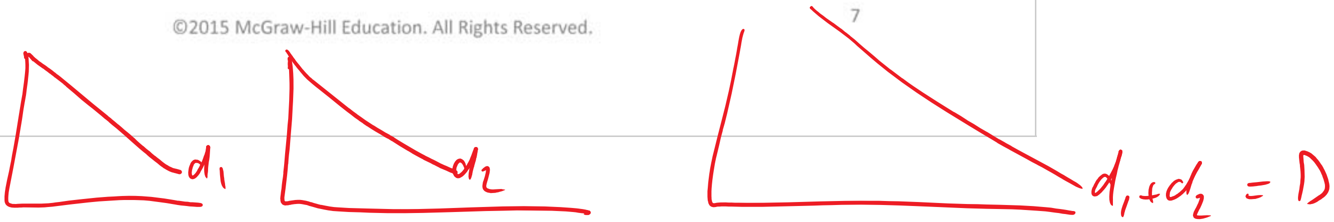


less or responsive to a change in w

(less elastic)

Market demand curve for labor is steeper than horizontal summation of the individual demand curves

(all firms)



An Imperfect Competitor's Demand for Labor

- ***Marginal revenue product (MRP):*** the amount by which total revenue increases with the employment of an additional unit of input.
- The firm will hire that quantity for which the wage rate and MRP^L are equal.

Competitive Labor market , Monopoly structure in good market

$\boxed{MRP = MR \cdot MP_L}$

Since in output market which is monopoly, monopolist sets Q^M at $MR = MC$, not $P = MC$.

$$MRP = \frac{\Delta TR}{\cancel{\Delta Q}} \cdot \frac{\cancel{\Delta Q}}{\Delta L} = \frac{\Delta TR}{\Delta L}$$

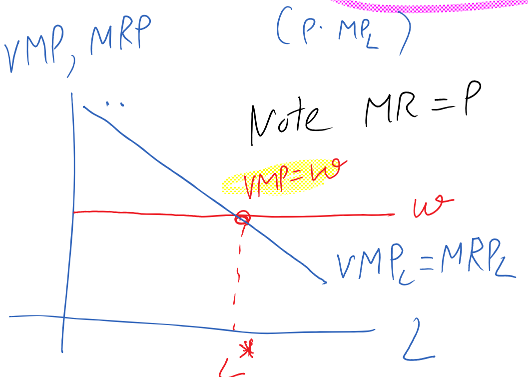
additional revenue received from an additional unit of worker.

In competitive output market : $P = MR$ so

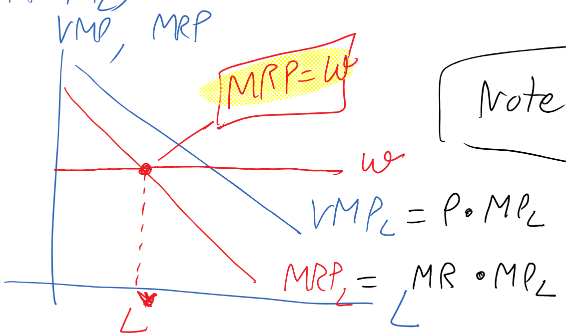
$$\underset{(P \cdot MP_L)}{VMP_L} = \underset{(MR \cdot MP_L)}{MRP_L}$$

In monopoly output mkt : $MR < P$ (as when monopolist wants to attract more sales, it has to lower the price)

$$\underset{(P \cdot MP_L)}{VMP_L} \geq \underset{(MR \cdot MP_L)}{MRP_L}$$



If outputs are



If outputs are sold

Note: $MR < P$

If outputs are sold is competitive mkt

If outputs are sold in monopoly mkt.

SUMMARY

$$\boxed{\text{competitive factor mkt } \& \text{ competitive output mkt}}$$

$$VMP_L = w$$

(hiring rule)

$$\boxed{\text{competitive factor mkt } \& \text{ monopolistic output mkt}}$$

$$MRP_L = w$$

(hiring rule)

Math note on this structure:

$$\max_L \pi(L) = TR - TC$$

$$= P(Q(L)) \cdot Q(L) - w \cdot L$$

$P(Q(L))$

$$\text{F.O.C.: } \frac{d\pi(L)}{dL} = 0$$

$$\frac{d\pi(L)}{dL} = P(\cdot)\frac{dQ(L)}{dL} + Q(L)\frac{dP}{dQ} \cdot \frac{dQ(L)}{dL} - w\frac{dL}{dL} = 0$$

$$= \left[P + Q\frac{dP}{dQ}\right] \cdot \frac{dQ}{dL} - w = 0$$

$$= MR \cdot MP_L = w$$

$$\boxed{MRP_L = w}$$ (in Factor m

his implies $MR \cdot MP_L = w$

$$MR = \frac{w}{MP_L} = \frac{w}{\frac{dQ}{dL}} = w \cdot \frac{d}{d}$$

$$\boxed{MR = MC}$$

my

nkt)

$$\frac{dL}{dQ} = \frac{d\,w \cdot L}{dQ} = \frac{d\,VC}{dQ} = MC \text{ !!!}$$

(in output mkt)

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The Supply Of Labor

- ***Leisure activities:*** which here include play, sleep, eating, and any other activity besides paid work in the labor market.

- The choice is between two goods we may call "income" and "leisure." As in the standard consumer choice problem, the individual is assumed to have preferences over the two goods that can be summarized in the form of an indifference map.

For a worker:

- U(income, leisure) — utility function

got it from working

Assume that both are normal goods:

- However, he faces with income/leisure constraint.

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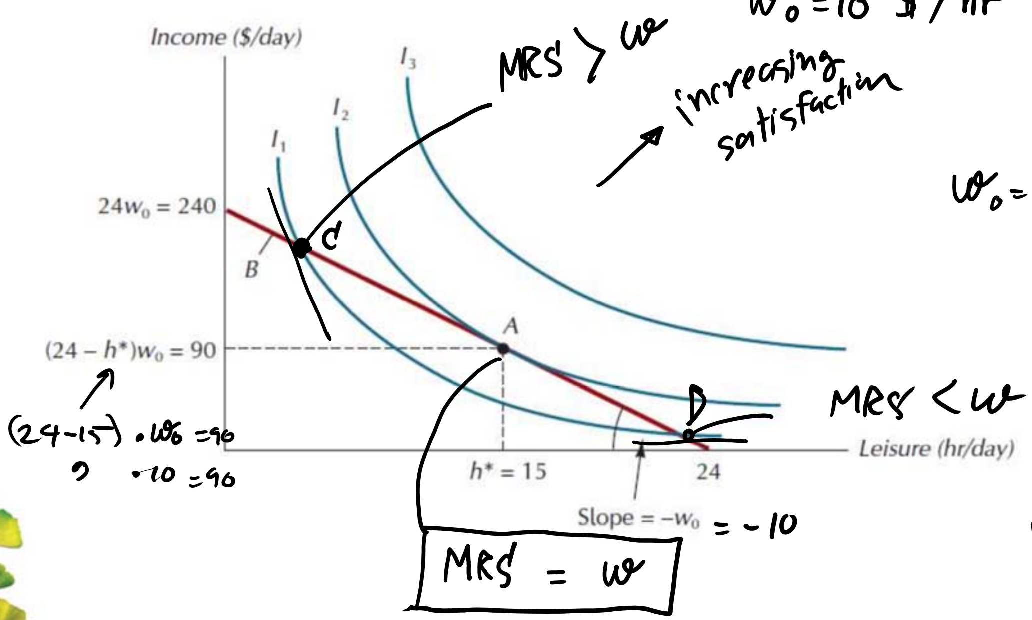
Figure 14.4: The Optimal Choice of Leisure and Income

$w_0 = 10$ \$ / hr



$w_0 = 10$, quantity supplied of working hours $= 9$ hrs / day

w reflects "opportunity cost of doing leisure 1 hr."

(= forgone wage of 10 \$/hr)

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IF MRS > w, it means that

MB of leisure > MC of leisure (10 \$/day)

then he moves from $C' \to A$: do more on leisure
do less on working.

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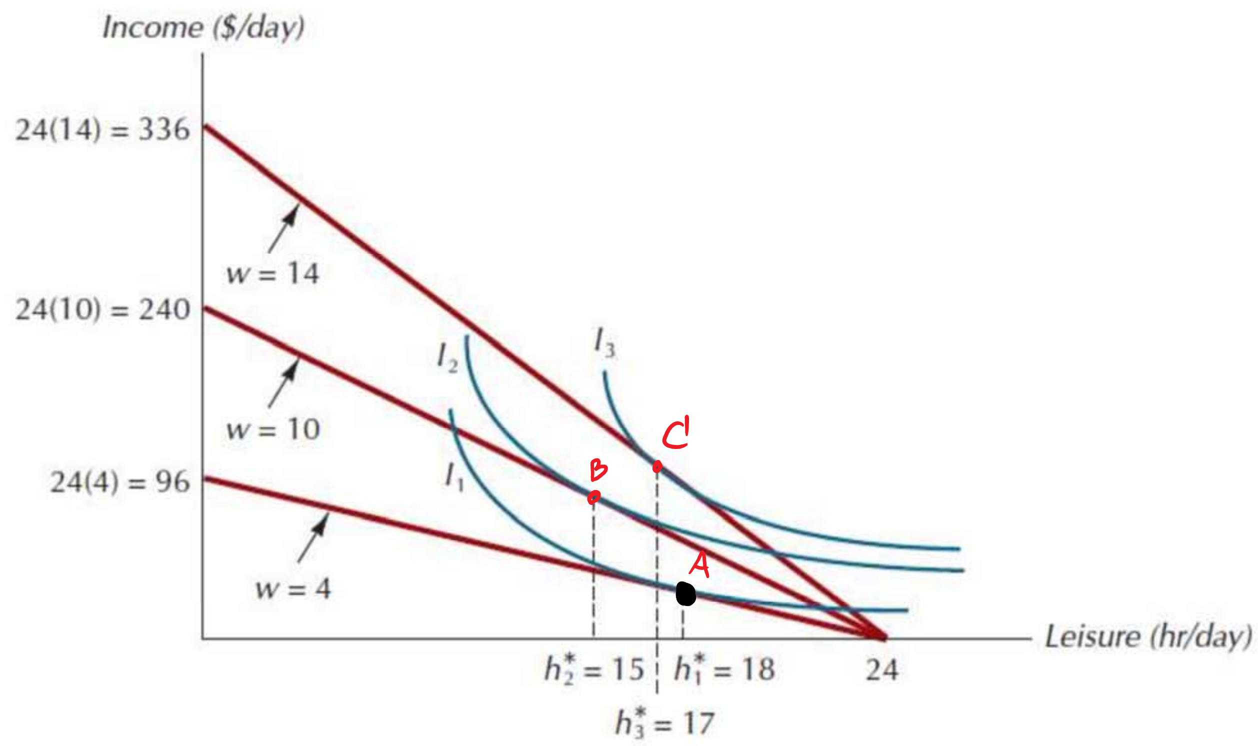
Figure 14.5: Optimal Leisure Choices for Different Wage Rates



$h_3^* = 17$

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When $w = 4$, $Q_1^s = 24 - 18 = 6$ hrs/day

when $w = 10$, $Q_2^s = 24 - 15 = 9$ hrs/day

When $w = 14$, $Q_3^s = 24 - 17 = 7$ hrs/day

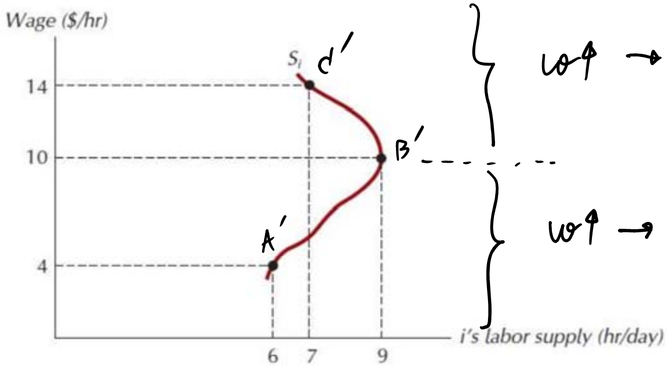
$w \uparrow \rightarrow Q^s \uparrow$ (why?)

$w \uparrow \rightarrow Q^s \downarrow$ (why?)

S.E and I.E can explain this...

Figure 14.6: The Labor Supply Curve for the *i*th Worker

[BACKWARD BENDING SUPPLY CURVE] For this worker.



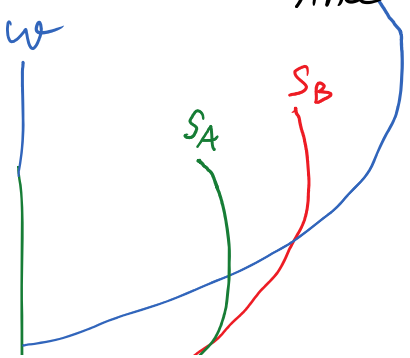
$w\uparrow \rightarrow Q^s \downarrow \therefore$ I.E > S.E

$w\uparrow \rightarrow Q^s \uparrow \therefore$ S.E. > I.E

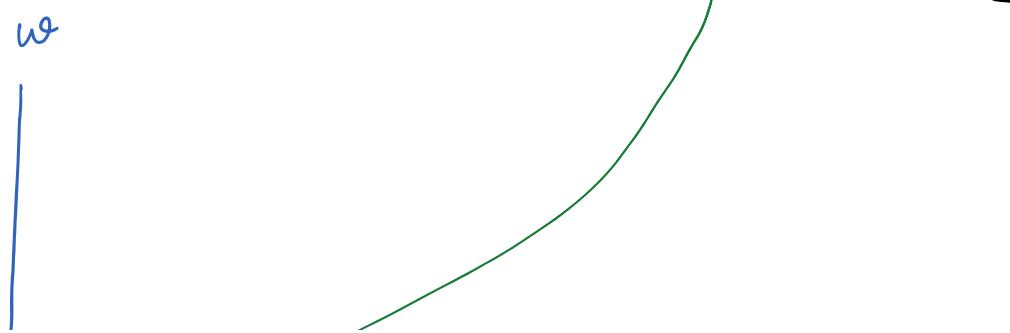
$w\uparrow$ → opp. cost of leisure ↑ (or leisure becomes more expensive) $\xrightarrow{\text{VIA S.E}}$ work more (= reduce leisure)

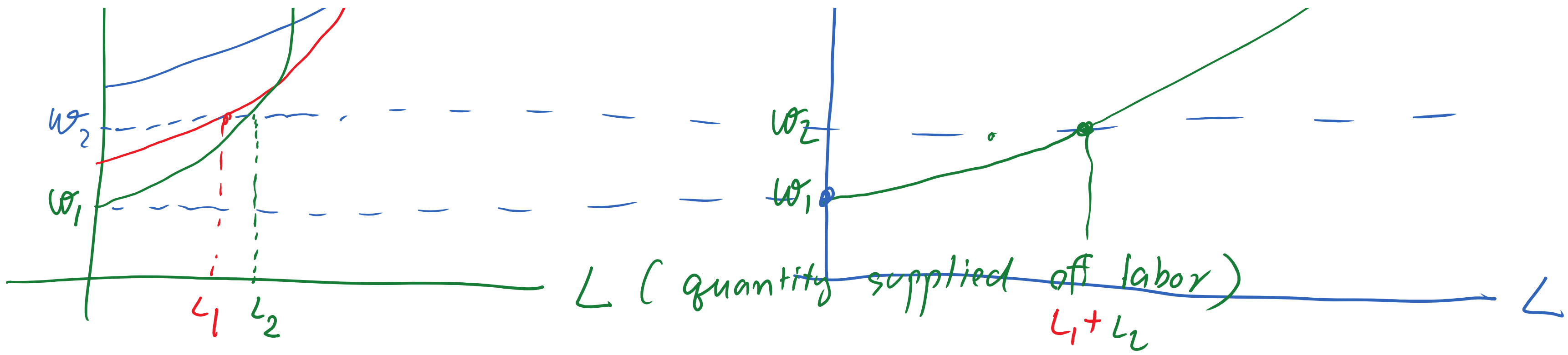
$w\uparrow$ → his purchasing power ↑ and since leisure is a normal good $\xrightarrow{\text{VIA I.E}}$ work less (= consume more leisure)

When S.E > I.E → **NET EFFECT**: he will work more.



$S'_{A+B+C} = S'_L$





At aggregate level, market labor supply curve is not backward bending.

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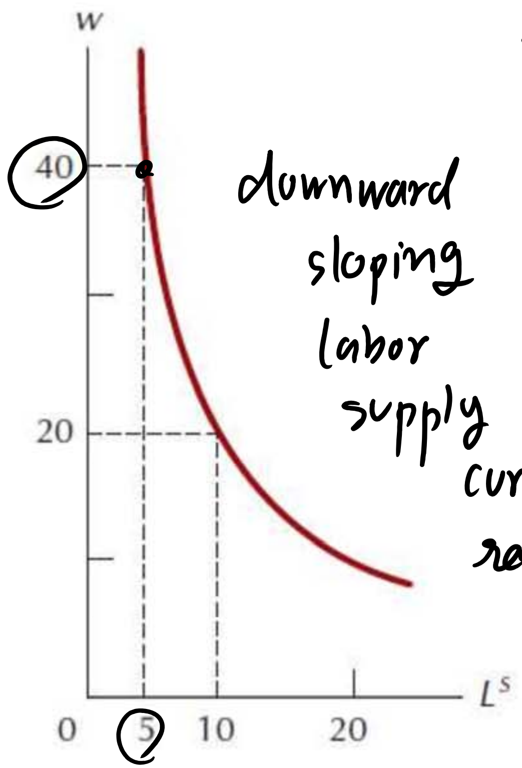
Figure 14.7: The Labor Supply Curve for a Worker Seeking a Target Level of Income



downward sloping labor supply curve results.

suppose Mr. Smith's target income to be earned = 200 $/day

So $\boxed{w \cdot L^s = 200}$

If $w = 40$, $L^s = 5$ hrs/day

If $w = 20$, $L^s = 10$ hrs/day

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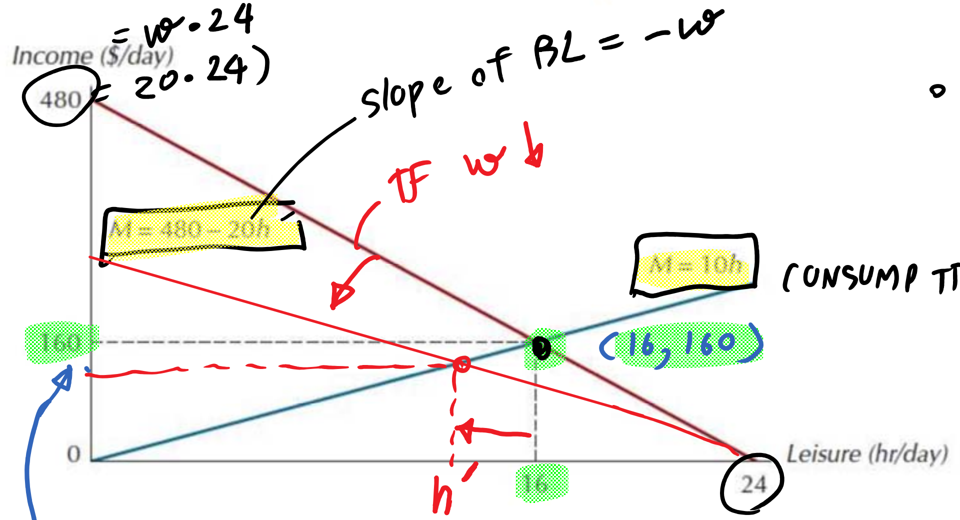
Figure 14.8: When Leisure and Income are Perfect Complements



- suppose $w = 20\$/\text{hour}$
- This guy requires 1 hr of leisure for every 10\$ of income.

$h^* = 16$ hrs a day → optimal hours for leisure when $w = 20\$/\text{hr}$.

So he works $24 - 16 = 8$ hours/day

and earns $8 \cdot 20 = \underline{\underline{160}}\ \$/\text{day}$

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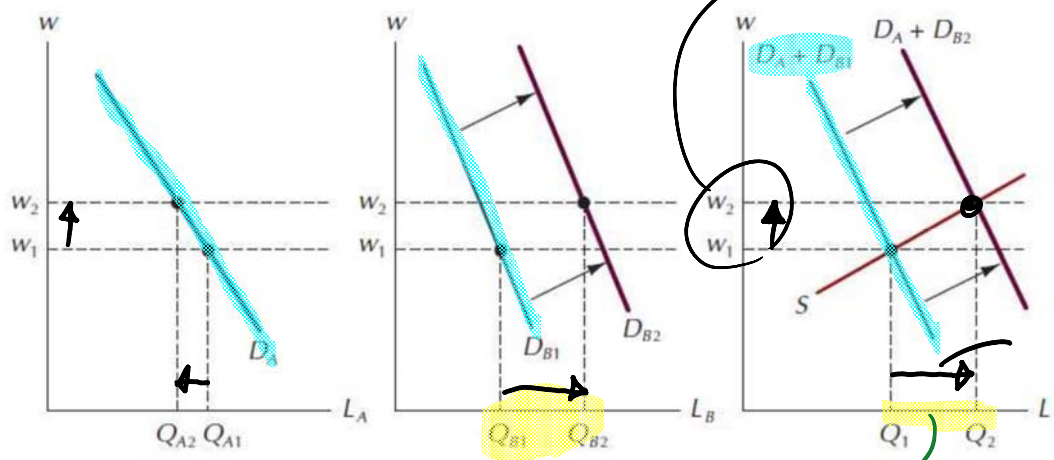
Figure 14.9: An Increase in Demand by One Category of Employer

wage increases



Total employment increases from Q_1 to Q_2

In liberal arts colleges

In business schools

total

1st source

2nd source

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INCREASE IN $(Q_{B2} - Q_{B1}) = (Q_{A1} - Q_{A2}) + (Q_2 - Q_1)$

Monopsony (A company in town)

- ***Average factor cost (AFC):*** another name for the supply curve for an input.
- ***Total factor cost (TFC):*** the product of the employment level of an input and its average factor cost.
- ***Marginal factor cost (MFC):*** the amount by which total factor cost changes with the employment of an additional unit of input.

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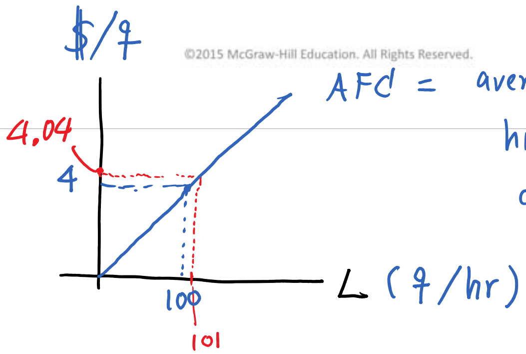
Factor Mkt

- single buyer of factor input (he is so called a Monopsonist)
- factor sellers (= workers) are in abundance.



AFC = average payment per unit of labor, high enough to attract a certain amount of workers.

AFC is actually supply curve of labor

- $TFC = w \cdot L = 4 \cdot 100 = 400$ \$/hr paid to these 100 workers (each earns 4 \$/hr)
- $\dfrac{\overset{400}{TFC}}{\underset{100}{L}} = \dfrac{w \cdot L}{L}$

$4 = \boxed{AFC = w}$

$MFC = \dfrac{\Delta TFC}{\Delta L}$ → change in tota Factor cost

→ change in amount of L (by an additional worker)

$w_1 = 4$ \$/hr, $L_1 = 100$ workers / hr. → $TFC_1 = w_1 \cdot L_1 = 4 \cdot 100 = 400$ \$/hr

$w_2 = 4.04$ \$/hr $L_2 = 101$ workers / hr → $TFC_2 = w_2 \cdot L_2 = 4.04 \times 101 = 408.04$ \$/hr.

$$MFC = \frac{\Delta TFC}{\Delta L} = \frac{TFC_2 - TFC_1}{L_2 - L_1} = \frac{408.04 - 400}{101 - 100}$$

$$= 8.04 \text{ \$/hr}.$$

8.04 = 4.00 + 4.04 to 101^{th} worker

4.00 → 0.04 0.04 … $\underbrace{}_{100 \text{ workers}}$

observe that MFC is higher than AFC (=4.04)

observe that MFC is higher than AFC (=4.04)
(8.04)

Monopsony

- ***The optimal level of employment for a monopsonist is the level for which MFC and the demand for labor are equal.***
  - For the monopsony firm wages will be lower than under competition.

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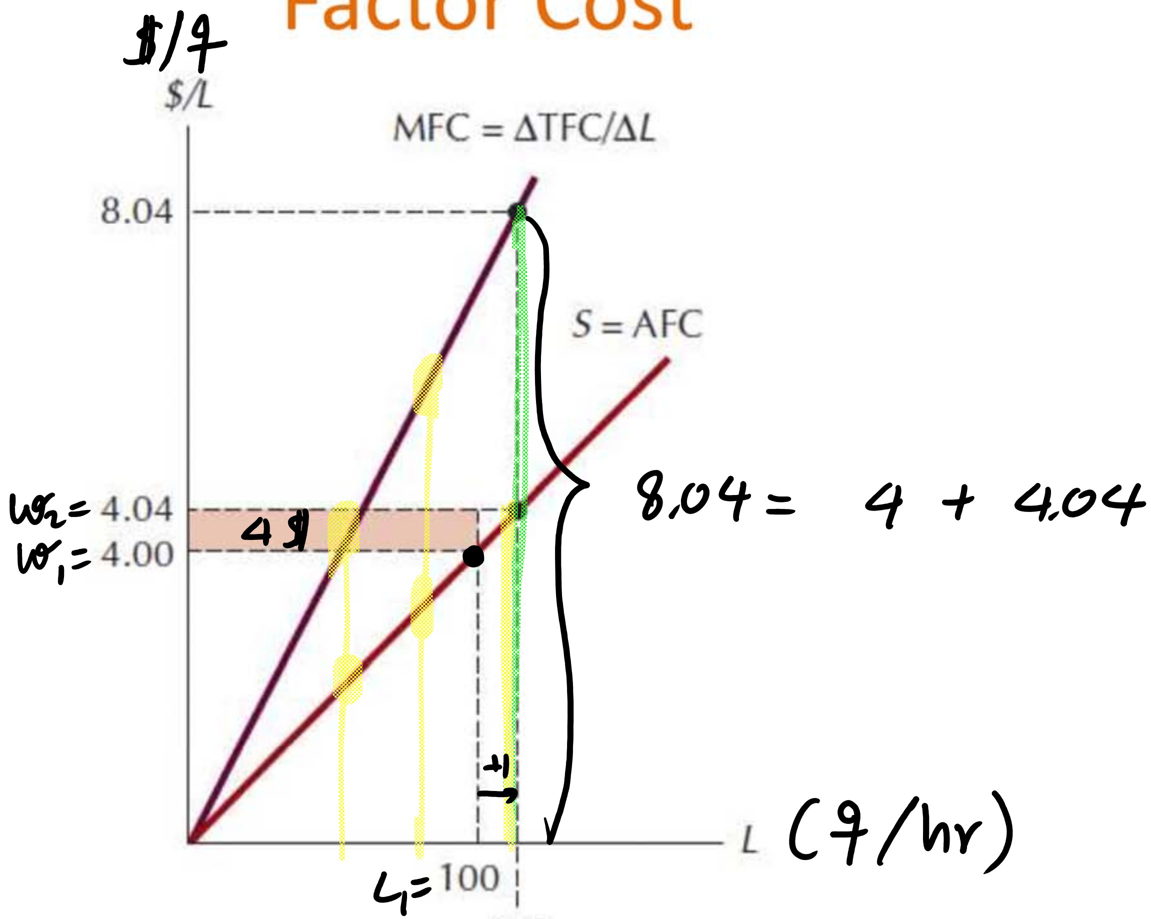
Figure 14.10: Average and Marginal Factor Cost



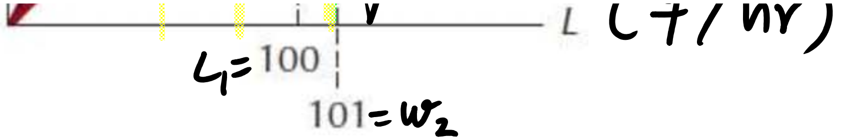
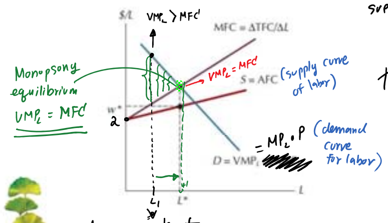

L
L_1= 100
101 = w_2

Figure 14.11: The Profit-Maximizing Wage and Employment Levels for a Monopsonist



Assume that output market is perfective competitive:
many sellers
many buyers

suppose $\boxed{AFC = a + bL}$ (a: intercept, b: slope of AFC)

then $TFC = AFC \cdot L$
$= (a + bL)L$
$TFC = aL + bL^2$

$MFC = \frac{\Delta TFC}{\Delta L} = \frac{dTFC}{dL} = \frac{d(aL + bL^2)}{dL}$

$\boxed{MFC = a + 2bL}$

L^* occurs at the point where VMP_L curve intersects w/ MFC curve

Why L^*?

when VMP_L is higher than MFC, the company should employ more workers to maximize its profits

optimal L would reach once $\boxed{VMP_L = MFC}$!!!
→ hiring condition for Monopsony case.

Math note

$\max_L \pi(L) = TR - TC$
$= P \cdot Q(L) - TFC(L) = P \cdot Q(L) - w \cdot L$
OR
$= P \cdot Q(L) - AFC(L) \cdot L$

F.O.C. $\boxed{\frac{d\pi(L)}{dL} = 0}$

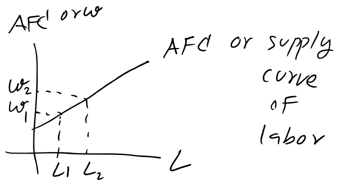
$$\frac{d\pi(L)}{dL} = \frac{d[P \cdot Q(L) - AFC(L) \cdot L]}{dL} = 0$$

$$= P \cdot \frac{dQ(L)}{dL} - \left(AFC(L)\frac{dL}{dL} + L\frac{dAFC(L)}{dL}\right) = 0$$

$$= P \cdot MP_L - \left(w + L \cdot \frac{dw}{dL}\right) = 0$$

$$= VMP_L - MFC = 0$$

$$\boxed{VMP_L = MFC^l}$$



Note: $\boxed{MFC^l = w + L \cdot \frac{dw}{dL}}$

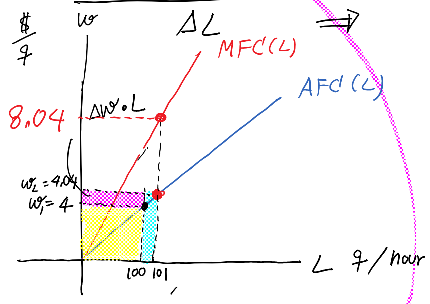
Proof: $MFC^l = \frac{\Delta TFC^l}{\Delta L} = \frac{\Delta (w \cdot L)}{\Delta L} = \frac{\Delta (AFC^l(L) \cdot L)}{\Delta L}$

$$\frac{d(AFC^l(L) \cdot L)}{dL} = AFC^l(L) \cdot \frac{dL}{dL} + L \cdot \frac{d\, AFC^l(L)}{dL}$$

$$= w \cdot 1 + L \cdot \frac{dw}{dL}$$

$$\boxed{MFC^l = w + L \cdot \frac{dw}{\Delta L}}$$

$$MFC^l = \frac{w \cdot dL + L \cdot dw}{dL} \quad \text{or} \quad \frac{\overset{4.04 \cdot 1}{w \cdot \Delta L} + \overset{100 \cdot 0.04}{L \cdot \Delta w}}{\Delta L} \Rightarrow \frac{\Delta TFC^l}{\Delta L}$$



- $w_1 = 4$, $L_1 = 100$ workers/hr

  So $TFC^l_1 = w_1 \cdot L_1 = 4 \cdot 100 = 400$ \$/hr
- $w_2 = 4.04$, $L_2 = 101$ workers/hr

  So $TFC^l_2 = w_2 \cdot L_2 = 4.04 \cdot 101$

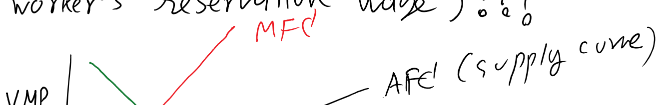
  $= 408.04$ \$/hr.

4.04 4.00

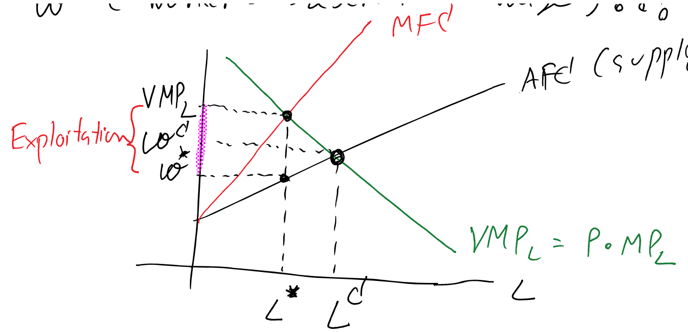
$$MFC^l = \frac{\Delta TFC^l}{\Delta L} = \frac{TFC^l_2 - TFC^l_1}{L_2 - L_1} = \frac{408.04 - 400}{101 - 100} = \frac{8.04}{1} \ \$/hr$$

Next issue is that Monopsonistic Exploitation arises as $VMP_L > w$!

A worker creates VMP_L but monopsonist pays him only w (worker's reservation wage)!!!



Recall that perfect



Recall that in perfect competitive labor market:

- lots of factor buyers
- lots of factor sellers,

$\boxed{VMP_L = w}$

But this is not the case in Monopsony! ($w < VMP_L$)

In competitive labor mkt,

$L = L^c > L^*$ (where AFC intersects VMP_L curve)

$w = w^c > w^*$ in monopsony

Let's derive monopsonistic exploitation Rate . . .

Recall that

$$
\begin{aligned}
MFC &= AFC(L) + L \cdot \frac{d\, AFC(L)}{dL} \\
&= w + L \cdot \frac{dw}{dL} \\
&= w + L \cdot \frac{dw}{dL} \cdot \frac{w}{w} \\
&= w + w \cdot \frac{L}{w} \cdot \frac{dw}{dL} \\
&= w \left[1 + \frac{L}{w} \cdot \frac{dw}{dL} \right]
\end{aligned}
$$

$E = ?$

$E =$

$$\frac{\%\Delta Y}{\%\Delta X}$$

$$\frac{\Delta Y}{\Delta X} \cdot \frac{X}{Y}$$

$$= w\left[1 + \frac{L}{w} \cdot \frac{dw}{dL}\right]$$

$$= w\left[1 + \frac{1}{\frac{dL}{dw} \cdot \frac{w}{L}}\right]$$

$E =$

$E =$

$\frac{\%}{\%}$

$$\boxed{MFC = w\left[1 + \frac{1}{E^{s}_{L}}\right]}$$

if

if

In monopsonistic equilibrium, $VMP_L = MFC$

$$VMP_L = w\left[1 + \frac{1}{E^{s}_{L}}\right]$$

$$VMP_L = w + \frac{w}{E^{s}_{L}}$$

$$VMP_L - w = \frac{w}{E^{s}_{L}}$$

$VMP - w \quad 1$

Where

$\frac{\Delta Y}{\Delta X} \cdot \frac{X}{Y}$

$= \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$

$\frac{\Delta L}{\Delta w}$ = Elasticity supply of worker (E_L^S)

$E_L^S > 1$, supply of labor is elastic ($\% \Delta L > \% \Delta w$)

$E_L^S < 1$, supply of labor is inelastic ($\% \Delta L < \% \Delta w$)

$VMP_L - w$ is percentage deviation

$$\boxed{\frac{VMP_L - w}{w} = \frac{1}{E^s_L}}$$

where

Degree of monopsonistic exploitation is inve
of labor supply.

The higher the E^s_L
The lower the E^s_L

$\dfrac{VMP_L - w}{w}$ is percentage deviation between VMP_L and w

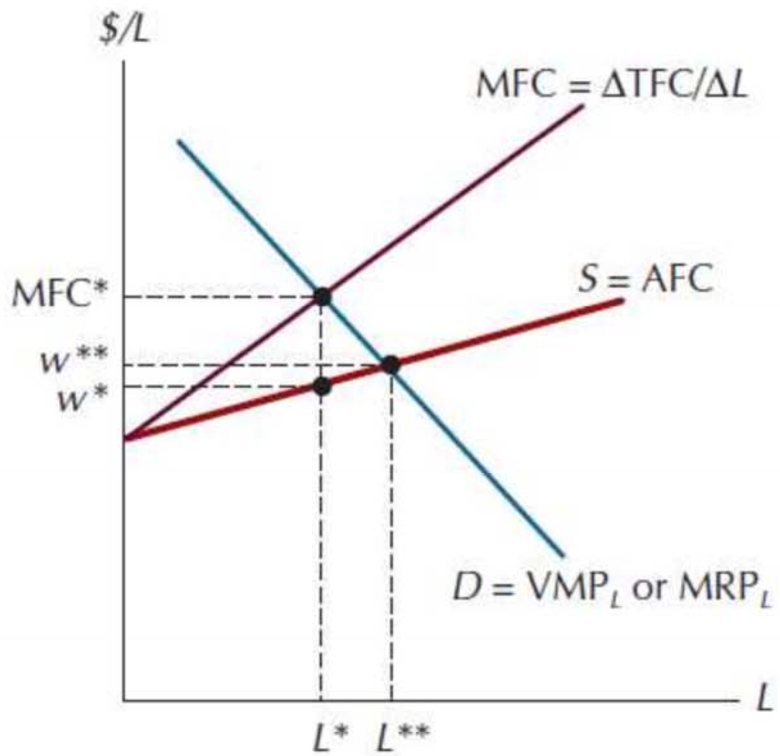
$\dfrac{1}{E_L^S}$ is the inverse of the elasticity of labor supply.

ersely related w/ the elasticity

, the lower degree of exploitation

, the higher " "

Figure 14.12: Comparing Monopsony and Competition in the Labor Market



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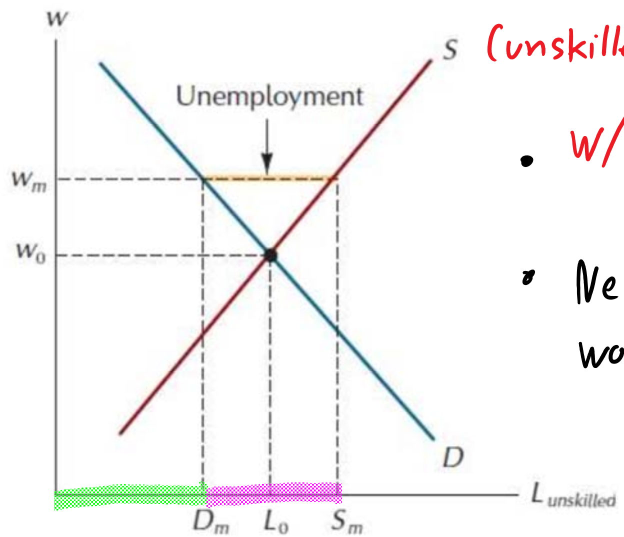
Minimum Wage Laws

- In 1938 Congress passed the Fair Labor Standards Act.
  - One of whose provisions established a minimum wage for all covered employees.

- Whether the net effect of the minimum wage is to increase the amount of income earned by unskilled workers depends on the elasticity of demand for that category of labor.

Figure 14.13: A Statutory Minimum Wage



(unskilled workers)

- W/ $w = w_m$, unemployment $= S_m - D_m$
- Net benefit of this law on workers' income is that
  - If elasticity of demand for workers > 1 (elastic), workers' income will fall.
  - If elasticity of demand for workers < 1 (inelastic), workers' income will rise.

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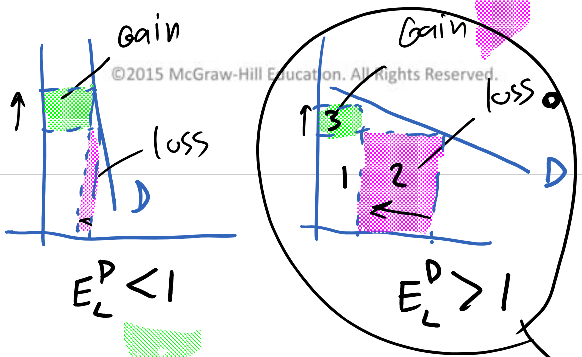


B/F : TE paid by firm $= 1+2$ (TE_1)

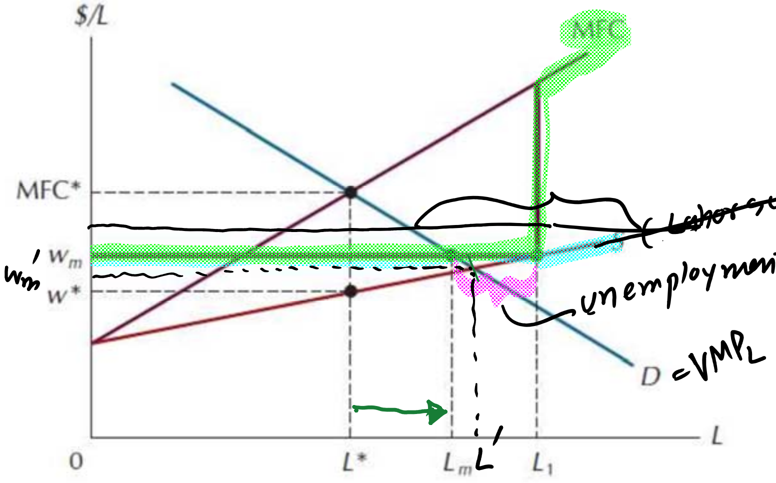
to workers

A/F $\quad$ u ——— u $= 1+3 \quad (TE_2)$

$TE_2 < TE_1$

$(1+3) \quad (1+2)$

Figure 14.14: The Minimum Wage Law in the Case of Monopsony



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From 0 to L_1:
$MFC' = AFC' = w_m$
From L_1 onwards:

w/ $VMP = MFC'$, $L = L_m$ (under minimum wage law)

OUTCOMES

① w rises from w^* to w_m.

② Employment increased from L^* to L_m.

IF $w = w_m'$ (where VMP_L = supply)

① $L = L'$

② no unemployment!

③ $w_m' > w^*$ (MONOPSONY w/o intervention)