

MEDIUM-TERM ADJUSTMENT AND THE INFLATION DYNAMIC

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STATE OF YOUR KNOWLEDGE

- Shocks can divert output from the long-term trend
 - **Generating *business cycles volatility*.**
- Deviation from the long-term level can be in conjunction with the rising/falling price and other macro aggregate variables.
 - **Generating *business cycles co-movements*.**
- We have studied these issues under two different contexts.
 - ***Closed v.s. opened economy***

DEVIATION FROM TREND: THREE FUNDAMENTAL QUESTIONS

- **Question 1** How does shock generate a deviation from trend?
- **Question 2:** Can this deviation be lasting forever?
- **Question 3:** If not, what is the **adjustment process**?
- Think about **the effect of money shocks** as an example.

QUESTION 1: HOW DOES SHOCK GENERATE A DEVIATION FROM TREND? UNDERLYING ASSUMPTIONS?

- **Classical economists**
 - Business cycles are purely the outcome of the **supply shocks**
 - This relies on a very strong assumption: **complete adjustment**
 - Demand shock does not a real-effect: **neutrality**
- **Keynesian economists**
 - Business cycles are explained by the outcome of both **supply and demand shocks**
 - This relies on a more realistic assumption: **incomplete adjustment**
 - Demand shock does have some real-effect: **non-neutrality**

QUESTION 1: HOW DOES SHOCK GENERATE A DEVIATION FROM TREND? UNDERLYING ASSUMPTIONS?

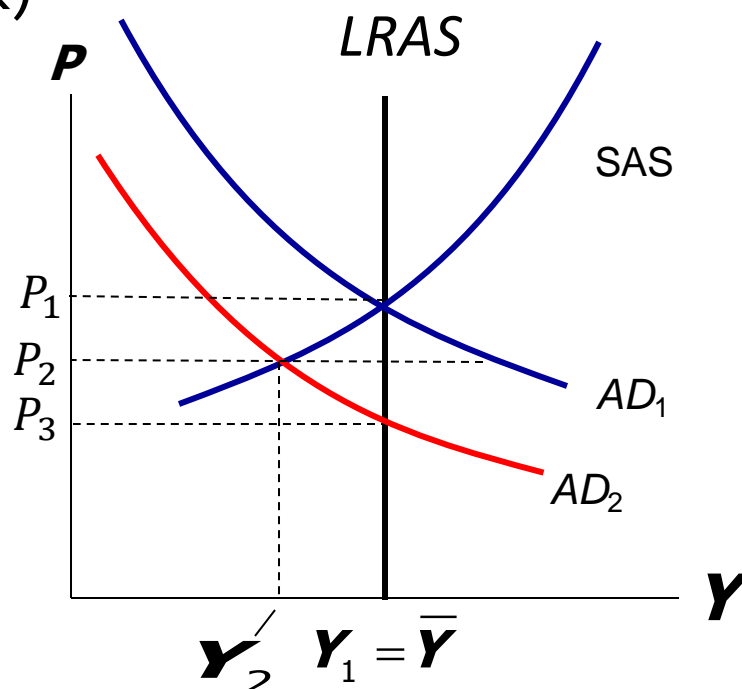
- **Example:** Monetary policy shock (as an example of demand shock)

Suppose a negative *AD* shock (decrease in money supply) moves output below its original; P is lower.

Underlying assumption:

Wage rigidity rationalizes the upward sloping AS curve.

(real wage increase!)



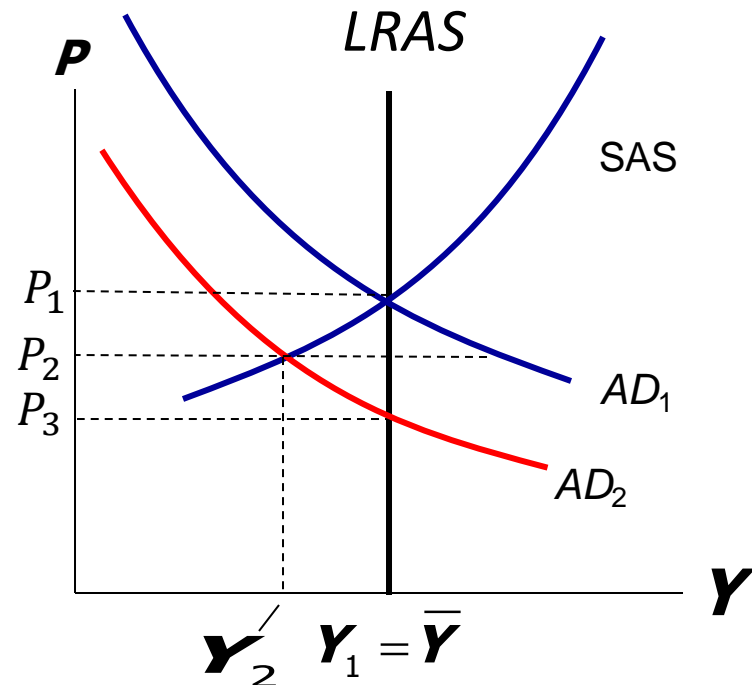
QUESTION 1: HOW DOES SHOCK GENERATE A DEVIATION FROM TREND? UNDERLYING ASSUMPTIONS?

- **Example:** Monetary policy shock (as an example of demand shock)

Should the one-time monetary policy shock generate **the permanent effect**? (Stay at Y_2 forever?)

How to answer!

Empirical evidences?



QUESTION 2: CAN THIS DEVIATION BE LASTING FOREVER?

Chart 1
**Money Growth and Inflation:
 A High, Positive Correlation**
 Average Annual Rates of Growth in M2 and in Consumer Prices
 During 1960–90 in 110 Countries

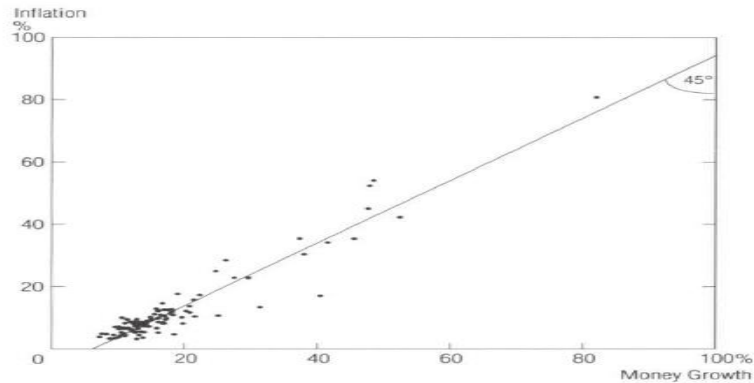


Table 1
Correlation Coefficients for Money Growth and Inflation*
 Based on Data From 1960 to 1990

Sample	Coefficient for Each Definition of Money		
	M0	M1	M2
All 110 Countries	.925	.958	.950
Subsamples			
21 OECD Countries	.894	.940	.958
14 Latin American Countries	.973	.992	.993

*Inflation is defined as changes in a measure of consumer prices.
 Source of basic data: International Monetary Fund

Chart 2
**Money and Real Output Growth:
 No Correlation in the Full Sample . . .**
 Average Annual Rates of Growth in M2
 and in Nominal Gross Domestic Product, Deflated by Consumer Prices
 During 1960–90 in 110 Countries

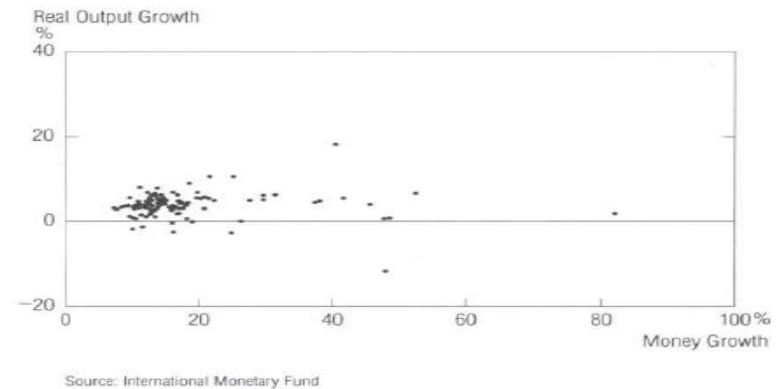


Table 3
**Correlation Coefficients for Money Growth
 and Real Output Growth***
 Based on Data From 1960 to 1990

Sample	Coefficient for Each Definition of Money		
	M0	M1	M2
All 110 Countries	-.027	-.050	-.014

*Real output growth is calculated by subtracting changes in a measure of consumer prices from changes in nominal gross domestic product.
 Source of basic data: International Monetary Fund

QUESTION 2: CAN THIS DEVIATION BE LASTING FOREVER?

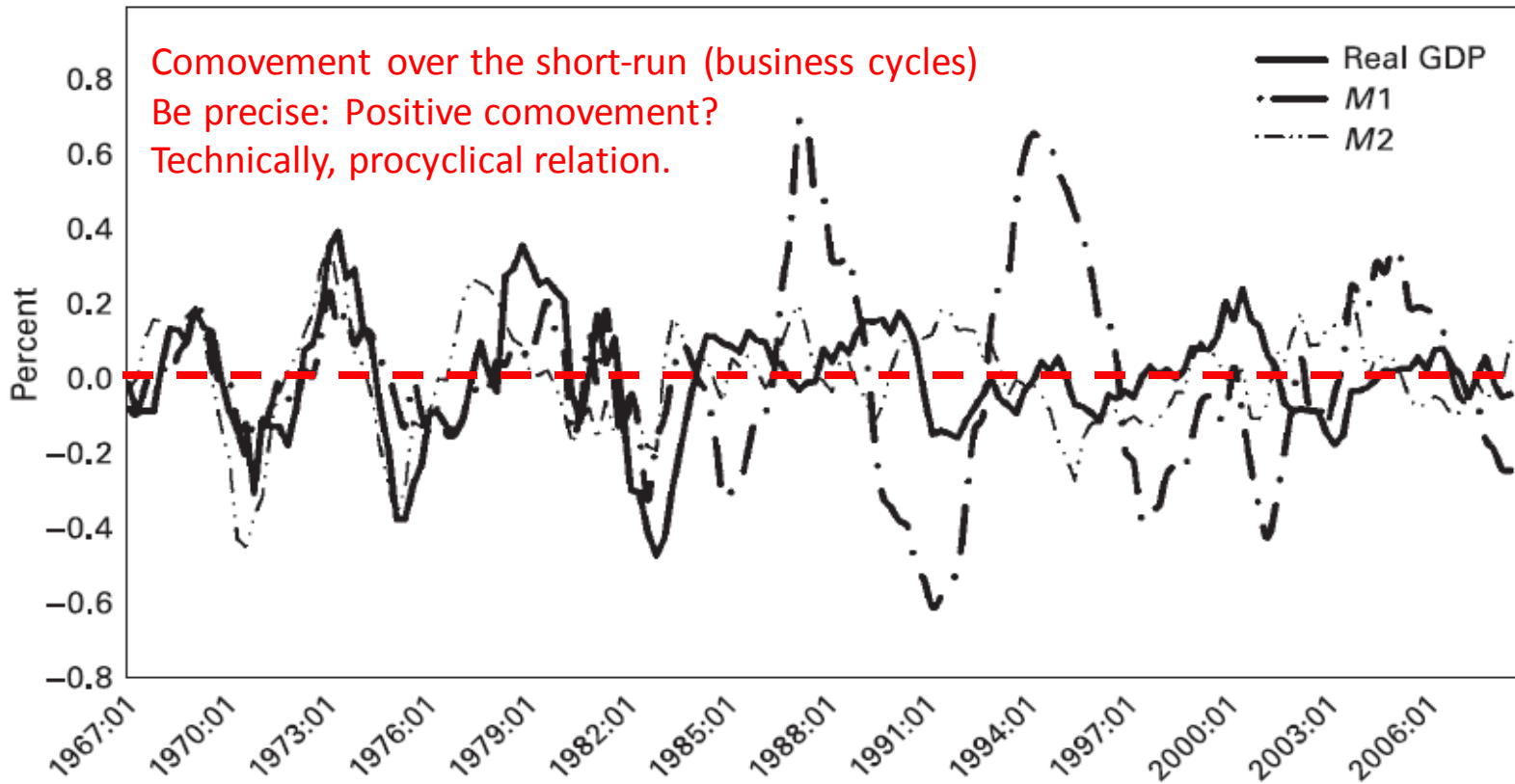


Figure 1.6
Detrended money and real GDP, 1967:1–2008:2.

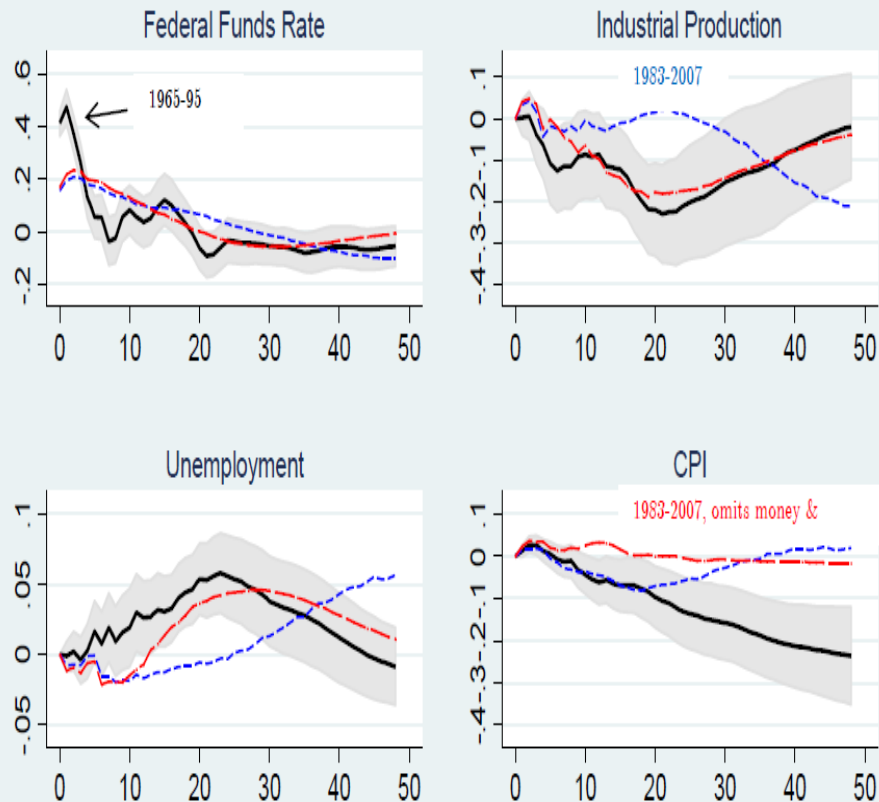
Based on methodology of (Friedman and Schwartz (1965)
Source Walsh (2014)

DIGRESSION: CORRELATION V.S. CAUSATION

- Correlation does not imply a causation.
 - A **correlation** between variables, however, does not automatically mean that the change in one variable is the cause of the change in the values of the other variable. **Causation** indicates that one event is the result of the occurrence of the other event; i.e. **there is a causal relationship between the two events.**
- **Reverse causation:** Possibly, higher output implies higher need for money. Then, central bank responds by increasing money supply.
- **Some advanced statistical methods needed!**

EVIDENCES: USA

I

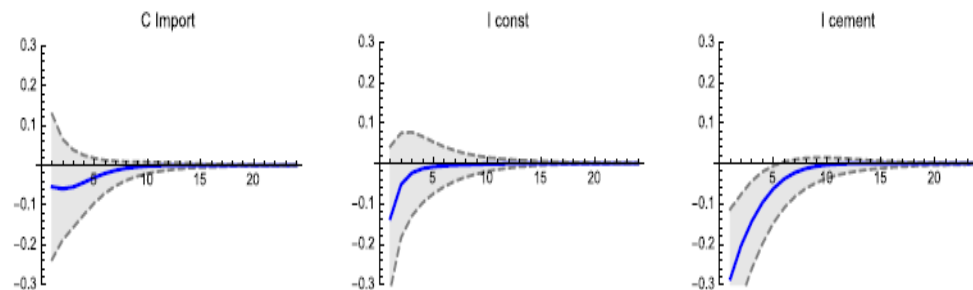
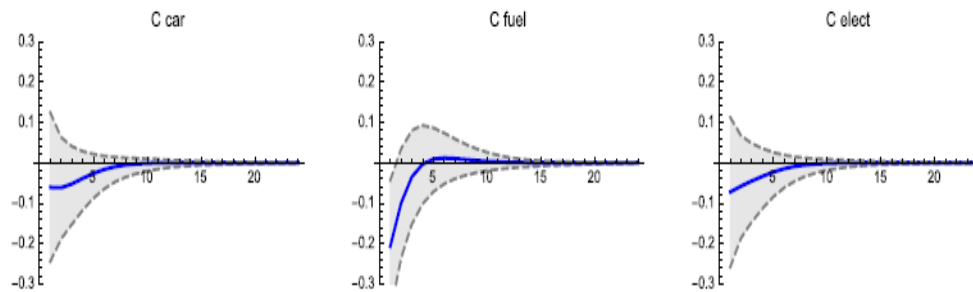
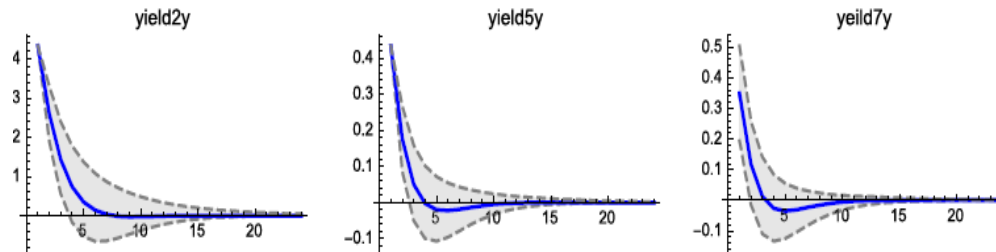
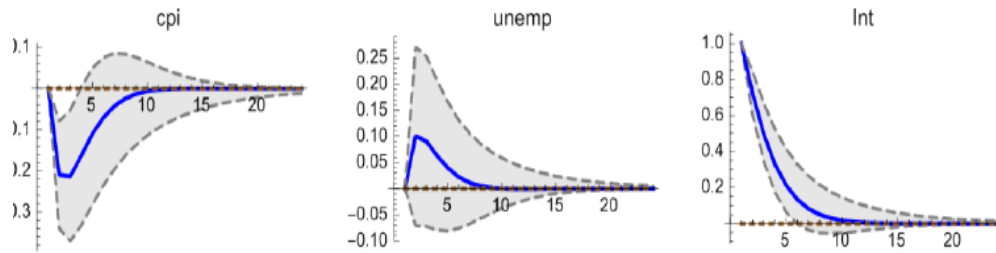


- Common findings:
- Shock: a surprise change in “FED fund rate” would *causally* led to
 - Higher unemployment rate
 - A decline in real economic activities
 - A falling in overall price.
- The effect lasts for several years.

Source: Valerie Ramey (2016)

EVIDENCES: THAILAND

Source: Sripinit (2017)

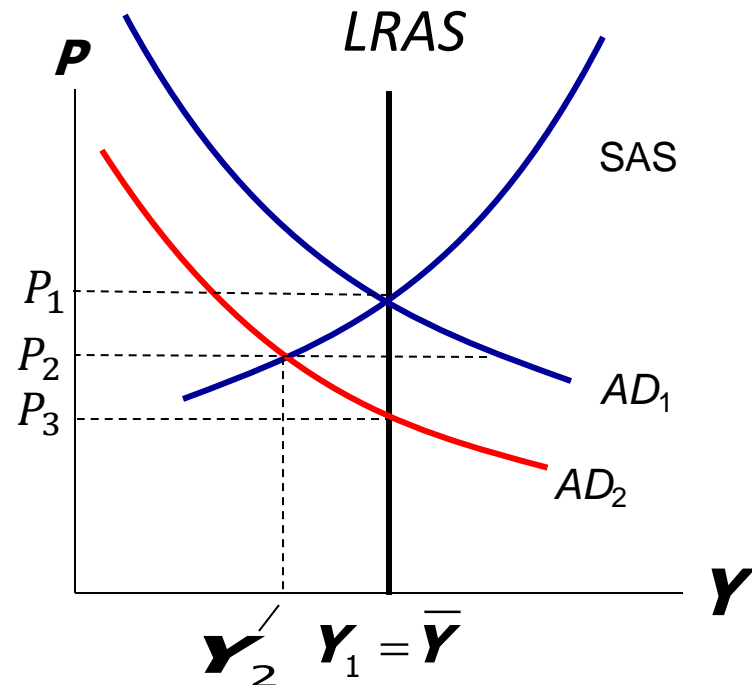


- Bernanke et.al (2005) "*Measuring the effects of monetary policy: FAVAR approach*"
- Sripinit (2017) for Thailand
 - CPI = Y-o-Y CPI inflation (monthly)
 - Unemp = Monthly unemployment rate
 - Int = Rp1day (daily average in each month)
- Offers similar findings!

QUESTION 2: CAN THIS DEVIATION BE LASTING FOREVER?

- **Example:** Monetary policy shock (as an example of demand shock)

Based on various empirical evidences (short-run and long-run), it is **highly unlikely** that the effect of demand shock will last permanently!

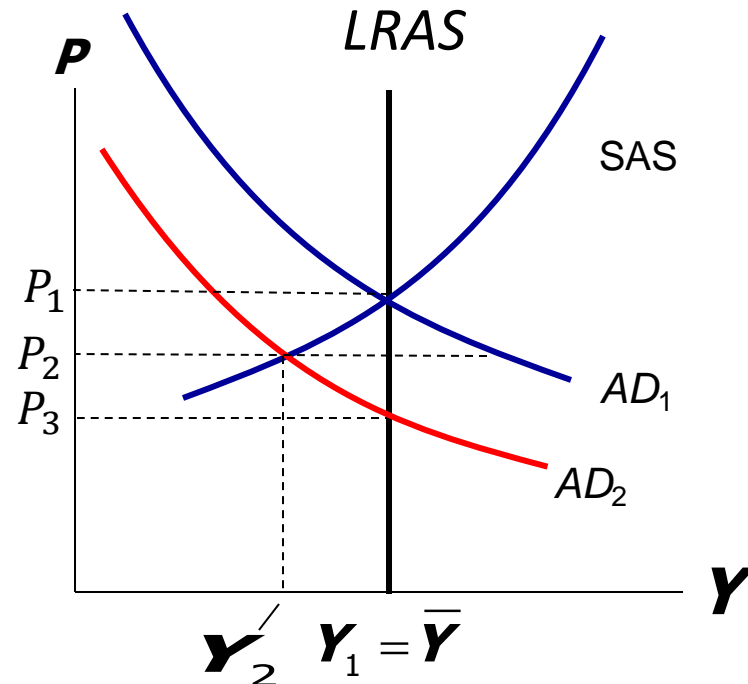
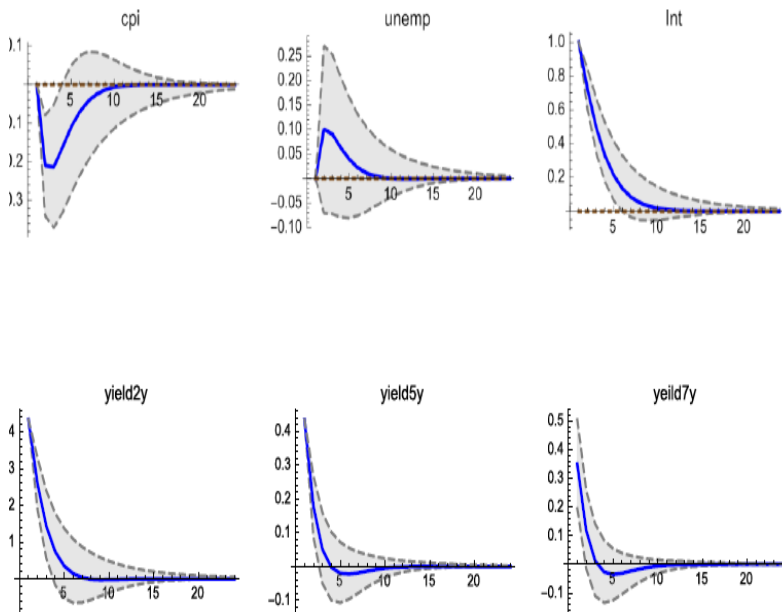


QUESTION 3: IF NOT, WHAT IS THE ADJUSTMENT PROCESS?

- Based on various empirical evidences (short-run and long-run), it is **highly unlikely** that the effect of demand shock will last permanently!
- Admittedly, in the long-run the effect of demand shock should disappear, **but what is the storyline?**

QUESTION 3: IF NOT, WHAT IS THE ADJUSTMENT PROCESS?

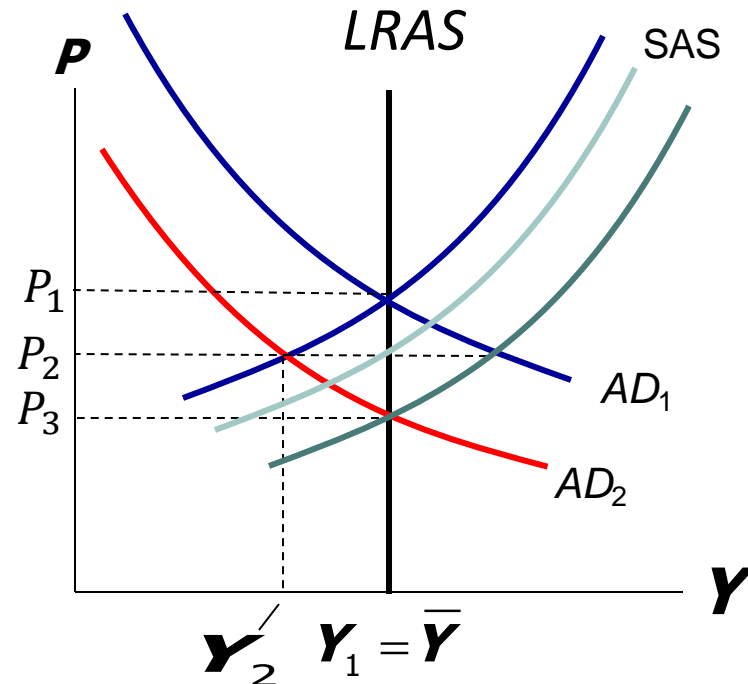
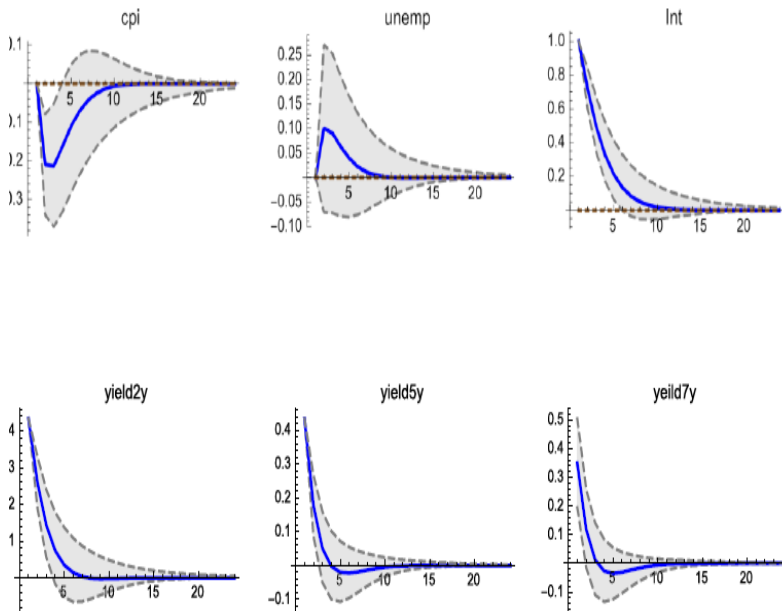
- Example:** Monetary policy shock (as an example of demand shock)



Demand shift back? → doesn't make sense?

QUESTION 3: IF NOT, WHAT IS THE ADJUSTMENT PROCESS?

- Example:** Monetary policy shock (as an example of demand shock)



Story should be about why supply shifts?

QUESTION 3: IF NOT, WHAT IS THE ADJUSTMENT PROCESS?

- Storyline appears to be more supportive to the empirical evidence if we focus on **the supply side**
- Self-adjustment theorem generally explains about the medium-term adjustment towards long-term trend: **focusing on the adjustment in factor market and firm's decision**

WHAT WE AIM TO DO IN THIS PART!!!

- Provide “**theoretical foundations**” that explains about inflation/labor market adjustment and how economy reverts to the long-term trend, called **medium-term adjustment theory**.
 - Factor market: Labor market in details
 - The Philips curve
- Readings:
 - Blanchard: Ch 7 – Ch 9
 - Williamson: Ch 6

AGENDA THIS PART!

- **Labor market in details**
- Phillips curve and inflation dynamic
- Current state-of-the-art of inflation dynamic model
- Policy implications

**MEDIUM-TERM ADJUSTMENT
AND THE INFLATION
DYNAMIC: PART I LABOR
MARKET IN DETAILS**

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AGENDA

- Labor market classifications: stylized-fact and dynamic
- The theory of equilibrium unemployment: search-theoretic approach
- Wage-price setting in the supply side

LABOR MARKET CLASSIFICATIONS

Employment
(Agri: 12.3 millions
NonAgri: 25.8 millions)

- **Pop > 15** = 56 millions
- **Labor force** = the employed (38 mil) + unemployment (0.4 mil)
- **Unemployment** = those who look for the job, but not currently being employed
- **Unemployment rate** = the unemployed/labor force. (1.04%)
- **Labor force participation:** Labor force / (labor force + out of labor force) (69%)

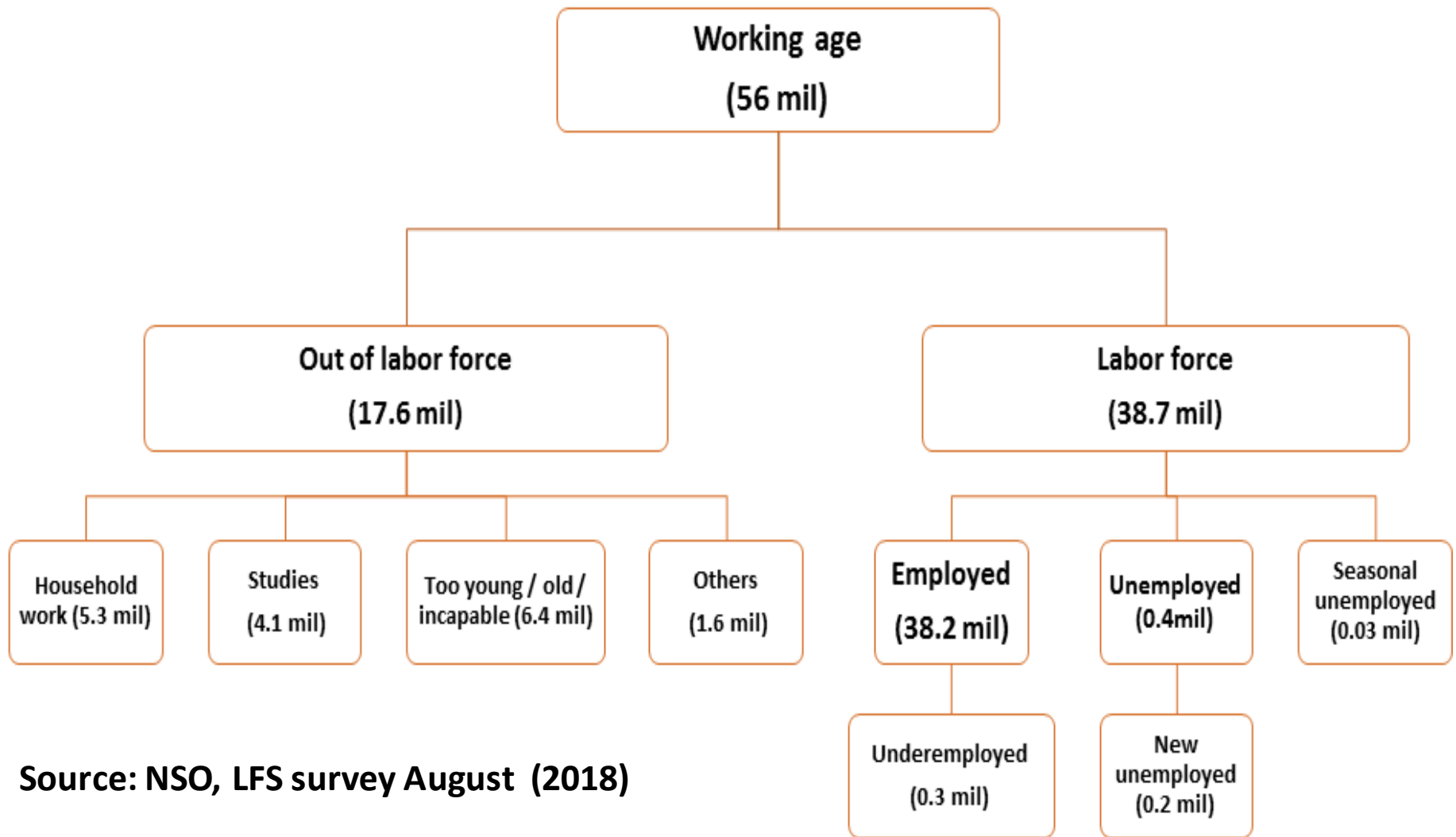


Out of labor force
(17.6 millions)

Unemployment
(0.4 millions)



Source: labor force survey; August (2018)

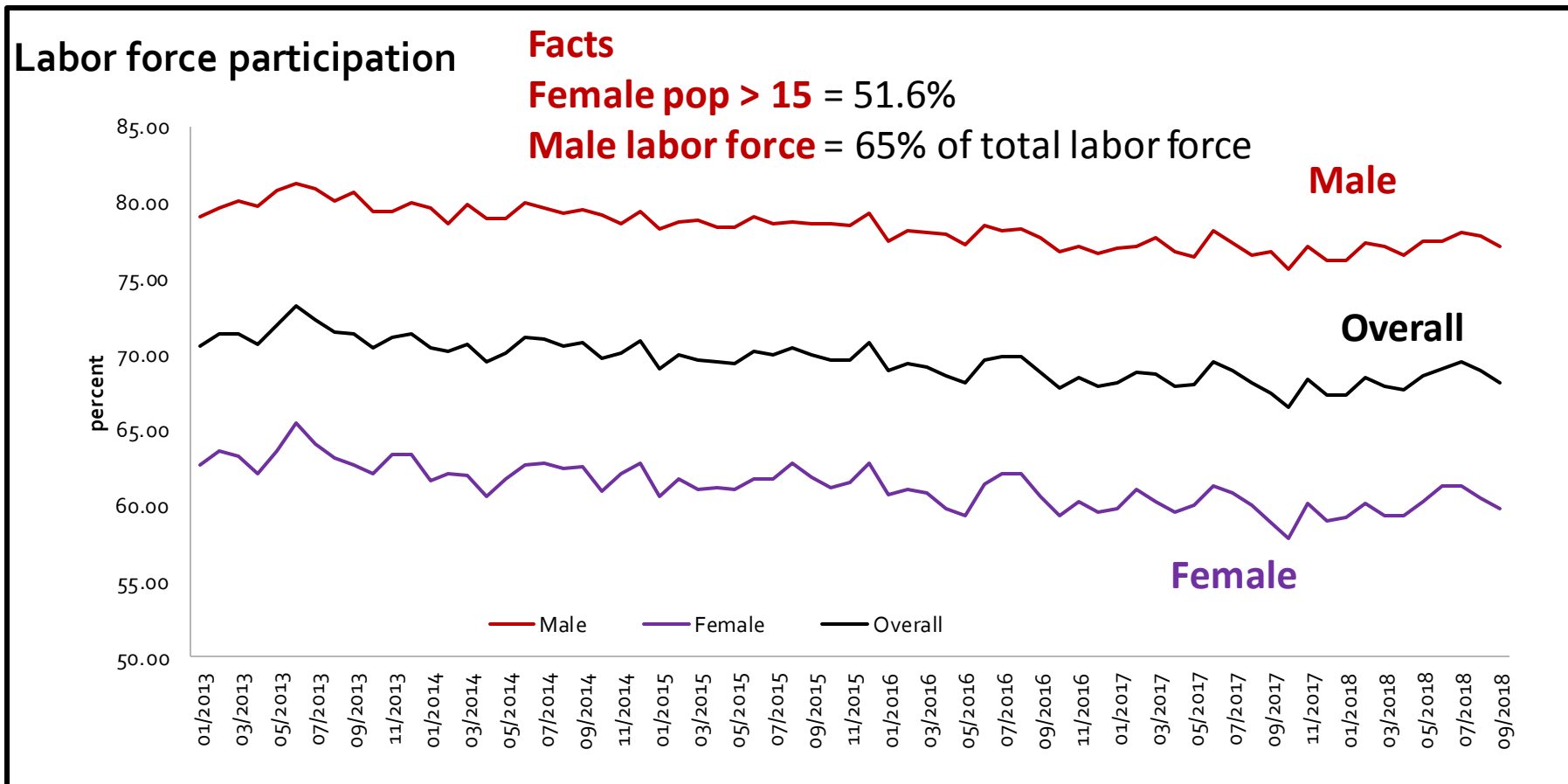


Source: NSO, LFS survey August (2018)

Labor market classifications

LABOR FORCE PARTICIPATION

1. **Labor force participation** = Labor force / Pop > 15
2. Male participation rate is higher than that of female.

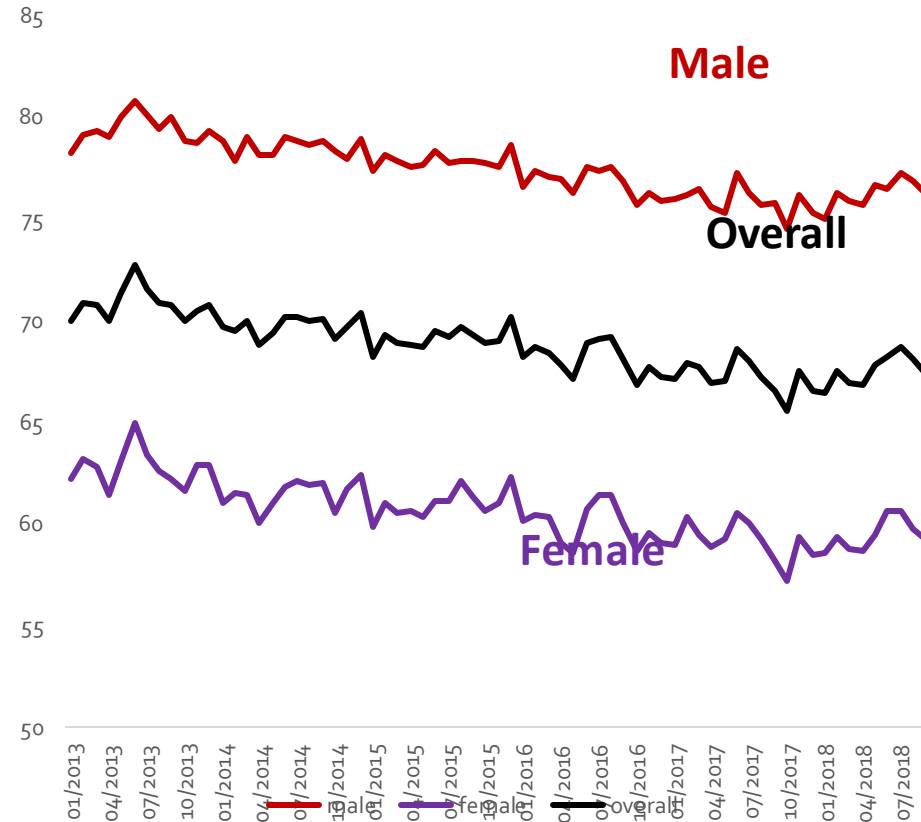
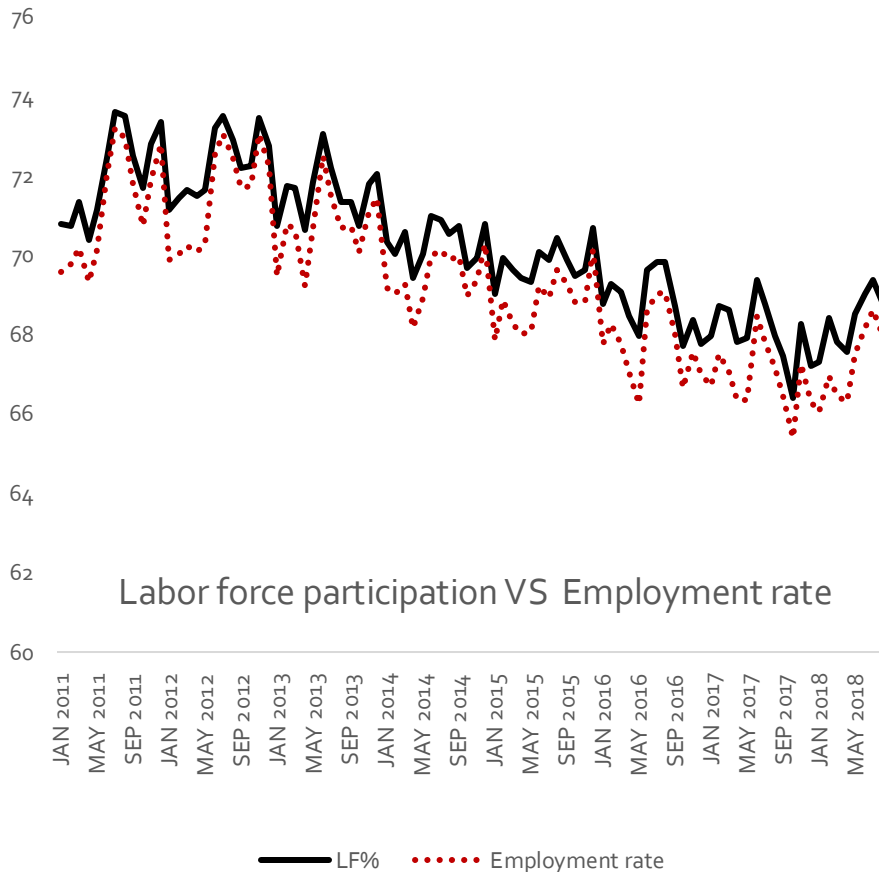


EMPLOYMENT RATE (1/3)

Employment rate = Employment / Pop > 15

= (Employment / Labor force) * LF participation rate

Female employment rate is due to lower female LF participation rate.



EMPLOYMENT RATE (2/3): WHEY DO THEY GO?

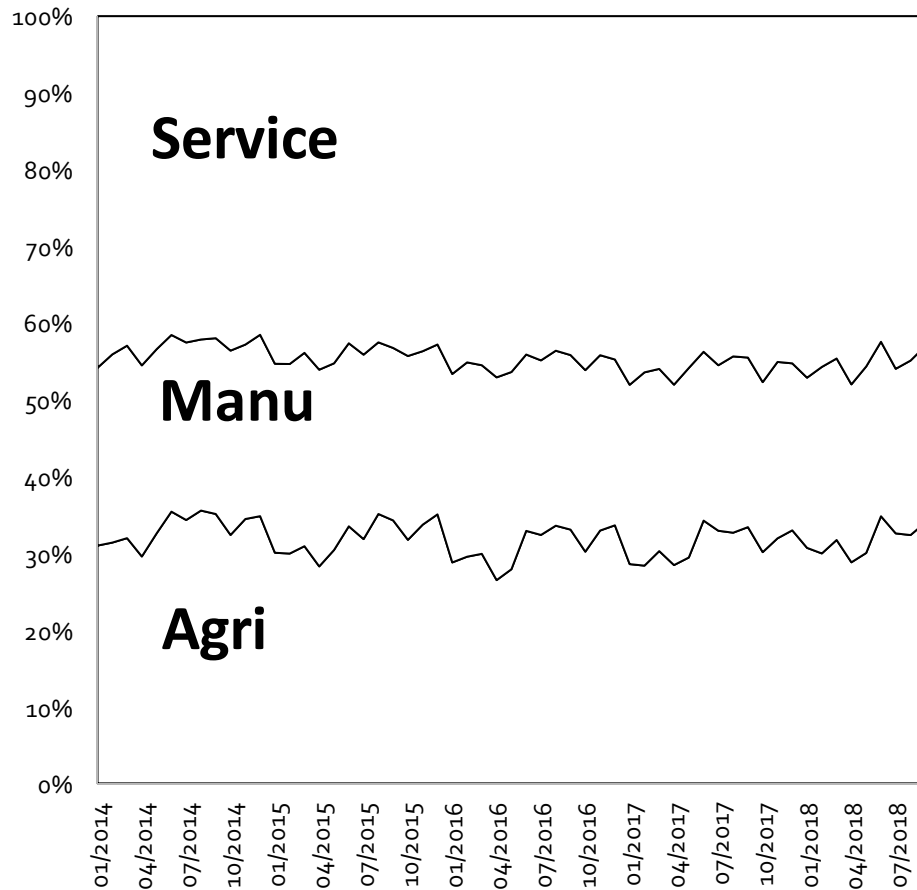
- Having classified by sex, male employment accounts for 55% of the total labor employment in Thailand
- **Informal sector** accounts for over 55% of the total labor employment in Thailand, both male and female.

	Male	Female	
Employment share	54.20	45.80	
	Overall	Male	Female
Informal	55.86	56.31	55.33
Formal	44.14	43.69	44.67

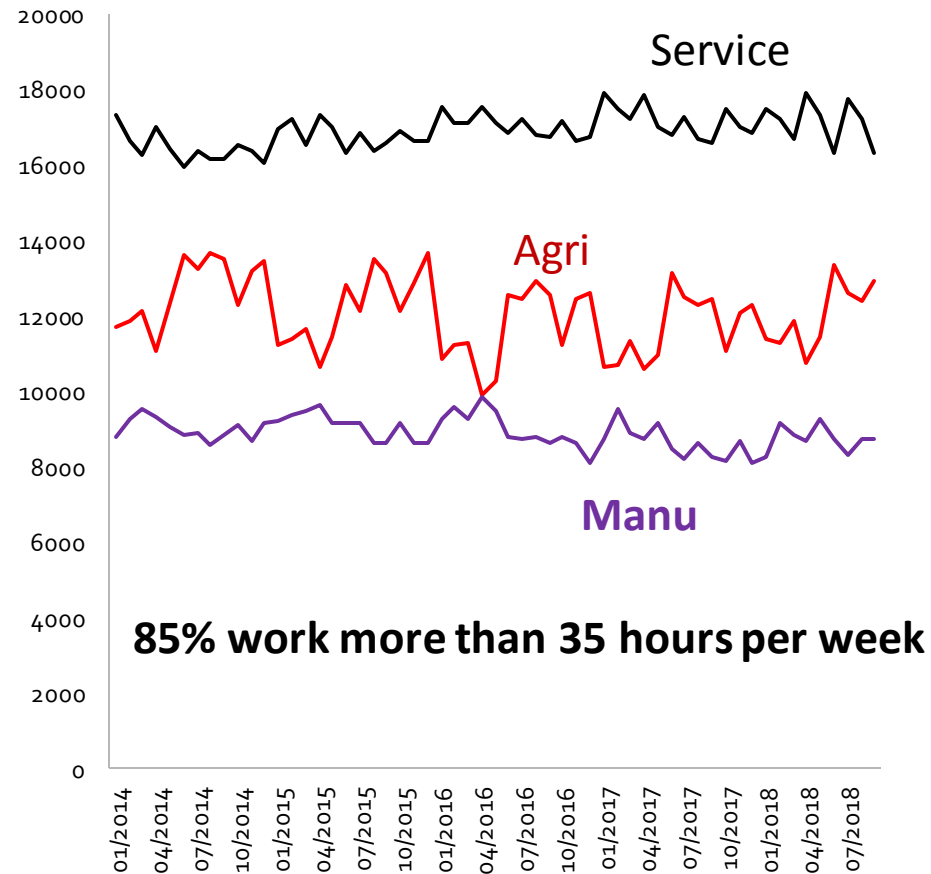
Source: NSO, informal sector survey, 2017

EMPLOYMENT RATE (3/3): WHEY DO THEY GO?

Sectoral employment by ISIC code (Share)



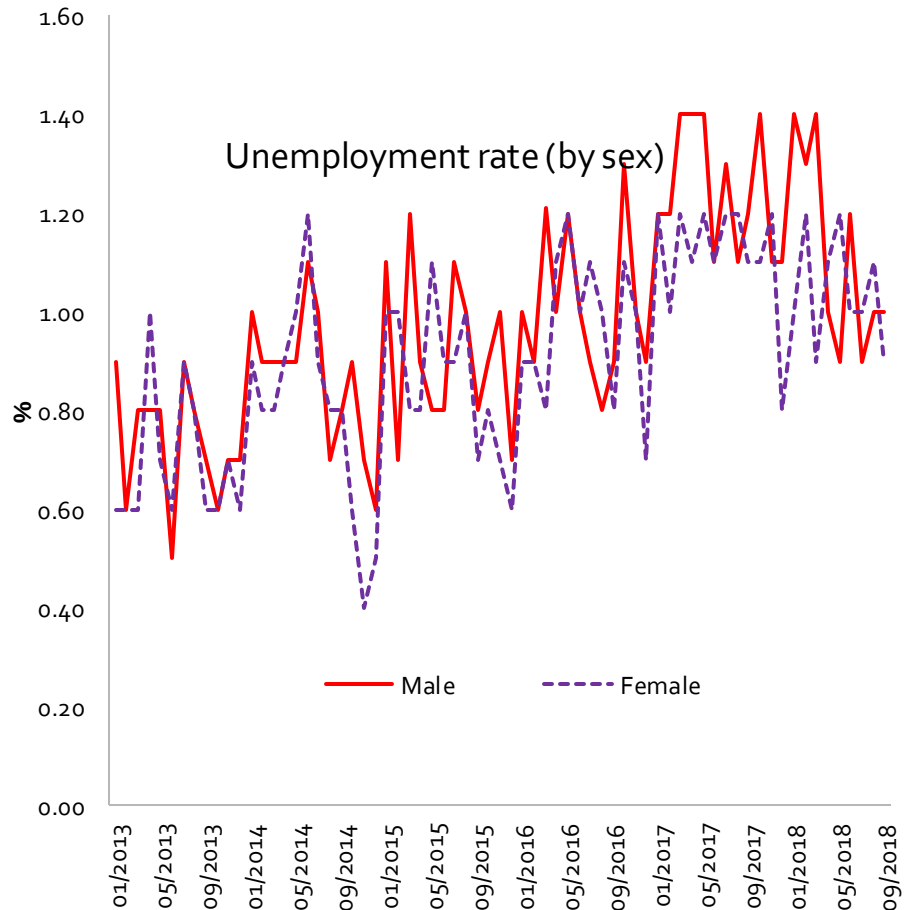
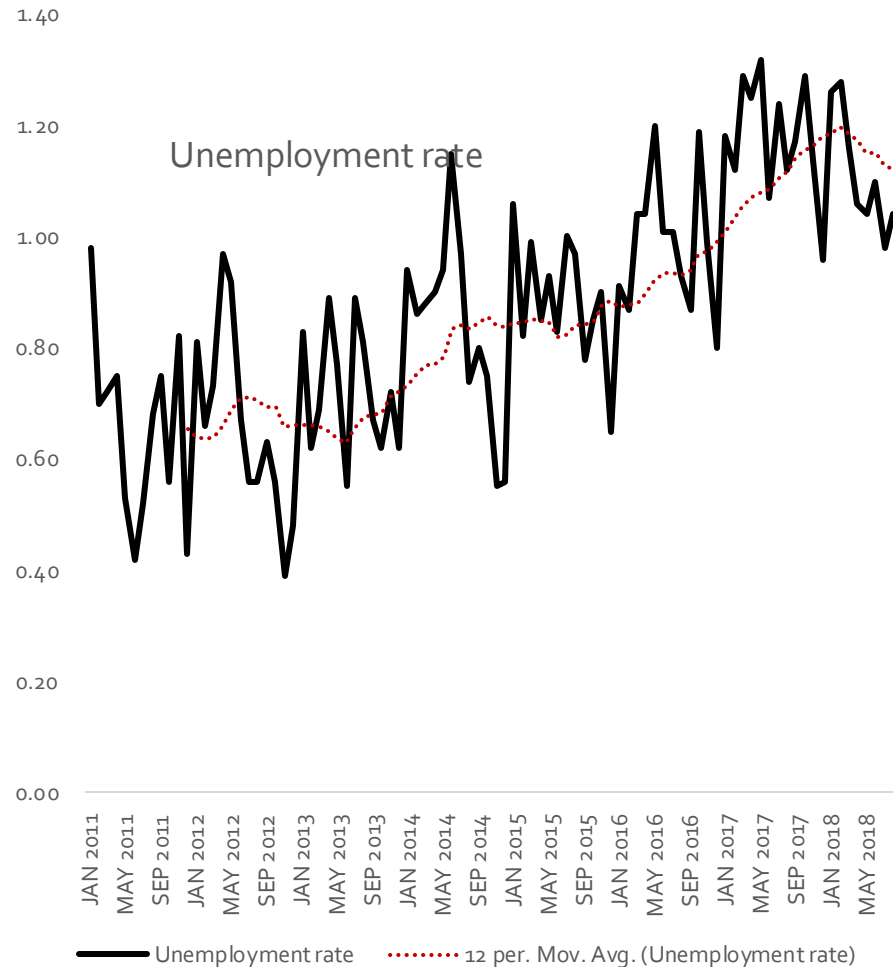
Sectoral employment (level)



UNEMPLOYMENT RATE (1/2)

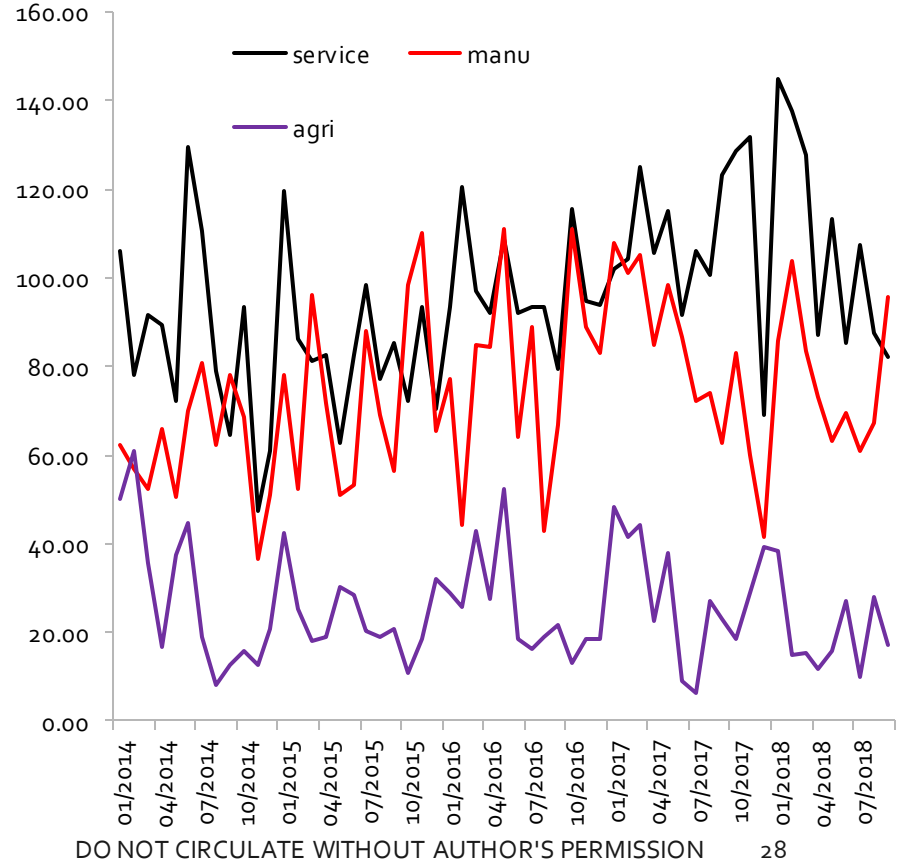
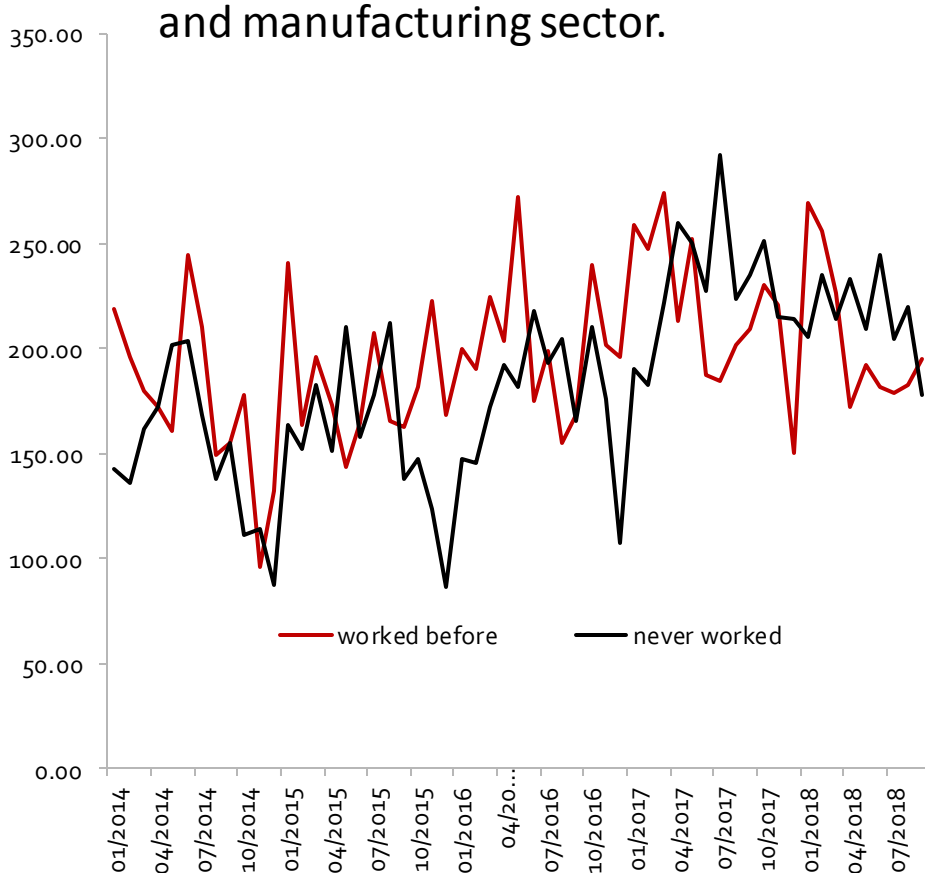
unemployment rate = unemployment / Labor force

Unemployment rates are roughly comparable across sex.

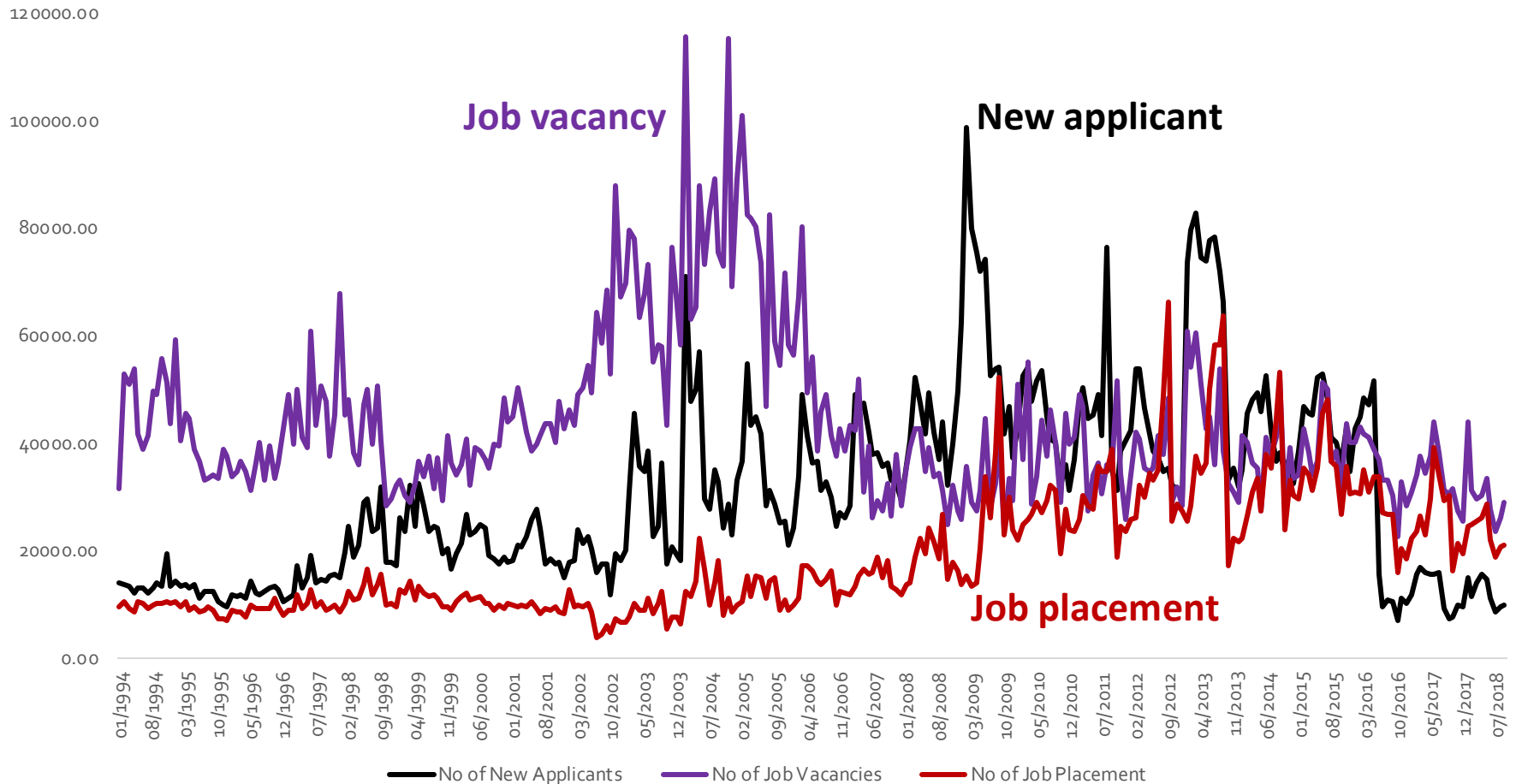


UNEMPLOYMENT RATE (2/2)

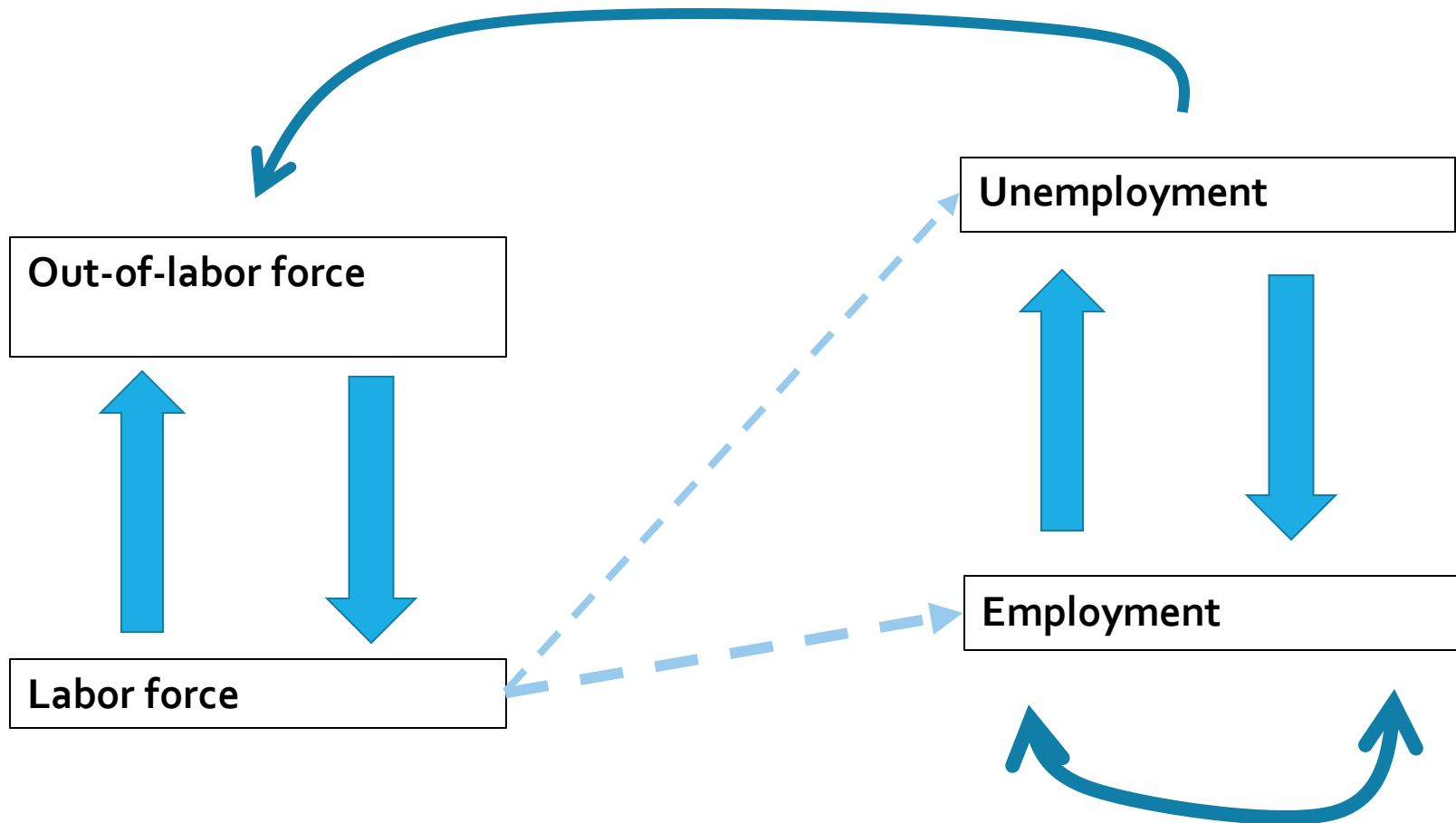
1. First-time unemployed persons are roughly comparable to repeating unemployed persons
2. Unemployed persons, classified by last job, are relatively high among service and manufacturing sector.



LABOR MARKET FLOWS: VACANCY, APPLICANT, PLACEMENT



FLOW AND STOCK IN THE LABOR MARKET: STOCK-FLOW DYNAMIC



FLOW AND STOCK IN THE LABOR MARKET: STOCK-FLOW DYNAMIC

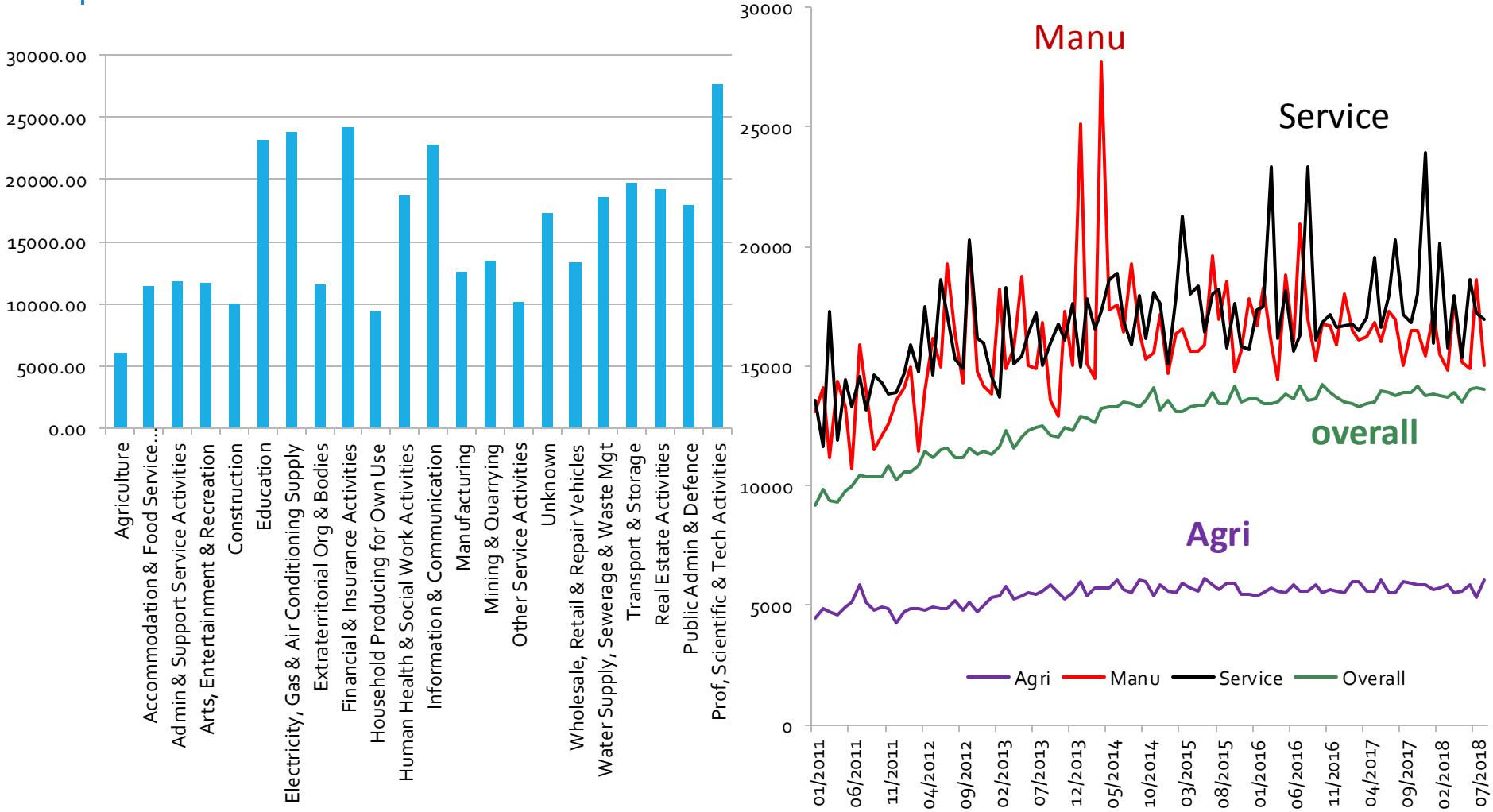
Status new survey	Employ(t+1)	Unemployed(t+1)	Out of labor force(t+1)
Status			
Employ(t)	Same job Switching to new job	Quits + Laid-off Job separation	Exit labor market
Unemployed(t)	New hired	Searching Haven't found a matched one.	Discouraged worker
Out of labor force(t)	Participate, and become a new hire	Searching Haven't found a matched one.	Not looking for a job.

Transition dynamic

STOCK-FLOW IN LABOR MARKET

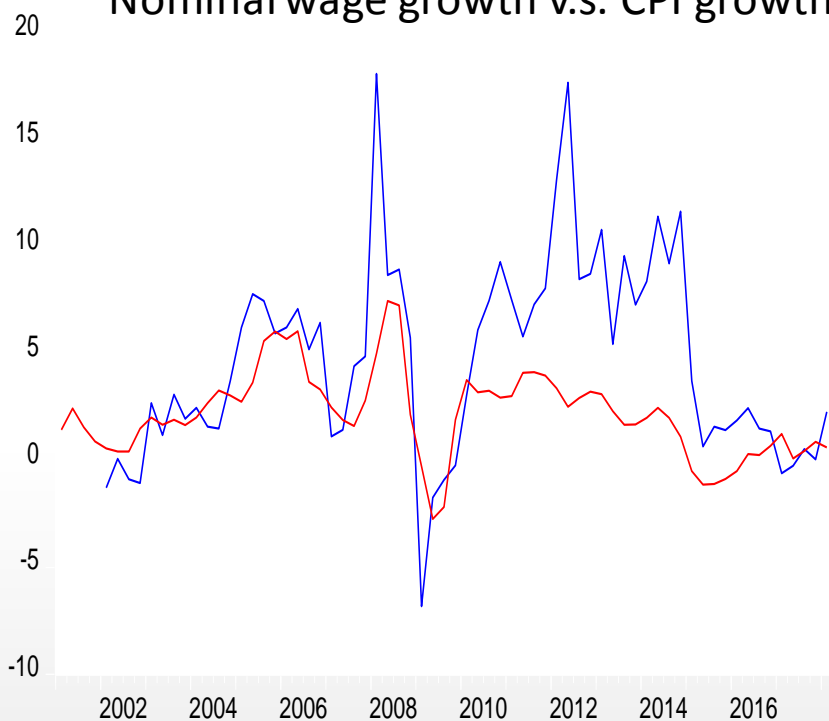
- $\text{Employment}(t+1) = (1-x) * \text{Employment}(t) +$
New placement
- $X =$ Job separation rate
 - laid-off, quit, contract expired, exit LF
- New placement = success rate of matching between unemployed and job vacancy

AVERAGE WAGE



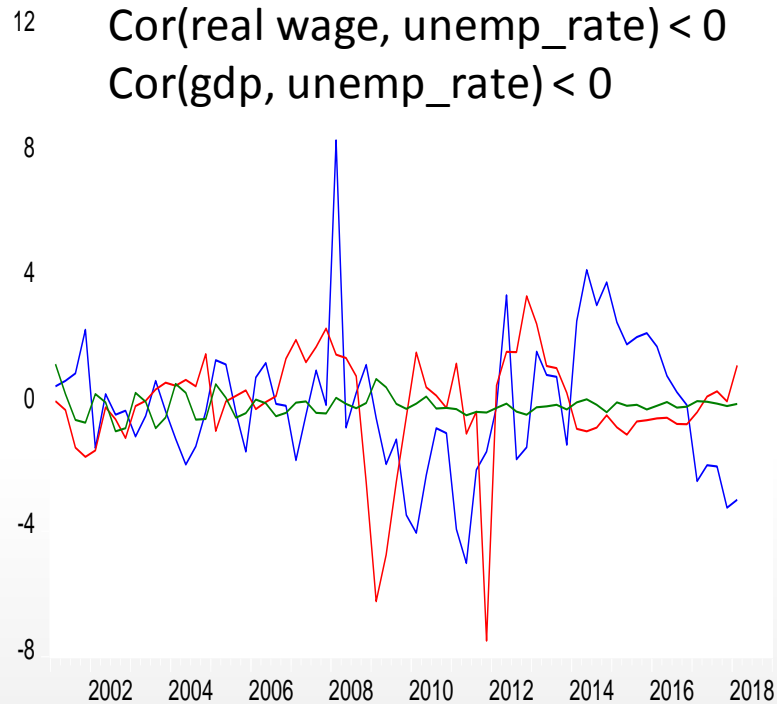
LABOR MARKET AND BUSINESS CYCLE FACTS

Nominal wage growth v.s. CPI growth



— Year % Change AVG_WAGE
— Year % Change HL_CPI

$\text{Cor}(\text{real wage, gdp}) > 0$
 $\text{Cor}(\text{real wage, unemp_rate}) < 0$
 $\text{Cor}(\text{gdp, unemp_rate}) < 0$



— REAL_WAGE_CYC*100
— RGDP_CYC*100
— UNEMP_RATE_CYC

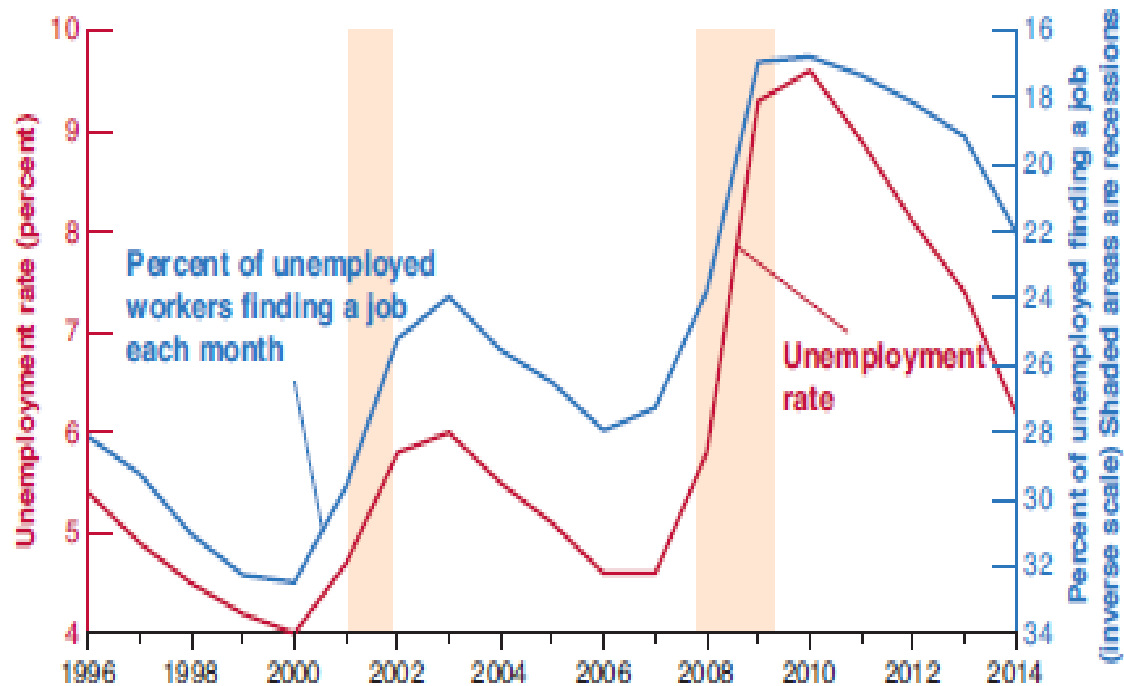
LABOR MARKET AND BUSINESS CYCLE FACTS

Figure 7-4

The Unemployment Rate and the Proportion of Unemployed Finding Jobs, 1996–2014

When unemployment is higher, the proportion of unemployed finding jobs within one month is lower. Note that the scale on the right is an inverse scale.

Sources: Series UNRATE: Federal Reserve Economic Data (FRED) <http://research.stlouisfed.org/fred2/>. Series constructed by Felschman and Fallick, <http://www.federalreserve.gov/econresdata/research/data/>.



LABOR MARKET AND BUSINESS CYCLE FACTS

Job separation rate is high during and in the aftermaths of recession

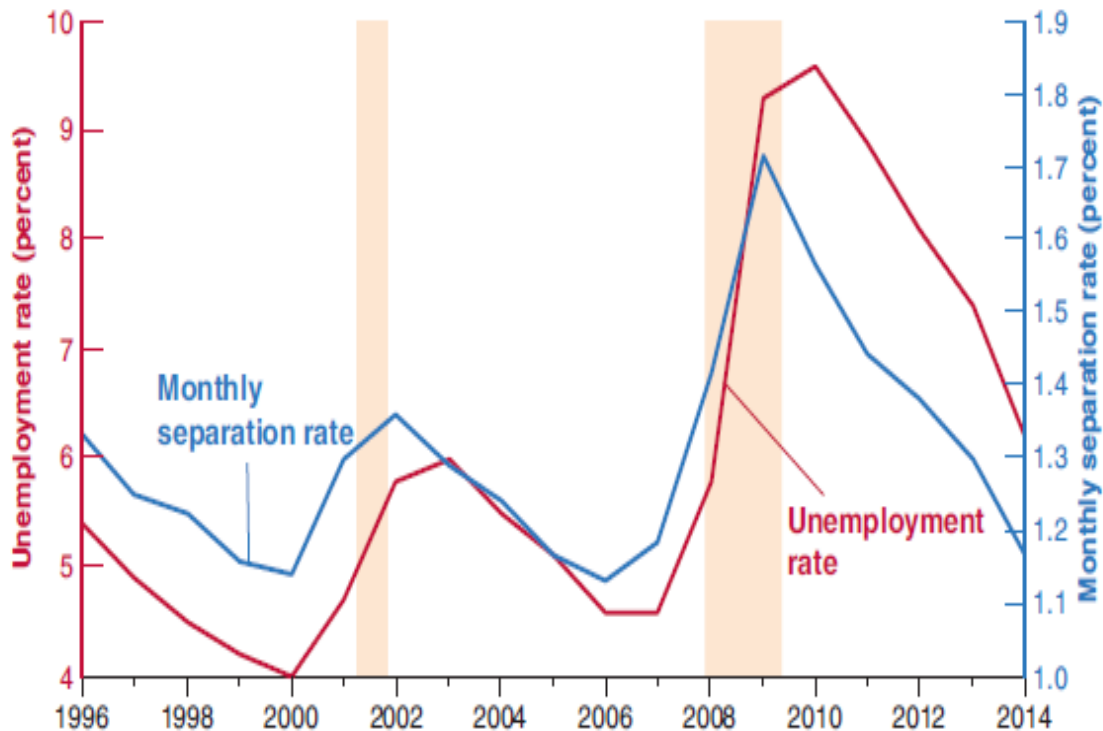


Figure 7-5

The Unemployment Rate and the Monthly Separation Rate from Employment, 1996–2014

When unemployment is higher, a higher proportion of workers lose their jobs.

Sources: Series UNRATE: Federal Reserve Economic Data (FRED) <http://research.stlouisfed.org/fred2/>.

Series constructed by Fleischman and Fallick, http://www.federalreserve.gov/econresdata/research_data/feds200434.xls.

FLOW AND STOCK IN THE LABOR MARKET: STOCK-FLOW DYNAMIC



Average duration of unemployment rises in the aftermath of the recessions

SUM UP

- Unemployment rate is NOT zero; there is always a positive unemployment rate
- In Thailand, unemployment rate is incredibly low in Thailand; this is true for most developing countries
- Labor market business cycles

Variable	Cyclical relationship
Unemployment rate	Counter-cyclical
Real wage	Pro-cyclical
Job separation rate	Counter-cyclical
Job placement rate	Counter-cyclical
Average duration	Counter-cyclical

AGENDA

- Labor market classifications: stylized-fact and dynamic
- **The theory of equilibrium unemployment: search-theoretic approach**
- Wage-price setting in the supply side

THIS SECTION EXPLAINS

- Why unemployment rate is **NOT** equal to zero? Unemployment duration?
- What fundamental structure determine the unemployment rate (duration)?
- Implications for cyclical behavior of unemployment.
- **The famous DMP model**

FOR THE CONTRIBUTION ON UNDERSTANDING THE MARKET WITH “SEARCH FRICTIONS”



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Peter A. Diamond

Prize share: 1/3



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Dale T. Mortensen

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Christopher A. Pissarides

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- Market with trading frictions: **Sellers and Buyers have difficulties to find each other..**
- Many markets are said to have trading frictions that impede the trading process.
 - Exchange-based economy
 - Labor/Agri/Housing market
 - Bond/interbank/FOREX market
- DMP were awarded with the Nobel prize for better our understanding the nature and consequence of trading frictions on market allocations.

THE DMP MODEL

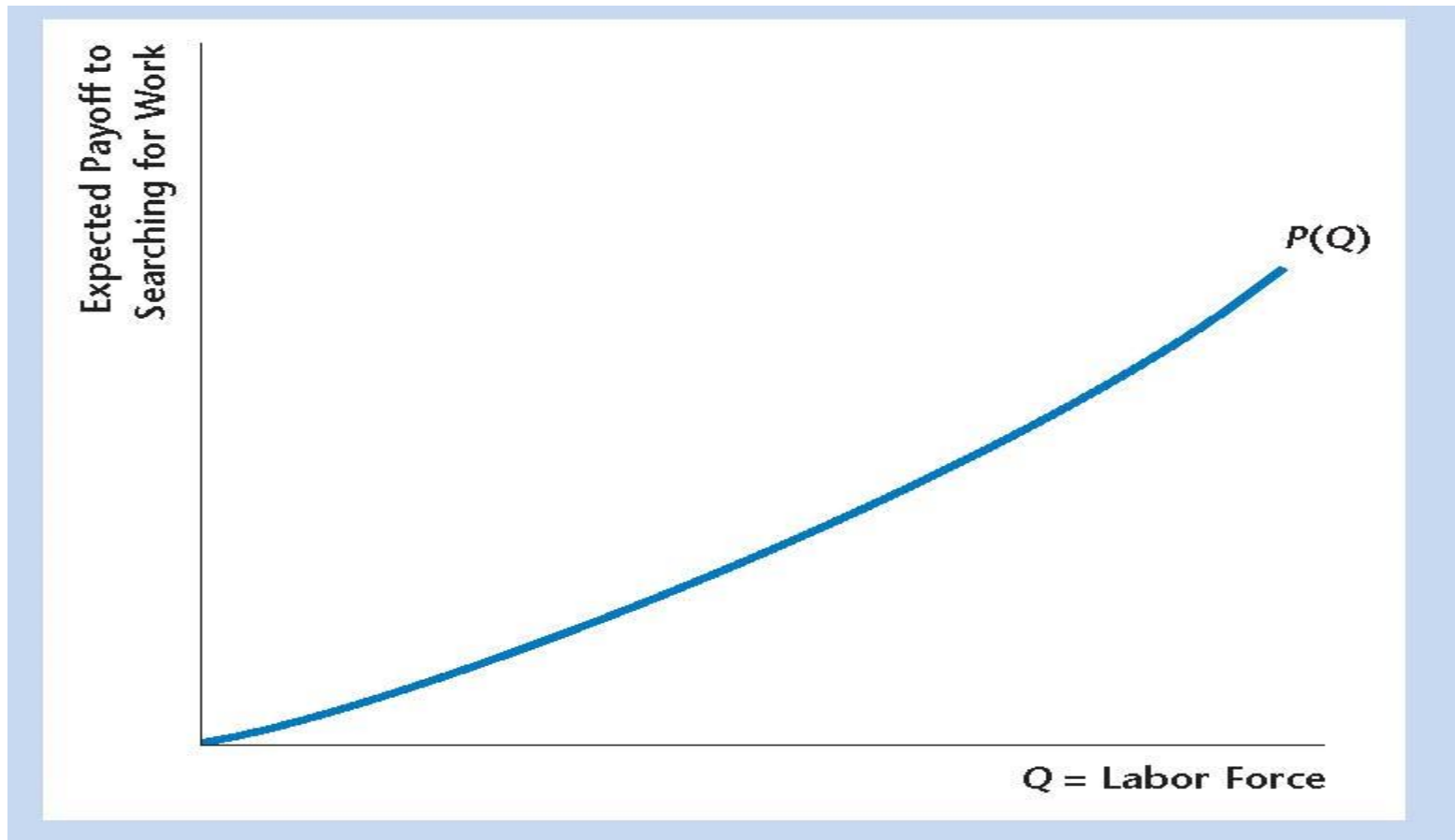
- One-period model
 - Abstract from dynamic; entry/exit for labor
- N consumers who can all potentially work, so N can be labor force
 - We will **NOT** concern about the demographic issue
- Number of firms is to be determined endogenously

CONSUMERS IN THE DMP MODEL

- Each of the N consumers chooses whether to work outside the market (homework), or to search for work in the market.
 - Q = number of consumers who search for work.
 - $N-Q$ = not in the labor force.
- $P(Q)$ = expected payoff to searching for work that would induce Q workers to search.
 - $P(Q)$ is essentially the supply curve for searching workers.



FIGURE 6.9 THE SUPPLY CURVE OF CONSUMERS SEARCHING FOR WORK



FIRMS

- A firm must post a vacancy in order to have a chance of matching with a worker.
- k = cost of posting a vacancy, in units of consumption goods.
- A = number of active firms (firms posting vacancies).



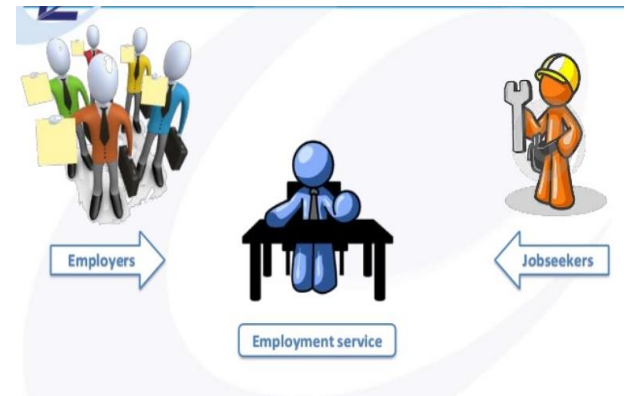
MATCHING

- A successful match in the model is between **one worker** and **one firm**.
- M = aggregate number of matches.

- Matching function:

$$M = em(Q, A)$$

- Q (job search) and A (vacancies)
- e = matching efficiency.



PROPERTIES OF THE MATCHING FUNCTION

- The matching function has properties like **a production function**.
- The “inputs,” Q and A , produce the “output” M , and e plays the same role as total factor productivity in the production function.
- The matching function has **constant returns to scale**, positive **marginal products**, and **diminishing marginal products**.
 - Studies have found this assumption sensible

PROPERTIES OF THE MATCHING FUNCTION

- **Example:** Cobb-Douglas matching function

$$M = e * m(Q, A) = e * Q^\alpha A^{1-\alpha}$$

$$\frac{M}{Q} = e * m(Q, A) = e * \frac{Q^\alpha A^{1-\alpha}}{Q} = e \left(\frac{A}{Q} \right)^{1-\alpha}$$

SUPPLY SIDE OF THE LABOR MARKET: OPTIMIZATION BY CONSUMERS

- Each consumer chooses between home production and searching for work.
- If the consumer chooses to search for work, then he or she finds a match with a firm with probability

$$p_c = \frac{em(Q, A)}{Q}$$

- If the consumer **searches for work and is matched** he/she receives wage w .
- If the consumer **searches and is not matched**, then he/she is unemployed and receives the UI benefit b .

MARGINAL CONSUMER

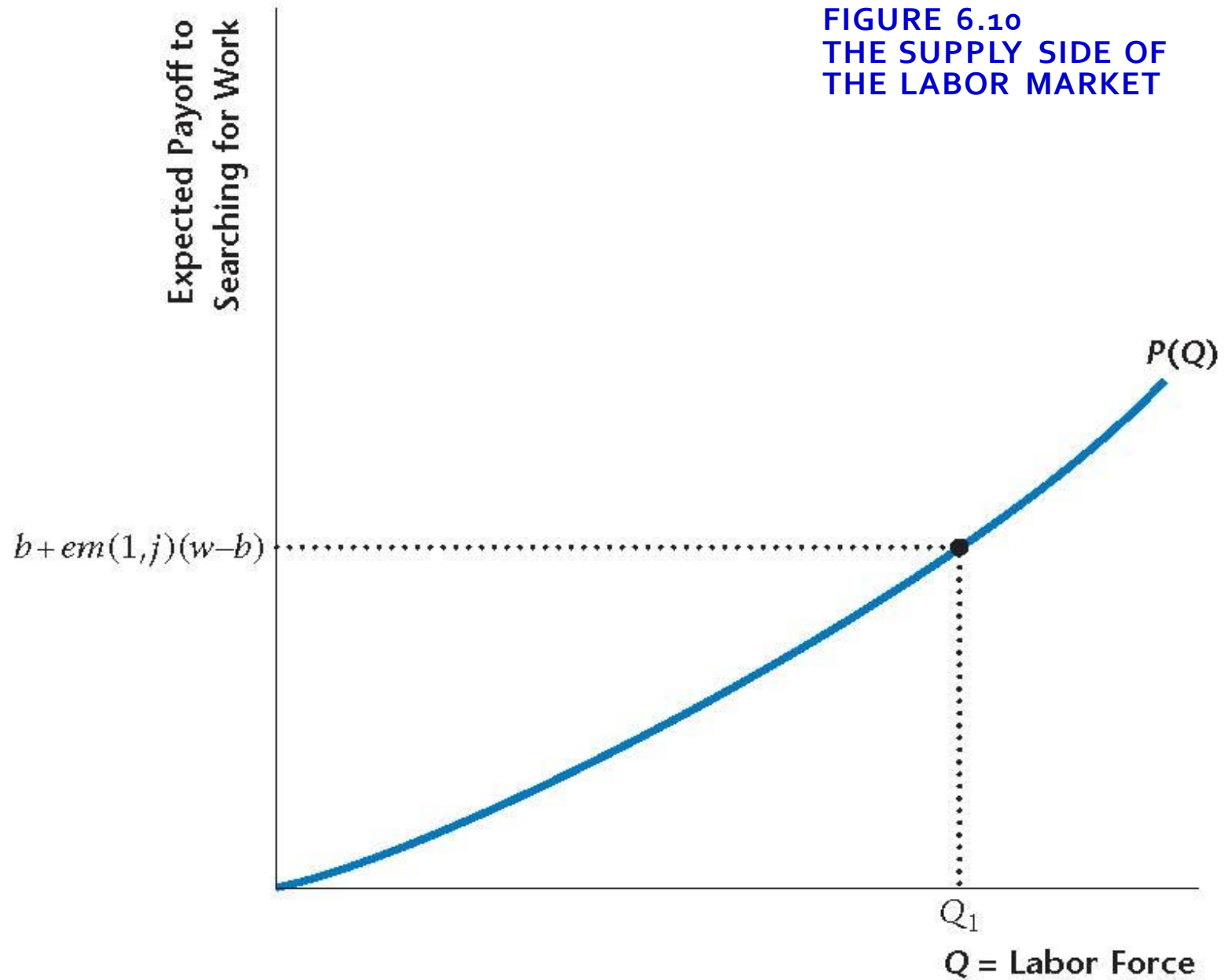
- For the consumer who is indifferent between home production and searching for work,

$$P(Q) = b + em(1, j)(w - b)$$

- Here, j is *labor market tightness*,

$$j = \frac{A}{Q}$$

FIGURE 6.10
THE SUPPLY SIDE OF
THE LABOR MARKET



DEMAND SIDE OF THE LABOR MARKET

- A firm entering the labor market bears the cost k to post a vacancy.
- The probability that a firm with a vacancy finds a worker to fill the job is

$$p_f = em\left(\frac{1}{j}, 1\right)$$

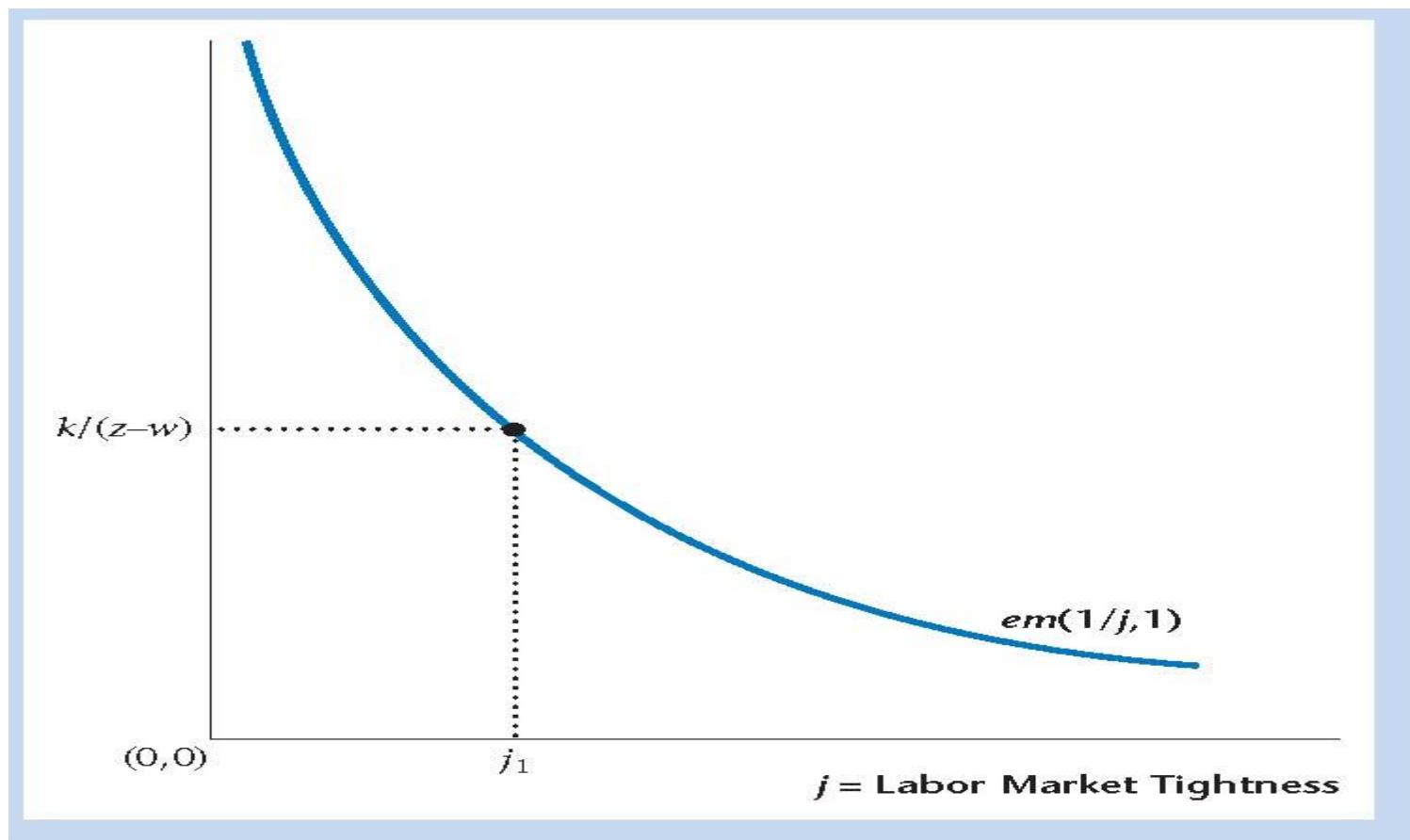
- When matched, a worker and firm produce z , so the payoff to the firm is profit = $z - w$.

EXPECTED NET PAYOFF FOR A FIRM POSTING A VACANCY IS ZERO IN EQUILIBRIUM

- Optimal decision: each firm looks into “marginal benefit of job posting” and “marginal cost of job posting”
 - Marginal benefit = expected pay-off from a firm posting
 - Marginal benefit = Job posting cost.
- Optimal decision: Firm sets “j” where k must be equal to the expected payoff for the firm from posting the vacancy, which implies

$$em\left(\frac{1}{j}, 1\right) = \frac{k}{z - w}$$

FIGURE 6.11 DEMAND SIDE OF THE LABOR MARKET



NASH BARGAINING

- Use **Nash bargaining theory** to determine how a matched firm and worker split the total revenue from production.
- Worker's surplus = $w - b$ (wage minus UI benefit)
- Firm's surplus = $z - w$ (profit)
- Total surplus = $z - b$
- a = worker's share of total surplus ("**bargaining power**")

$$w = az + (1 - a)b$$

EQUILIBRIUM

- Two equations determining Q and j (from supply side, demand side, and Nash bargaining):

$$P(Q) = b + em(1, j)a(z - b)$$

$$em\left(\frac{1}{j}, 1\right) = \frac{k}{(1-a)(z-b)}$$

EQUILIBRIUM UNEMPLOYMENT RATE, VACANCY RATE, AND AGGREGATE OUTPUT

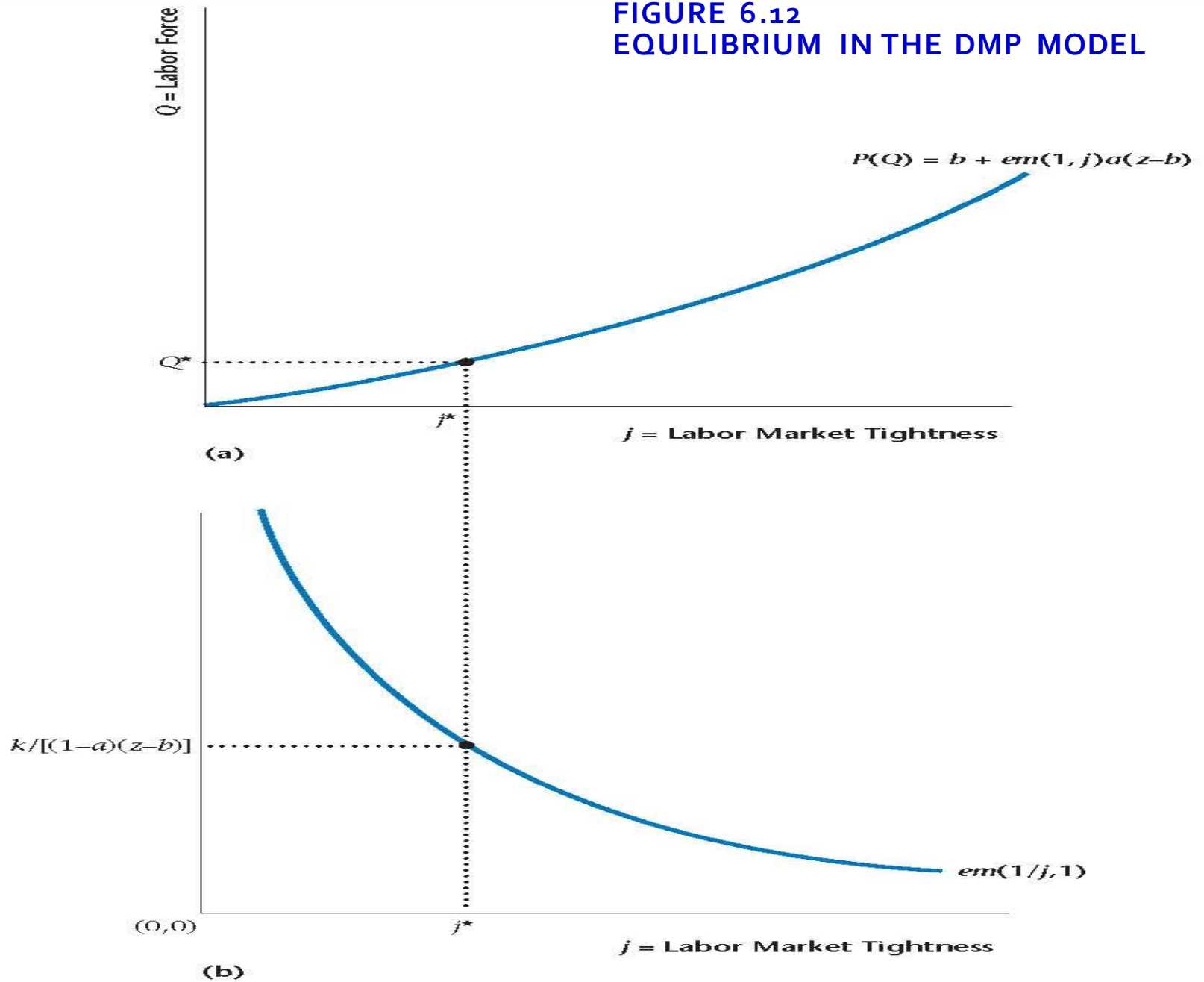
- In equilibrium, as functions of j and Q , the unemployment rate, vacancy rate, and level of aggregate output, respectively, are:

$$u = 1 - em(1, j)$$

$$v = 1 - em\left(\frac{1}{j}, 1\right)$$

$$Y = Qem(1, j)z$$

FIGURE 6.12
EQUILIBRIUM IN THE DMP MODEL



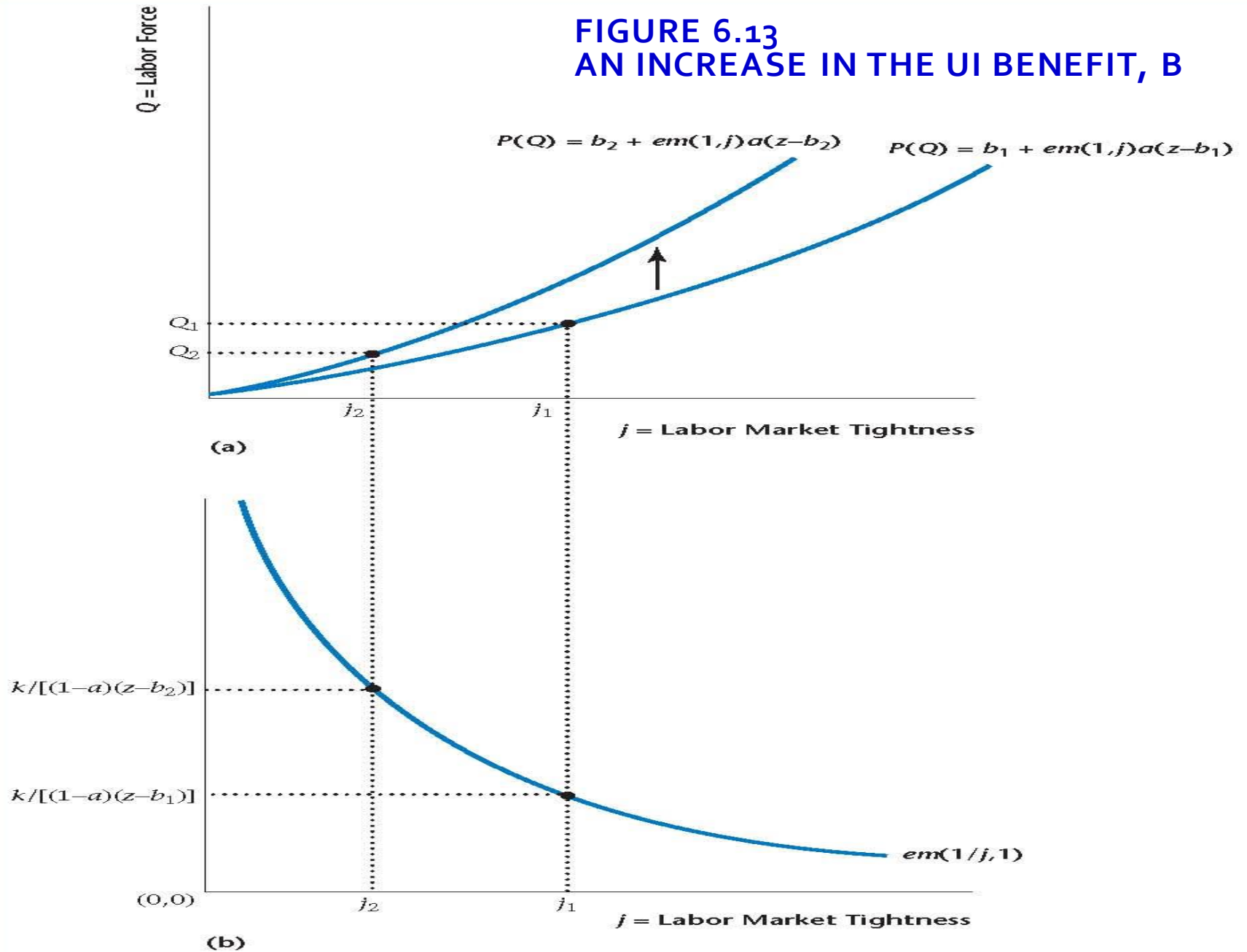
WORKING WITH THE DMP MODEL: 3 EXPERIMENTS

- Increase in the UI benefit b .
- Increase in productivity z .
- Decrease in matching efficiency e .

INCREASE IN THE UI BENEFIT, B

- Reduces total surplus from a match, $z - b$
- Increases the wage, w , as the alternative to working becomes more tempting for a searching consumer.
- Posting vacancies becomes less attractive for firms, so labor market tightness, j , falls.
- For consumers, searching for work becomes more attractive, as the wage is higher. But searching for work is also less attractive, as the chances of finding a job are lower (j is lower).
- Q may rise or fall given these two opposing effects.
- u rises and v falls.

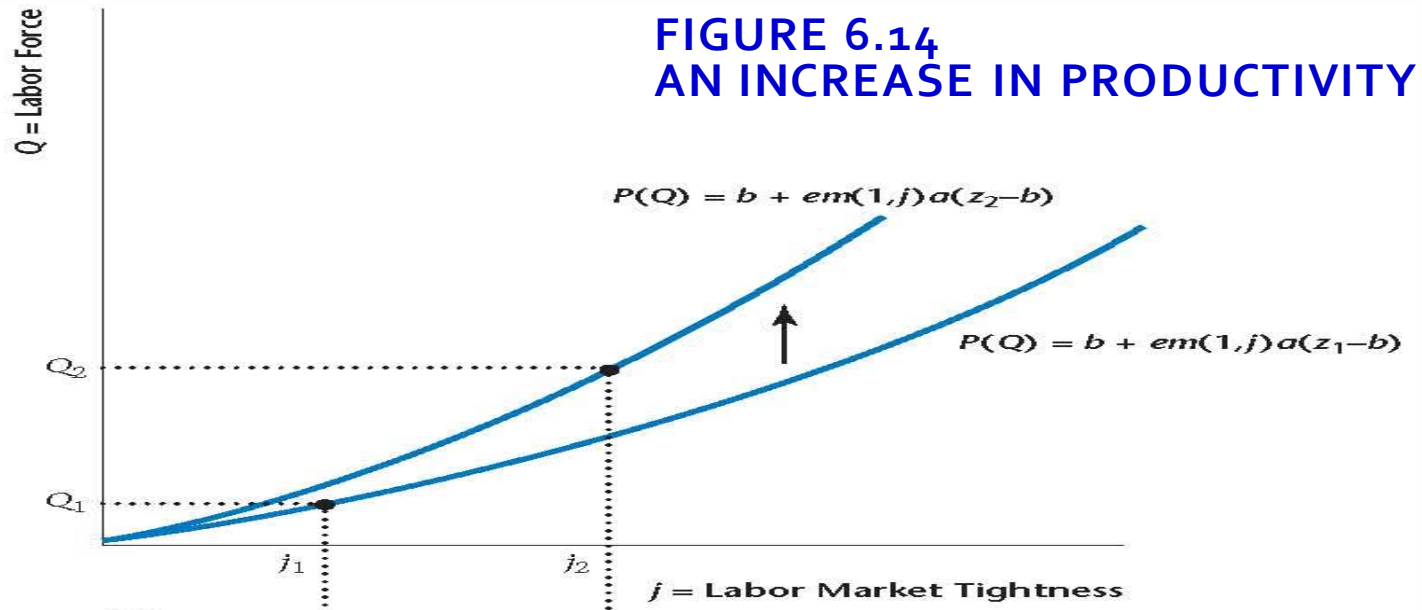
FIGURE 6.13
AN INCREASE IN THE UI BENEFIT, B



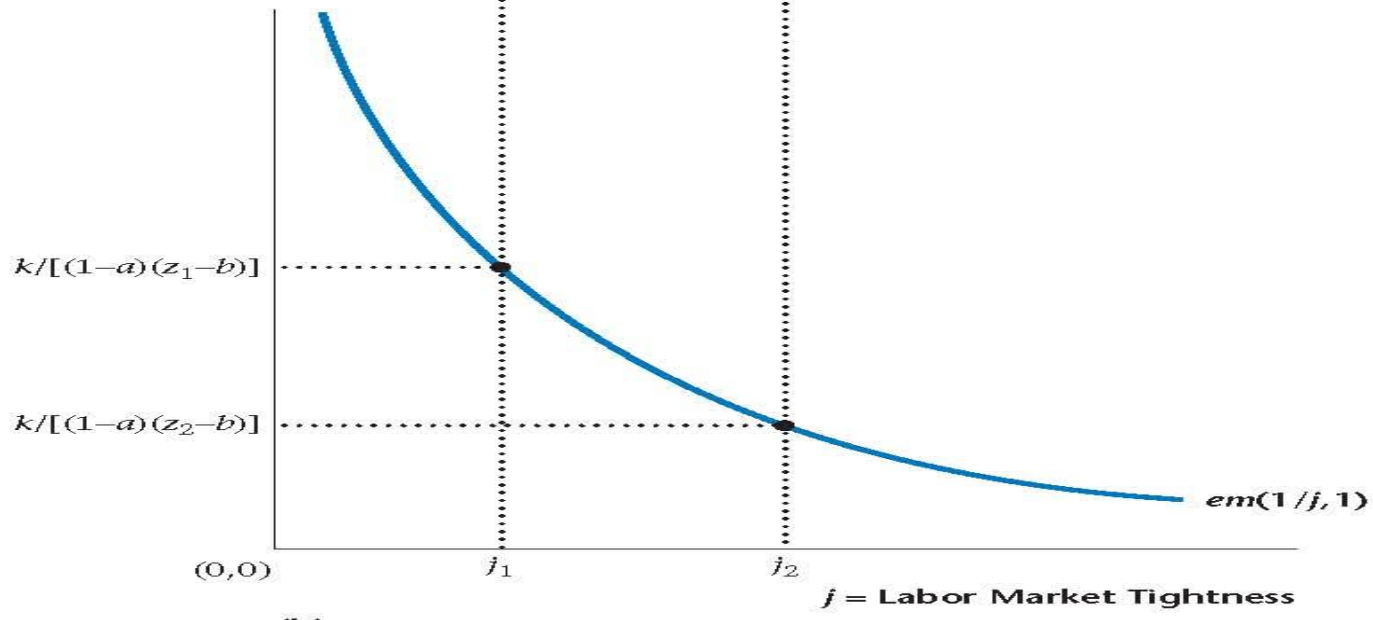
AN INCREASE IN PRODUCTIVITY

- Increases the total surplus from a match, $z - b$.
- Increases the wage, w , as the worker gets the same share of a larger pie.
- As profit is higher, posting vacancies becomes more attractive for firms, so labor market tightness, j , rises.
- For consumers, searching for work becomes more attractive, as the wage is higher, and the chances of finding work are better.
- Q rises, u falls, v rises, Y rises.

FIGURE 6.14
AN INCREASE IN PRODUCTIVITY



(a)

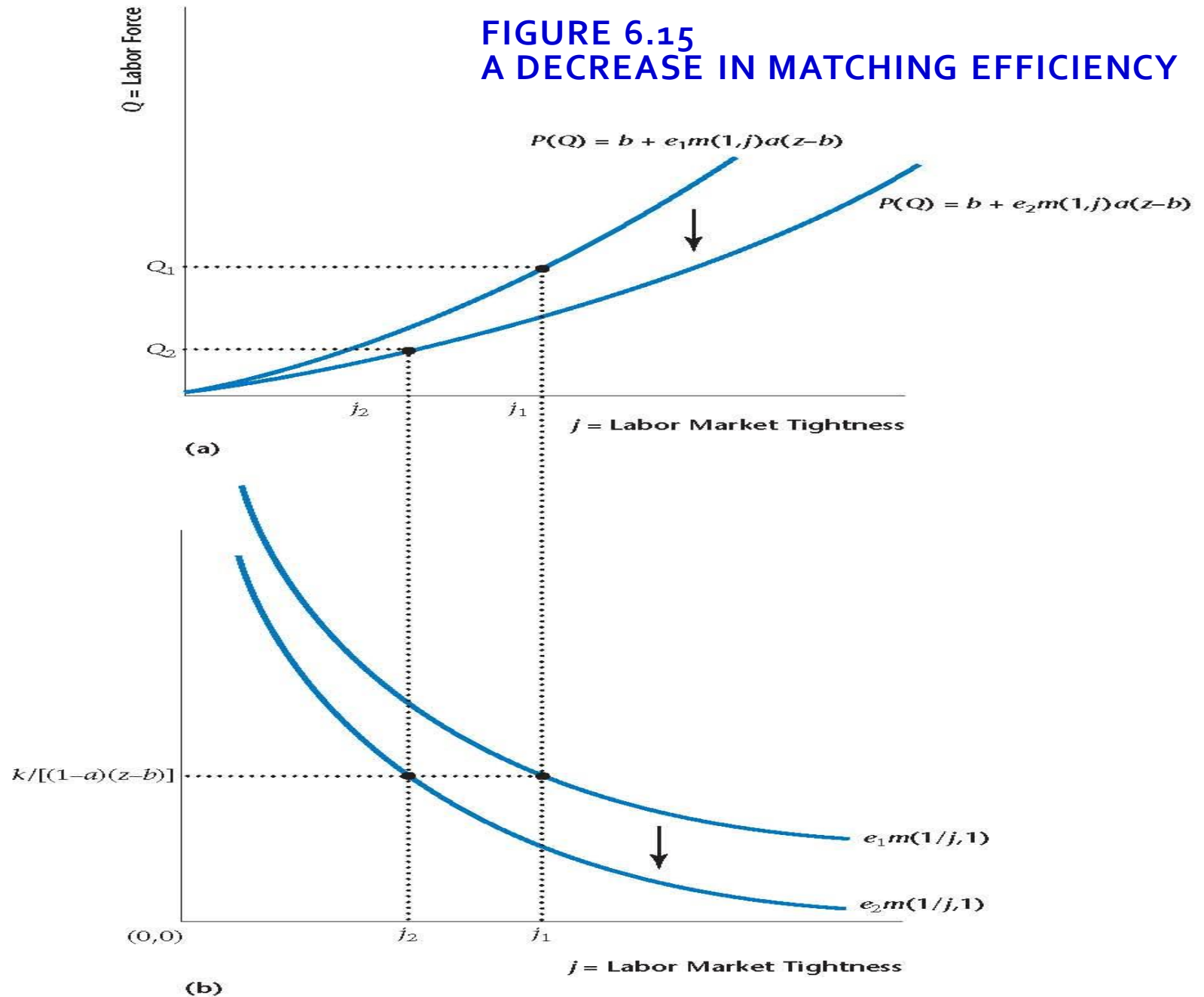


(b)

A DECREASE IN MATCHING EFFICIENCY

- No change in total surplus, or in the wage.
- Chances of finding a worker are lower, so fewer firms post vacancies and j falls.
- For consumers searching is less attractive – the wage is the same, but the chances of finding a job are lower, so Q falls.
- u rises, but vacancy rate stays the same, and Y falls.

FIGURE 6.15
A DECREASE IN MATCHING EFFICIENCY



SEARCH-THEORETIC EXPLANATION TO UNEMPLOYMENT ISSUE

- **Question 1:** why do we naturally have positive unemployment rate?
- **Question 2:** why has the unemployment rate in Thailand has been so low?
- **Question 3:** why does the unemployment rate rise during the recession, along with the unemployment duration?

SEARCH-THEORETIC EXPLANATION TO UNEMPLOYMENT ISSUE

- **Question 1:** why do we naturally have positive unemployment rate?
 - Imperfect matching: cost and benefit of job search and job posting
 - Firms do not post job vacancy
 - Workers choose to stay out of the labor force.
 - Fundamental reasons why unemployment rate is naturally high or low.
 - See the three experiment

SEARCH-THEORETIC EXPLANATION TO UNEMPLOYMENT ISSUE

- **Question 2:** Why has the unemployment rate in Thailand has been so low?
 - Limited unemployment insurance covered to formal sector
 - Huge size of the employment in informal sector

SEARCH-THEORETIC EXPLANATION TO UNEMPLOYMENT ISSUE

- **Questions 3:** Why does the unemployment rate rises during the recession, and higher unemployment duration?
 - Firms' productivity slowdown → wage received is lower
 - Job separation rate is enlarged → Mass of unemployed relative to job vacancy is smaller → Harder to get matched
 - Government is more generous in extending the UI program → create negative unintended consequence on job search

AGENDA

- Labor market classifications: stylized-fact and dynamic
- The theory of equilibrium unemployment: search-theoretic approach
- **Wage-price setting in the supply side**

THIS SECTION

- Discuss about general theory of wage setting
- Explain how the wage settings interact with unemployment
- Provide a framework that can be integrated with standard IS-LM model

SUPPLY SIDE DECISION

- Wage setting problem
 - Households choose to work, and negotiate wage with firm.
- Price setting problem
 - Firm takes wage as given, and sets its price to maximize the profit.

A TALE OF TWO STORIES ON THEORY OF WAGE SETTING

- Two famous theories of wage setting
 - Bargaining wage theorem
 - Efficiency wage theorem
- Both theories predict some similar results; wage is determined by
 - Nature and characteristic of the job
 - Labor market condition

A SIMPLE MODEL OF WAGE SETTING

- Nominal wage (contract) depends on three factors:

$$W = P^e F(u, z) \quad (7.1)$$

(-, +)

The aggregate nominal wage W depends on three factors:

- The expected price level, P^e
- The unemployment rate, u
- A catch-all variable, z , that stands for all other variables that may affect the outcome of wage setting.

A SIMPLE MODEL OF WAGE SETTING

- Does the workers care about the nominal wage?
- No, they care about **the real wage**, but simply cannot observe the actual level of cost of living when contract is being signed.
- They form **the expectation** then!

A SIMPLE MODEL OF WAGE SETTING

- Unemployment rate (-)
 - Following the bargaining theorem, workers gain more bargaining power when labor market is tight.
 - Following the efficiency wage theorem, workers find it easier to quit their job under low unemployment, and seek for another job that offers a higher wage.

A SIMPLE MODEL OF WAGE SETTING

- Other (structural) factors:
 - From the search-matching model, “generous” unemployment benefits tend to have workers accepted for the high-wage-offer job.
 - Employment protection makes it difficult for worker to get laid-off.

PRICE DETERMINATION

- Firms take wage as given, and set price that maximizes their profit.
- Firm's pricing decision depends on the market structure – i.e. perfect competition v.s. monopolistically competitive.

PRICE DETERMINATION

Market structure	Pricing rule
Perfect competition	$P = MC$
Monopolistic competition	$P = (1 + m) * MC$

PRICE DETERMINATION

- Cost equation: $W \times N$
- Suppose that production function is given by

$$Y = A \times N$$

- Cost function (in terms of output)

$$C(Y) = \frac{W}{A} \times Y$$

- Marginal cost: $MC = \frac{\Delta C}{\Delta Y} = \frac{W}{A}$

PRICE DETERMINATION

- Price setting equation implies that

$$P = (1 + m) \frac{W}{A}$$

WAGE-PRICE SETTING INTERACTION

- Wage setting determination

$$W = P^e F(u, z)$$

- Price setting determination

$$P = (1 + m) \frac{W}{A}$$

WAGE-PRICE SETTING INTERACTION: IDEALISTIC SCENARIO

- Suppose that “wage” **is automatically indexed to actual price level**

$$W = P * F(u, z)$$

- With the interaction with price setting, we yield that

$$\frac{A}{1 + m} = F(u, z)$$

NATURAL RATE OF UNEMPLOYMENT

- **Natural rate of unemployment** is defined as the level of unemployed that would prevail under **the flexible wage adjustment or nominal-wage setting with full-indexation**.

$$\frac{A}{1 + m} = F(\mathbf{u}_n, z)$$

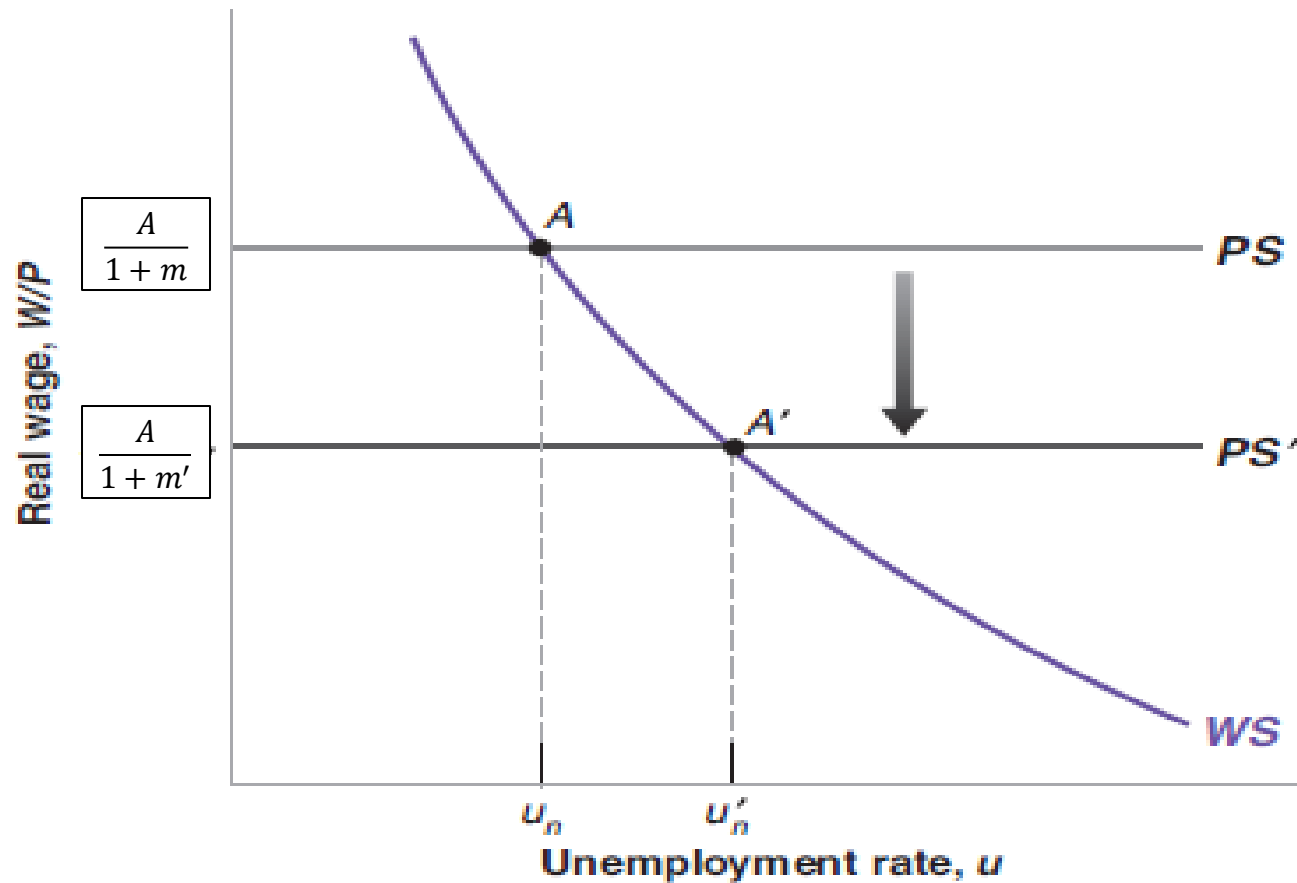
NATURAL RATE OF UNEMPLOYMENT



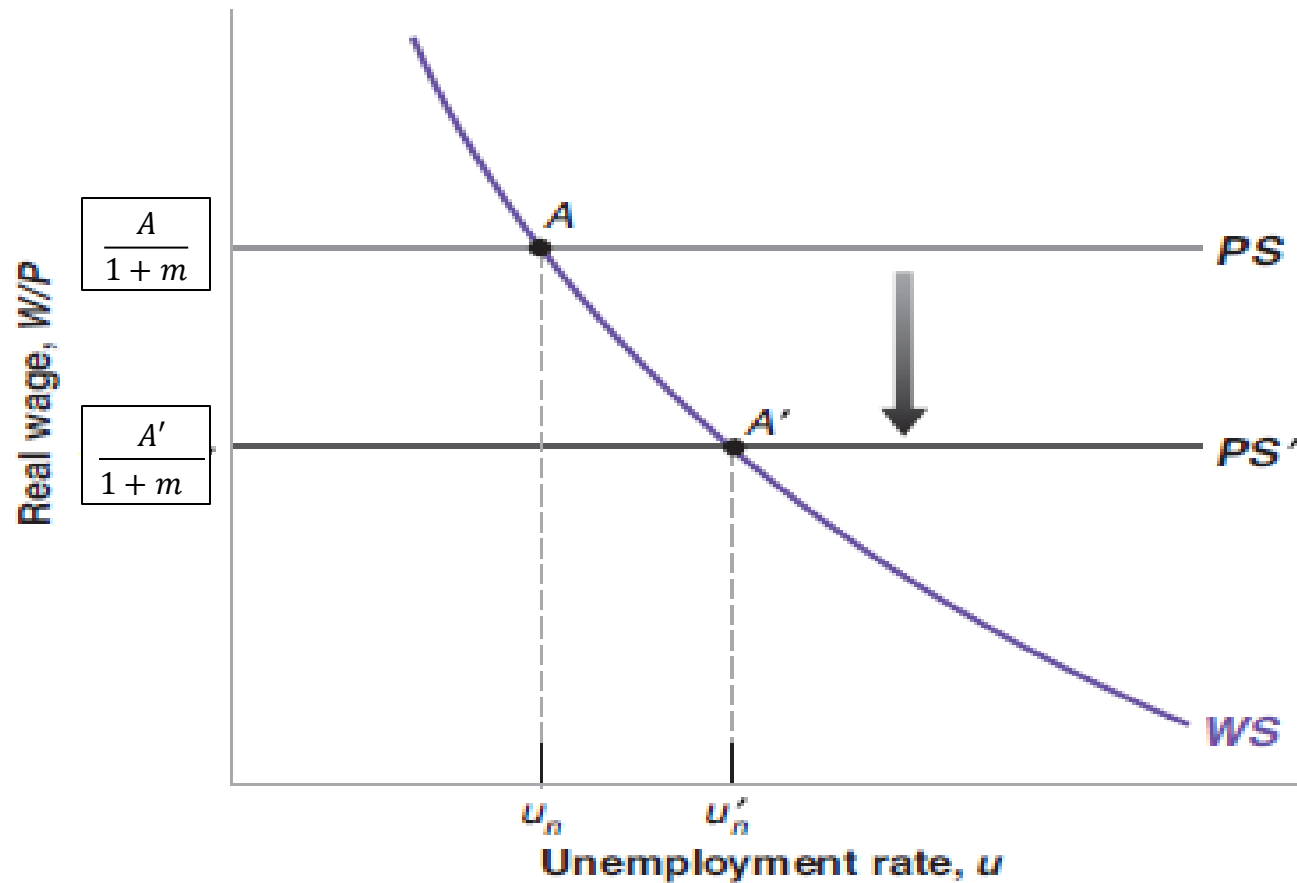
NATURAL RATE OF UNEMPLOYMENT: DETERMINANTS

- Natural rate of unemployment is determined by
 - Firms' condition: Productivity level and Firm's mark-up
 - Structural factors: unemployment benefits and unemployment protection

Higher mark-up



Lower productivity



Higher unemployment benefits and employment protections

