ECO2003F

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Chapter 12

Factor Markets:

Labour

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Abbreviations used in these slides. Please DON'T use them in your exam – use the full versions.

\( \text{VMP}_L = \text{value marginal product of labour} \)

\( \text{MRP}_L = \text{marginal revenue product of labour} \)

\( \text{DD} = \text{demand} \)

\( \text{SS} = \text{supply} \)

\( \text{SR} = \text{short run} \)

\( \text{LR} = \text{long run} \)

\( \text{PC} = \text{perfect competition, imperfect} \)

\( \text{IC} = \text{comp. imperfect comp.} \)
- PC firm's short run demand for labour
- PC firm's long run demand for labour
- Market demand curve for labour
- Imperfect competitor's demand for labour
- The supply of labour
- Non-economist's reaction to the labour supply model
- Market supply curve, Monopsony, Minimum Wage laws, Labour Unions
- Monopoly Power and Wage rates
- Discrimination in labour markets, statistical discrimination
- Internal wage structure, Winner take all markets
Why did Tokyo Sexwale choose to become a government minister earning only R1.6 million rather than his previous salary of R5.4 million as chairperson to the Mvelapanda Group?

Similarly Tito Mboweni earned far less as governor of the Reserve Bank vs in the private sector. Why waste time in **public sector**?

There have to be **non-monetary benefits**, such as power and attention, not to mention the fact that when you sneeze stock markets rise or fall...
David Beckham earns 49 million dollars playing for LA Galaxy – would he be willing to do it for less?

Why does he earn so much?

Why didn't LA Galaxy hire me? Or you?

He has (1) more than one potential employer (2) the ability to increase profits for his employer and (3) skills that none of us have
What forces drive wages and other conditions of employment?

We need to look at **demand** and **supply** of labour.

Why do compensating **wage differentials** exist?

Given fixed capital (in the short run), and a firm selling output in a perfectly competitive market, **how much labour should a firm hire?**
Revision

Labour demand is **derived**—what does this mean?

How do I decide how much labour to hire?

Keep hiring as long as:

as long as the extra workers are “useful”

workers benefit \( \geq \) workers' cost

\[
VMP_L = P \times MP_L
\]

Set \( w = VMP_L \) and solve for \( L^* \)
Short-Run Demand for Labour under PC

Marginal product of labour (units of output/unit of labour)

Value of marginal product (R/unit of labour)

Optimal quantity of labour when \( w = 120 \)
Exercise

Given \( MP_L = 10 - (1/20)L \)

And \( P = 20 \).

\[
VMP_L = P \cdot MP_L \\
= 20(10 - 1/20L) \\
= 200 - L
\]

Given \( w = 120 \), set \( w = VMP_L \)

\[ 120 = 200 - L \text{ Therefore } L^* = 80 \]

This is the algebraic equivalent of the graph
VMP$_L$ shows us the **combinations of w and L** that would be **optimal** – i.e. the demand for labour at every wage rate

We assume **PC** in the **product** market, and the **labour** market. You can produce and hire as much as you want, **but can't affect w or P**.

**LR DD** will be more elastic than **SR DD**. Why?

If the wage rate falls:

In the **short run**, hire more labour
In the **long run**, hire even more labour. Why?
Figure 12.2: Short and Long-Run Demand Curves for Labour

Wage (R/day)

Long-run demand for labour

Short-run demand for labour

Labour (person-hr/day)
When will demand for labour be more **elastic**? When will \( DD_L \) be more sensitive?

1. If the product demand is more elastic
2. The easier I can substitute other factors for \( L \) (so in LR it is more elastic – i.e. sensitive to changes in wage).

\( \text{VMP}_L \) is for one firm, each firm has different \( \text{MP}_L \)

What is the horizontal \( \Sigma \text{VMP}_L \)?

This sounds like the total \( Q \) demanded of \( L \), for each \( w \). Isn't this market \( DD_L \)? No.
Breaking down point 1 from the previous slide

If product demand is **elastic**
Then if price of the good changes, $Q_D$ of the good changes **a lot**
(it's **v sensitive** to changes in price)

So for e.g. If price falls, $Q_D$ increases a lot
So firms need to hire a lot more labour
(to produce more to meet the increased demand)
So $Q$ demanded of L will be elastic
(i.e. **v sensitive** to changes in price $P$)
If demand for the good is elastic
Figure 12.3: The Market Demand Curve for Labour
Why is the market demand curve for labour steeper than the horizontal summation of $\text{VMP}_L$ ($\sum\text{VMP}_L$) for all firms?

Initially we're at $w_1$, $L_1$
Now the wage falls from $w_1$ to $w_2$
If wage falls from w1 to w2

→ every firm hires more labour
→ all firms produce more output
→ P, the price of output falls from P1 to P2
→ we move down the industry product DD curve
→ \( VMP_L = P.MP_L \) shifts down for every level of L
→ So for new w2, instead of reading off \( L^* \) from the \( VMP_L \) for P1, but rather \( VMP_L \) for P2
→ we hire less labour than expected
→ market DD is steeper than horizontal \( \sum VMP_L \)

Why? Because all firms faced the lower wage w2, and not just one firm.
When would we expect to see the market demand curve for labour be close to \( \Sigma VMP_L \)?

If the change in wages didn't cause a change in output price \( P \)

This will occur if the demand for \( L \) comes from more than one industry, and \( L \) is heterogenous

E.g. electricians are hired by many industries
So a change in wage will affect costs by only a small percentage in many industries, and thus not product price, so \( \Sigma VMP_L = \text{Market} \; DD_L \)
In PC, **firms cannot affect output price**

**Imperfect competitors** can impact product price  
imperfect competition = fewer competitors

Now demand for goods no longer perfectly elastic

Demand curves are now downward sloping

If you hire more labour, you have to cut prices to sell your extra output

We know  

\[ \text{VMP}_L = P \times \text{MP}_L \]  

for PC

Now we consider  

\[ \text{MRP}_L = \text{MR} \times \text{MP}_L \]  

for Monopoly
\[ MRP_L = MR \times MP_L \]
\[ = \Delta TR/\Delta Q \times \Delta Q/\Delta L \]
\[ = \Delta TR/\Delta L = dTR/dL \]

i.e. \( MRP_L \) is the \( \Delta \)revenue from \( \Delta L \), i.e. value of extra output produced from one more worker.

Both \( MRP_L \) and \( VMP_L \) reflect an increase in revenue, from increasing labour.

But MR is generally less than price. Why?

However we still hire until \( MRP_L = w \).
Perfect competition: \( DD_\perp \) is downward sloping as you use more labour, \( MP_\perp \) falls (diminishing returns)
And thus \( VMP_\perp = P*MP_\perp \) falls
So the amt you're willing to pay for it \( (w) \), falls,

Under monopoly, \( DD_\perp \) is downward sloping
For the reasons above, and
Because \( MRP_\perp = MR \times MP_\perp \) falls as \( Q \) rises

LR \( DD_\perp \) is more elastic than SR \( DD_\perp \) for Monopoly

And Monopolist \( DD_\perp \) is Industry \( DD_\perp \)
The supply of labour

How does the student decide how much to work?

We can work, or be at leisure
Our two goods are leisure, and income

We use consumer theory:
\[ \text{budget curve slope} = \text{indifference curve slope} \]

In Equilibrium,
\[ w = MRS \]
Figure 12.4: The Optimal Choice of Leisure and Income

\[ 24 w_o = 2400 \]

\[ (24 - h^*) w_o = 900 \]

\[ h^* = 15 \]

Slope = \(-w_o\)
$w_0 = R100/hr$
$h = \text{hours of leisure}$

If don't sleep, income = $R100/hr \times 24\text{hrs} = R2400$

Move to left = work more

Amount of time working = $24 - h$

Income = wage $\times$ hours working

The **budget curve** has equation $M = w(24-h)$
We want to know $SS_L$

How does $h^*$ change as wage rate $w$ changes?

We obtain a **backward bending supply curve**

Why?

**Substitution and income effects** (curses)
Figure 12.5: Optimal Leisure Choices for Different Wage Rates

Income (R/day)

W = 140
24(140) = 3360

W = 100
24(100) = 2400

W = 40
24(40) = 960

Leisure (hr/day)

h_2^* = 15
h_1^* = 18
h_3^* = 17

W = 140
W = 100
W = 40
Figure 12.6: The Labor Supply Curve for the \(i\)th Worker

![Labor Supply Curve Diagram]

- **Wage (R/hr)**
  - 140
  - 100
  - 40
  - 0

- **i's labour supply (hr/day)**
  - 6
  - 7
  - 9

\(S_i\)
Figure 12.7: Substitution and Income effects of a Wage Increase
Income effect: Because of the increase in wages, your income goes up. Your budget curve shifts out, and you can now afford to buy more of both goods. This means you consume more leisure, i.e. you work less.

Substitution Effect: Because wage rises (while holding utility constant) your budget curve swivels around (becomes steeper), and leisure is now more expensive for you, so you consume less of it – i.e. you work more.

Income: work less, Substitution: work more
Why can't we get a taxi on rainy Days?

Do some people have backward bending supply curves for all levels of wage?

\[
wL^s = 2000 \\
L^s = 2000/w
\]
Figure 12.8: The Labour Supply Curve for a Worker Seeking a Target Level of Income
Find the optimal leisure demand for wage \( w = 200/\text{hr} \) for someone with income and leisure as **perfect complements** (R100:1hr ratio).

\[
M = w(24-h) = 200(24-h) = 4800-200h
\]

We need 1 hour leisure for every R100.

\[
h = M/100 \quad \text{and therefore} \quad M = 100h
\]

How much leisure do we consume?

\[
4800-200h = 100h
\]

\[
\rightarrow \\
\text{h} = 16
\]
Leisure & Income as Perfect Complements

Income (R/day)

$M = 4800 - 200h$

$M = 100h$

Leisure (hr/day)

16
Note: P456 with perfect substitutes – make sure you work through

We may see individuals with only an upward sloping labour supply curve – i.e. where the substitution effect always dominates

Wage doesn't stay constant – think overtime (so you may get a kinked budget line)
Worldwide the work week has been declining, and real wages have been rising. Is this true in SA?

Does the backward bending supply curve explain this?

So how realistic is the theory of labour supply?

It is difficult in most jobs to change your hours. But you can select a job with more or fewer hours.

In general though, **hours aren't flexible** and neither are working conditions. One reason is the need for employee **interaction**.
So we can ask, why is the work week 40 hours? In general, because labourers want it to be. If \textit{marginal benefit from working} > \textit{marginal cost}, then we would work more.

**Market Supply Curve:** How do we obtain it?

Demand for labour in PC was not the sum of the individual firm demand, but supply of labour is.

**Market Labour SS will slope upwards** (no bendy stuff).

This is because higher wages will attract more entrants from other sectors.
Monopsony – a sole buyer in the labour market

In South Africa, small mining towns, School education market

Workers have limited mobility, other firms don't enter

Given a monopsonist's power, they might exploit their workers, and pay low wages

http://farm8.staticflickr.com/7011/6798855107_1e6287d0e5_z.jpg
Monopsony
Can an employer in the perfectly competitive labour market influence wages?

PC labour market = horizontal labour supply
One firm can't affect wage

Here labour supply = market labour supply, therefore upward sloping SSₙ

What must I do if I want to hire one more worker?
Pay a higher wage

Think about AFC, TFC, MFC
At R10/hr, only 1 person will agree to work for me. At R12/hr, a 2nd person will agree, and at R14/hr, a third will work. But will the 1st one still agree to work at R10? And the second for R12 still? No. I'll need to pay them all R14 too. And so on, and so forth...

\[
\text{AFC} = \text{average payment per worker to achieve any level of employment (supply curve)}
\]

\[
\text{TFC} = \text{wage bill}
\]

\[
\text{MFC} = \text{increase in TFC as you hire 1 more worker}
\]

Please be careful about units
Average Factor Cost: average payment/worker to achieve a given level of output: supply curve

Total Factor Cost: AFC * L

Marginal Factor Cost: $\Delta$TFC/$\Delta$L or (dTFC/dL)

In the following slide,
AFC = R40/worker when L = 100
TFC = AFC*L = 40*100 = R4000

What is the marginal factor cost when L = 100?
What is the **marginal factor cost** when $L = 100$?

\[
\text{MFC} = \frac{\Delta \text{TFC}}{\Delta L}
\]

TFC when $L = 100$ is $40 \times 100 = \text{R}4000$

TFC when $L = 101$ is $41 \times 101 = \text{R}4141$

\[
\Delta \text{TFC} = \text{R}4141 - \text{R}4000 = \text{R}141
\]

\[
\Delta L = 101 - 100
\]

Thus $\text{MFC} = \frac{141}{1} = \text{R}141$

That $\text{R}141$ is split up by giving that extra worker his wage of $\text{R}41$, and then splitting the $\text{R}100$ with the other 100 workers, to bring their wage up to $\text{R}41$

So for $L = 101$, AFC = 41, but MFC = 141 > AFC
Figure 12.11: Average and Marginal Factor Cost

The diagram illustrates the relationship between marginal factor cost (MFC) and average factor cost (AFC). The equation for MFC is given as $MFC = \Delta TFC/\Delta L$. The graph shows two lines: one representing the change in total factor cost with respect to the change in labor ($\Delta TFC/\Delta L$) and the other representing the average factor cost ($S = AFC$). The points on the graph correspond to specific values of labor ($L$) and the ratio of resources to labor ($R/L$).
Why does MFC lie above AFC?

For example, given
\[ AFC = a + 2bL \]

Then
\[ TFC = AFC \times L \]
\[ TFC = aL + 2bL^2 \]

Therefore
\[ MFC = a + 4bL \]

(mistake in textbook on page 461)

MFC = AFC with a steeper slope, thus lies above
How do we now put it all together for a monopsonist?

If PC in product market, hire based on \( w = VMP_L \)

If IC in product market, hire based on \( w = MRP_L \)

How much labour to hire?
Hire labour where \( MFC = DD_L \)

What wage to pay?
Pay wage \( w^* \) based on supply curve = AFC

How does this compare to perfect competition?
Figure 12.12: The Profit-Maximizing Wage and Employment Levels for a Monopsonist

MFC = ΔTFC/ΔL

S = AFC

D = VMP_L or MRP_L

W^*
How to hire and what wage to pay is complicated

First decide on how much labour $L^*$ to hire
By seeing where $MFC = D$ (either VMP or MRP)

Then go down and read off the supply curve (AFC) to find out the equilibrium wage $w^*$
Why?
VMP or MRP = increase in revenue from hiring one more labourer
MFC = increase in costs from hiring one more labourer
Supply curve – what wage to pay, for a certain $L$
Figure 12.13: Comparing Monopsony and Competition in the Labor Market
Comparing PC and Monopsony

PC in labour mkt:
- hire $L^{**}$ where $SS_L = DD_L$
- Pay wage $w^{**} = MFC = AFC$
- MFC lies on AFC

Monopsony:
- hire $L^*$ where $MFC = DD_L$
- Pay wage $w^*$ (from S AFC)

Monopsonists pay less, and hire less than PC

This is inefficient
Last lecture summary

• Are monopsonists bad?
• What do minimum wages do? Do they always do this? Are they ever good?
• What do unions do, and are they good? How do unionised firms stay in business?
• Does discrimination exist, and why? Many reasons
• What is statistical discrimination?
• Why does David Beckham get paid so much?

NB: good here = efficient for the market
Note omissions from chapter 12

Monopoly Power and the wage rate – page 469
-half of P470

Internal wage structure – the middle of Page 476
until nearly to the end of P479

We cover some of discrimination lightly – see slides.

There is a lot – focus on what I've covered in lectures and tuts and you will be fine.
If monopsonists could hire one more worker without raising everyone else's wage, they could produce more (good for them) and the extra worker would be better off, but they can't.

Workers often aren't mobile and can't escape a monopsony situation

So are monopsonists really exploitative?

Firms that do pay lower wages in a town and earn higher profits see other firms eventually enter into the market, and workers won't choose to move to those towns or work at those firms.