

ECON 222A

Macroeconomic Theory I

Productivity, Output, and
Employment
Lecture 6

Today's Lecture

- PS1: Deadline is today.
- One Class Representative
- How is the supply of labor determined?
- What forces act to alter equilibrium in employment and wages?
- Why is there unemployment? What is the link between the change in unemployment and the change in output?

Labor Demand (N^D)

- Production function (letting N vary and K fixed)
- $MB=MC$ ($MPN=w$)
- Labor Demand: plot of profit maximizing points (boils down to MPN)
- Aggregate labor demand = Sum of all the individual firms' labor demand

Aggregate N^D shifts

- Increase in productivity $\rightarrow N^D$ curve shifts right
 - MPN rises with technology, so for a given wage, hiring more people is worth it
- Decrease in capital stock $\rightarrow N^D$ curve shifts left
 - MPN rises with capital stock, worth it to hire more people to make use of the capital
- Changes in the wage: movement along the labor demand curve, do not shift the N^D curve

Labor Supply

- Remember that we are studying the labor Mkt, so we need both sides: demand and supply
- With labor markets, it's about individuals deciding how much to work for a given wage, given alternatives
- Aggregate supply of labor: sum of labor supplied by everyone

Alternatives

- Working has a 'cost': time and effort that are no longer available for other activities
- Leisure: all the off-the-job activities like eating, working around the house, family, friends, etc.

Income-Leisure Tradeoff

- Utility (happiness) – depends on G&S you consume, and the amount of time you relax.
- Unfortunately, have to work to make money to buy G&S.
- Same idea: $MB = MC$ to determine utility maximizing work/leisure levels

Real Wages and Labor Supply

- Real wage – amount of income in real terms a worker receives in exchange for giving up leisure
- Increase in real wage has two effects
 - substitution effect
 - income effect

Labor Supply Curve

- Labor supply curve – relates the amount of labor supplied to the current wage, all else equal.
- Positive relationship: as wages go up, people are more willing to supply labor (board)
- Implicit assumption: substitution effect dominates wealth effect

FIGURE 3.7

THE LABOUR SUPPLY CURVE OF AN INDIVIDUAL WORKER

The horizontal axis shows the amount of labour that a worker will supply for any given current real wage on the vertical axis. The labour supply curve slopes upward, indicating that—with other factors including the expected future real wage held constant—an increase in the current real wage raises the amount of labour supplied.

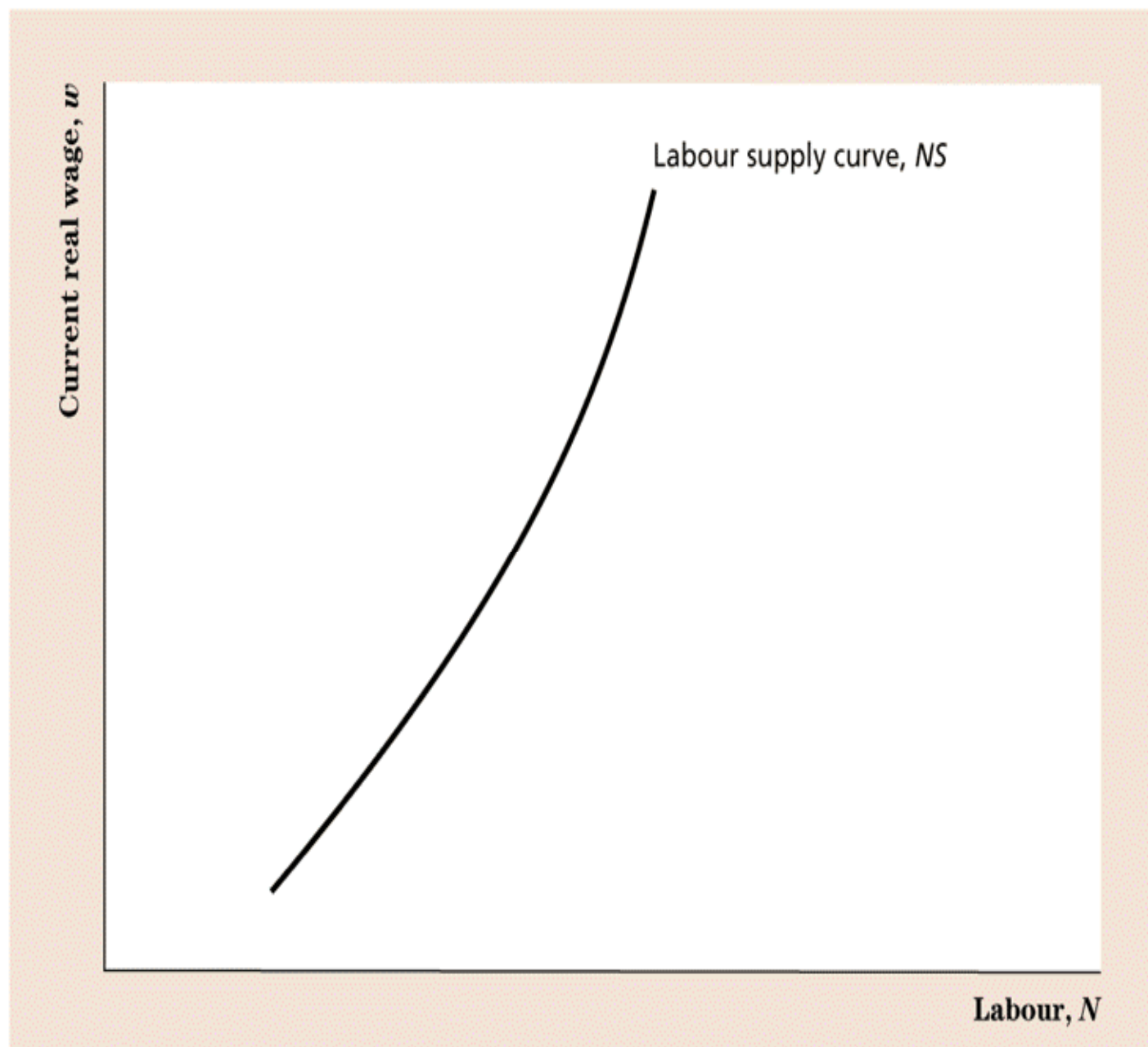


FIGURE 3.9

**AVERAGE WEEKLY HOURS,
CANADIAN
MANUFACTURING**

Reflecting the income effect of wages on labour supply, the steady increase in the real wage in Canada during the 20th century tended to reduce the average weekly hours of manufacturing workers. Weekly hours fluctuated sharply during the Great Depression and World War II, then declined further in the postwar period.

Source: For 1901–1927, average weekly hours of machinists in Halifax, Montreal, Toronto, Winnipeg, and Vancouver: Adapted from *Wages and Hours of Labour in Canada, 1901–1920*, Report No. 1, Department of Labour, Canada, Table II(d) and *Wages and Hours of Labour in Canada, 1920–1927*, Report No. 11, Department of Labour, Canada, Table I(b). For 1926–1955, average weekly hours of non-agricultural workers: *Historical Statistics of Canada* (1st ed., 1965), Series D408. For 1945–1970, average weekly hours in manufacturing: *Historical Statistics of Canada*, Series E131. For 1961–2001, Statistics Canada, CANSIM series V718395.

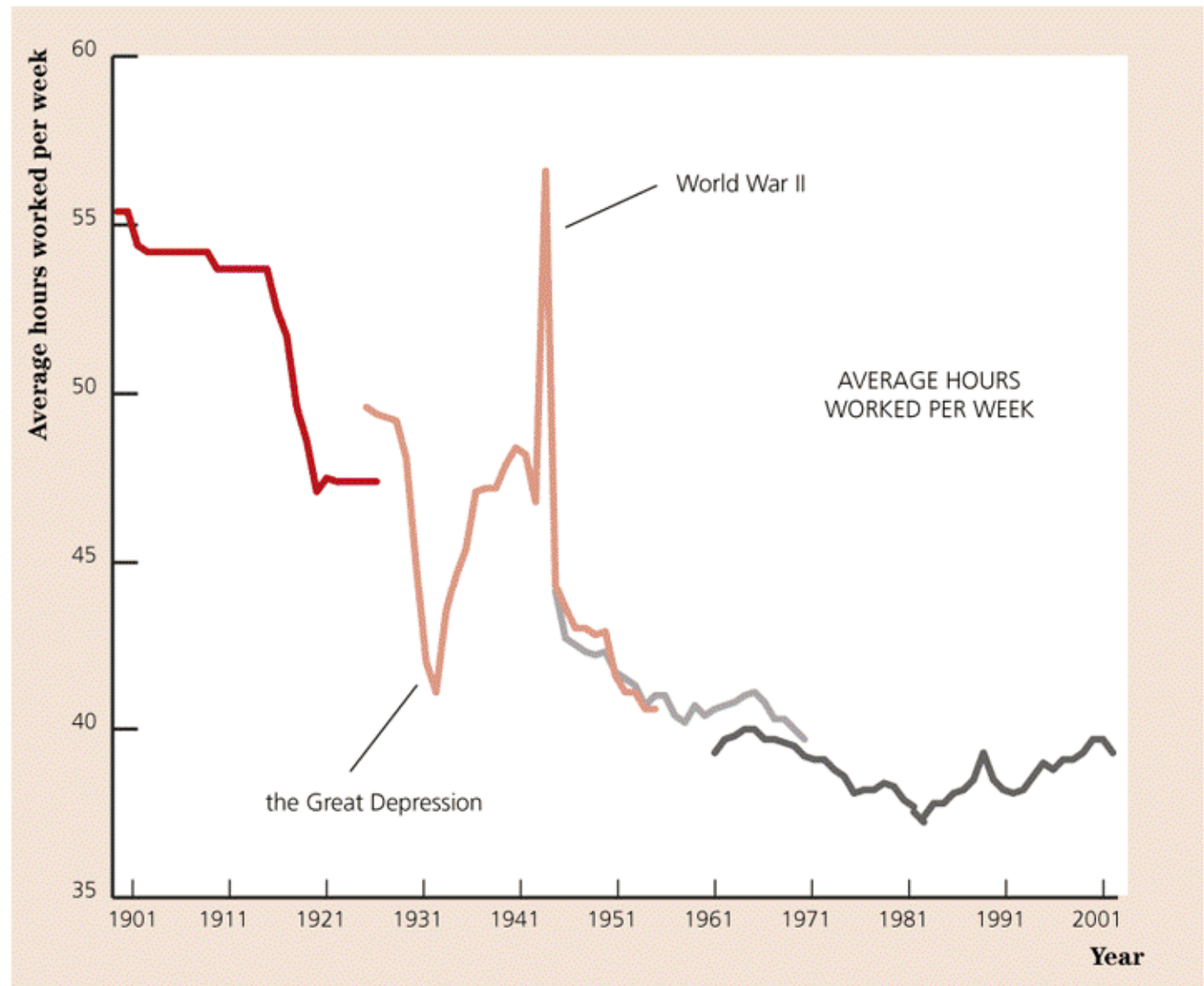
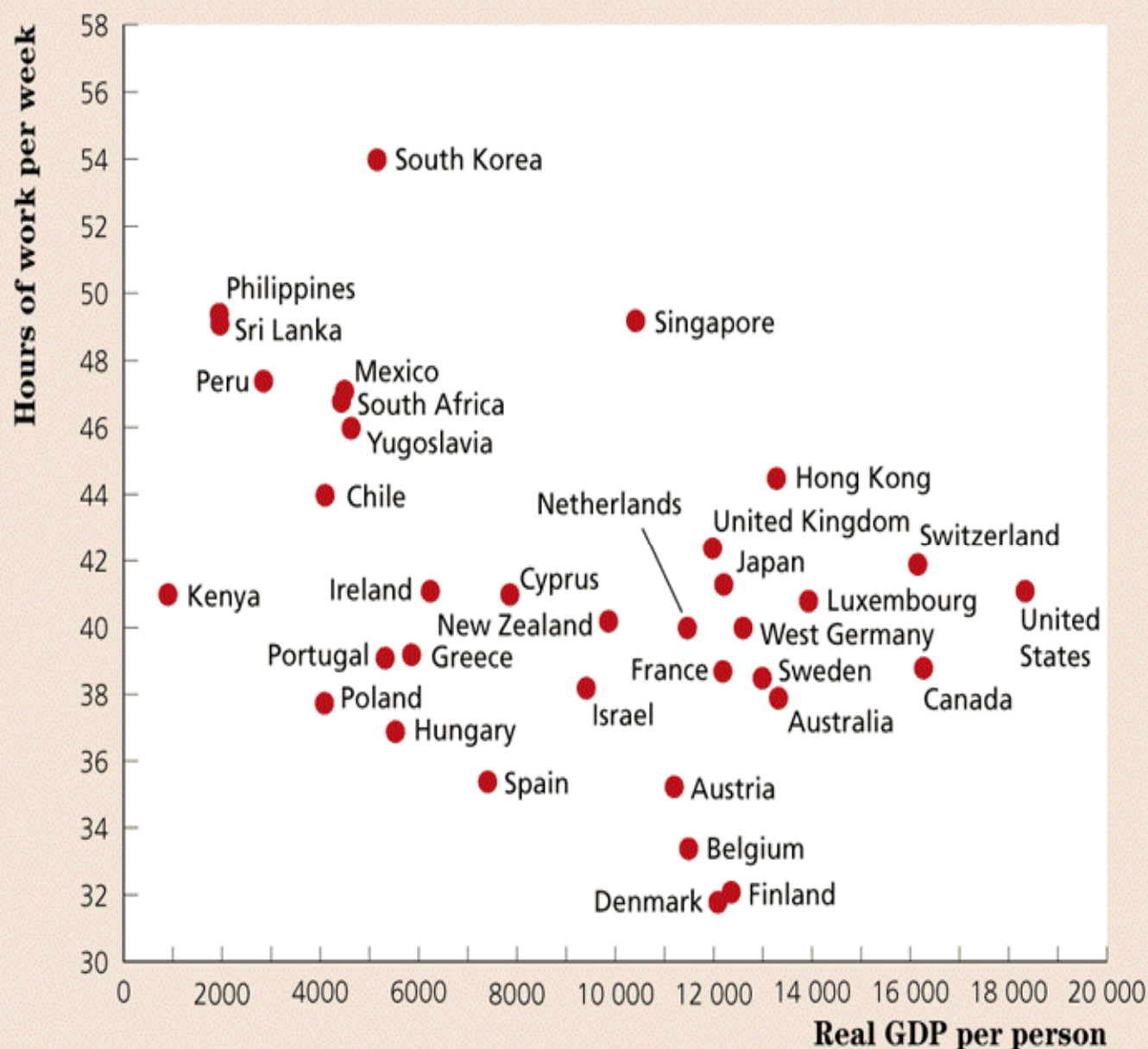


FIGURE 3.10

THE WORKWEEK AND REAL GDP PER PERSON IN 35 COUNTRIES

The point corresponding to each country shows the country's real GDP per person in 1988 on the horizontal axis and the average number of hours worked per week in manufacturing on the vertical axis. Because of the income effect on labour supply, richer countries tend to have short workweeks.

Source: Average hours per week: Based on *United Nations Statistical Yearbook, 1988–1989*, Table 41, p. 316; real GDP per capita in 1985 dollars: Based on Robert Summers and Alan Heston, "The Penn World Table (Mark 5): An Expanded Set of International Comparisons, 1950–1988," *Quarterly Journal of Economics*, May 1991, pp. 327–368, Table II.



Shifts in Labor Supply

- Changes in factors that increase/decrease labor supply, for a given wage, shift the curve right/left
 - lottery win: shift left

Aggregate Labor Supply (N^S)

- The total amount of labor supplied by everyone in the economy
- Increase in economy-wide wages means more labor will be supplied
 - substitution effect (dominates wealth effect)
 - some people not in the labor force will enter and look for jobs

Shifts in Aggregate Labor Supply (N^S)

- Other things that increase total labor supplied for a given wage shift the aggregate N^S curve
 - increased wealth (shift left)
 - increased expected future wage (shift left)
 - working age population (shift right)
 - participation rate (shift right)

The Labor Market

	Labour Demand	Labour Supply
Determined by	Firms	Individuals
Goal	Max Profits	Max Utility
Benefit	MPN	Real Wage
Cost	Real Wage	Loss of Leisure

Labor Market Equilibrium

- We treat labor just like any other commodity: there is a price (w) and two quantities N^D and N^S
- Aggregate $N^D(w) = \text{Aggregate } N^S(w)$
- (Equilibrium Condition)
- Classical perspective: real wage adjusts fast enough to keep market in equilibrium
- Graphically it is the intersection of the N^D and N^S curves (board)
- Market-clearing point is a full employment situation

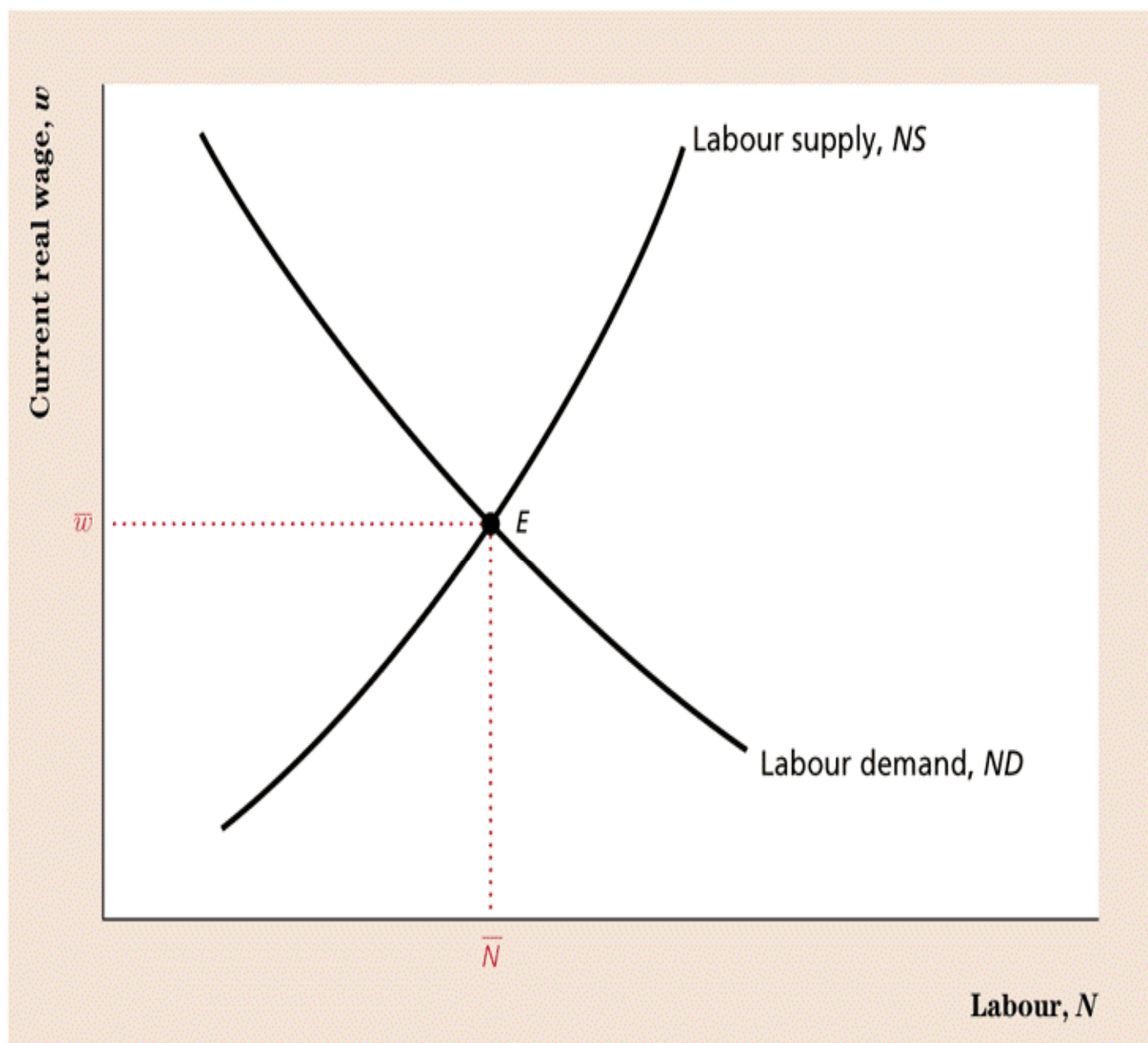
Labour Market Equilibrium

- Supply = Demand
- It's the resulting point of two opposite forces at work.
 - Workers who would prefer less hours of work for some wage
 - Firms who would prefer less hours of work for some wage
- The only point satisfying these opposite forces is the equilibrium point.

FIGURE 3.11

LABOUR MARKET EQUILIBRIUM

The quantity of labour demanded equals the quantity of labour supplied at point E . The equilibrium real wage is \bar{w} , and the corresponding equilibrium level of employment is \bar{N} , the full-employment level of employment.



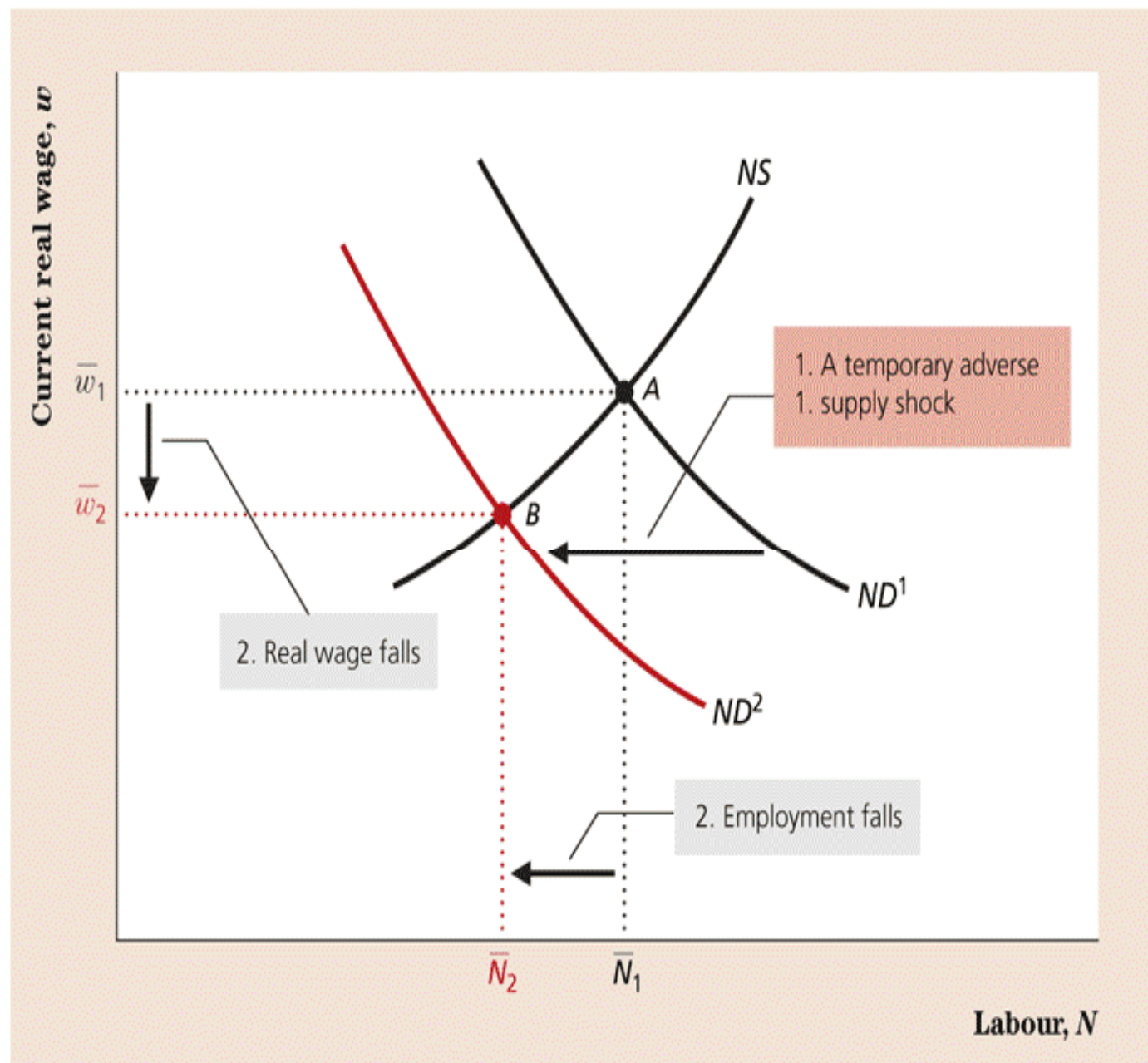
Shifts change the Equilibrium

- Shifts in N^D and/or N^S change the equilibrium level of employment and wages
- Examples:
 - adverse productivity shock: reduces labor demand at all wage levels
 - MPN falls as A falls (from before)
 - board

FIGURE 3.12

EFFECTS OF A TEMPORARY ADVERSE SUPPLY SHOCK ON THE LABOUR MARKET

An adverse supply shock that lowers the marginal product of labour (see Figure 3.4, p. 63) reduces the quantity of labour demanded at any real wage level. Thus, the labour demand curve shifts left, from ND^1 to ND^2 , and the labour market equilibrium moves from point A to point B . The adverse supply shock causes the real wage to fall from \bar{w}_1 to \bar{w}_2 and reduces the full-employment level of employment from \bar{N}_1 to \bar{N}_2 .



Full Employment?!?

- Recall the Smith vs. Keynes debate
- This model is simple, but predicts full employment for anyone who wants a job, as the wage adjusts instantly
- Problem with classical model: can't study unemployment
- There can be unemployment (excess supply of labor) if:
 1. Matching people to jobs can be a time consuming process;
 2. The wage adjusts slowly.

Full-Employment Output

- Combine labor market equilibrium and the production function
- Full-employment output (or potential output): level of output that firms in the economy supply when wages and prices have fully adjusted
- Production function, for given A and K , when N has reached its equilibrium level \bar{N}

$$\bar{Y} = AF(K, \bar{N})$$

Unemployment

- Classic model is rooted in the assumption that in equilibrium, all people who want a job can find it
- But we see people looking for jobs, without one, in the real world

Measurement

- Unemployment is measured using the monthly *Labour Force Survey*.
- *Statscan* surveys 62,000 households, over 15 years old and puts them in one of 3 groups:
 - employed: has a full/part time job
 - unemployed: without work, and available/looking
 - not in the labor force: does not work and is not looking

Important definitions

- Labor Force: $U + E$
- Unemployment rate = U/LF
- Participation rate = LF/P
- Employment ratio = E/P

Labor force, Winter Term 2010

Category	Number (Millions)	Share of Labor Force (%)	Share of Adult Population (%)
Employed Workers	16.6	91.7	71.6 (emp. ratio)
Unemployed Workers	1.5	8.3 (unemp. rate)	6.5
Labor Force	18.1	100	78.1 (participation rate)
Not in Labor Force	5.1		21.9
Adult population (16-64 y.o.)	23.1		100

Source : StatCan, Table 282-0087, seasonally adjusted.

Changes in Employment Status

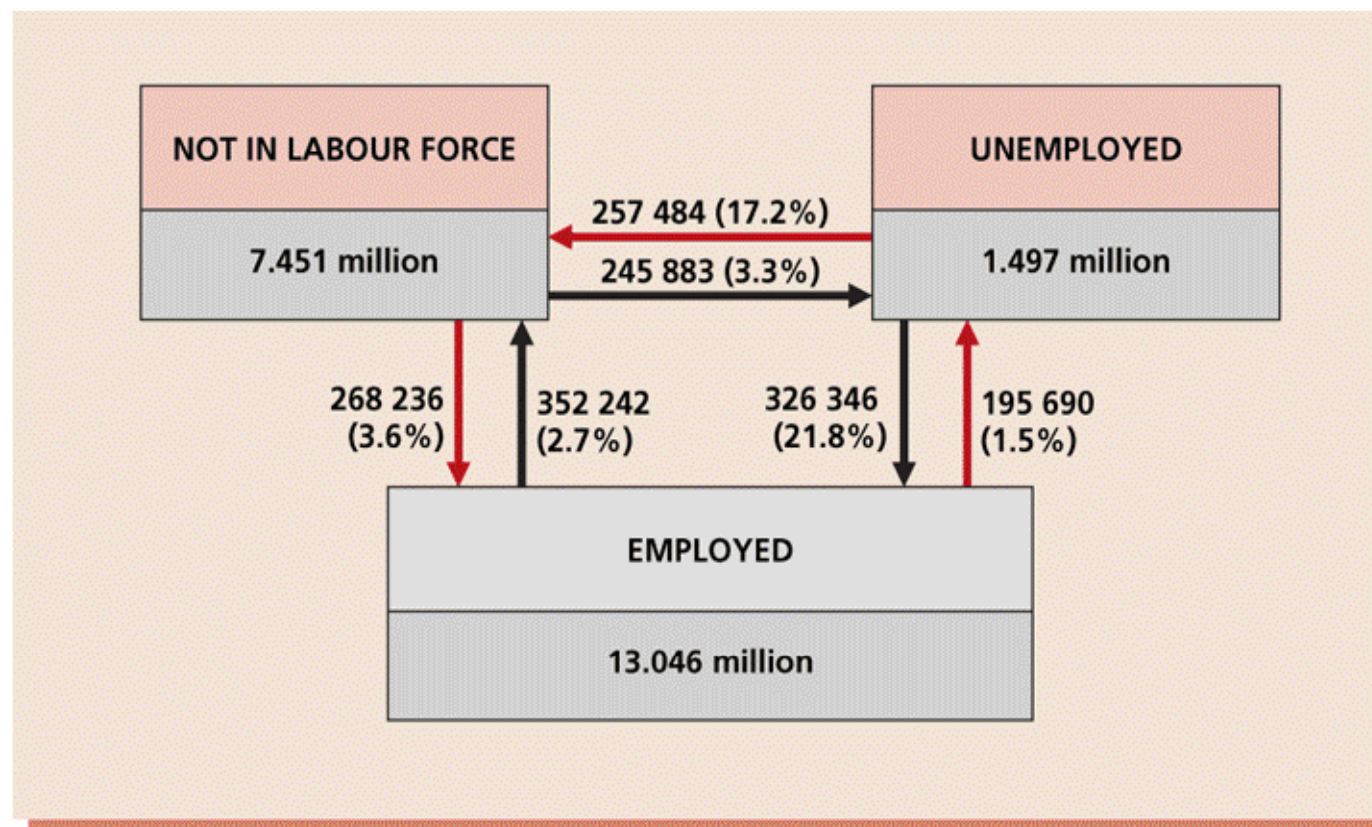
- Labor markets are very dynamic, they are constantly changing. That's why we study them in the short run.
- Can have fixed employment rate with 1,000's of people becoming unemployed, and 1,000's becoming employed. Flows are crucial!
- Discouraged workers: people, who after losing a job, stop looking and leave the labor market.

FIGURE 3.15

**CHANGES IN EMPLOYMENT
STATUS IN A TYPICAL
MONTH**

The arrow between two boxes represents a change from one employment status to another; the label on the arrow shows the number of people in one status who switched to the other status in a typical month, during the period 1990–1994. For example, the arrow from the unemployed box to the employed box shows that 326 346 unemployed workers (21.8% of the unemployed) became employed the following month. The arrow from the employed box to the unemployed box shows that 195 690 employed workers (1.5% of the employ became unemployed during the following month.

Source: Adapted from Stephen R. G. Jones and W. Craig Riddell, "Gross Flows of Labour in Canada and the United States," *Canadian Public Policy*, February 1998, pp. 103–120.



How long do people stay unemployed?

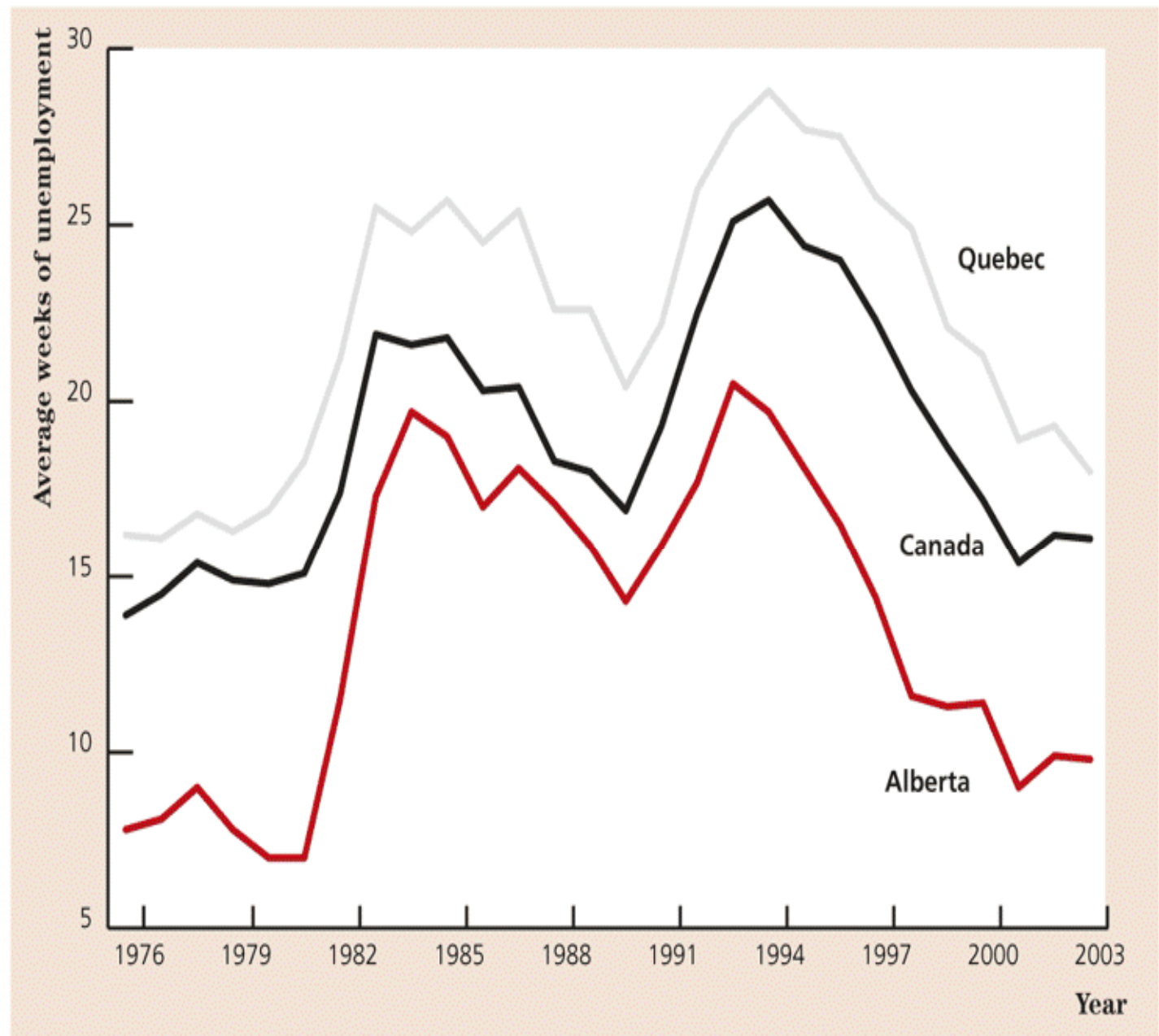
- Unemployment **spell**: = period of time an individual is continuously unemployed.
- The length of an unemployment spell is called unemployment duration
- Duration of spells has two characteristics:
 - they are short (two months or less)
 - most people who are unemployed on a given date are experiencing spells with long duration
- Knowing the composition is crucial for public policy

FIGURE 3.16

THE AVERAGE DURATION OF UNEMPLOYMENT, 1976–2003

The figure shows the average number of weeks someone suffering a spell of unemployment remained unemployed. These data are presented for two provinces (Quebec and Alberta) as well as for Canada as a whole. Note how unemployment duration rises during recessions (1981–1982, 1991–1992) but falls during expansions (1983–1990 and 1993–2003).

Source: Adapted from the Statistics Canada CANSIM database <<http://cansim2.statcan.ca>>, Table 282=0048.



There is always Unemployment

- There will always be unemployed people, even if the economy is booming
 1. frictional unemployment: arises when workers search for suitable jobs and firms search for suitable workers
 2. chronically unemployed: workers who are unemployed most of the time (but may have brief employment periods)

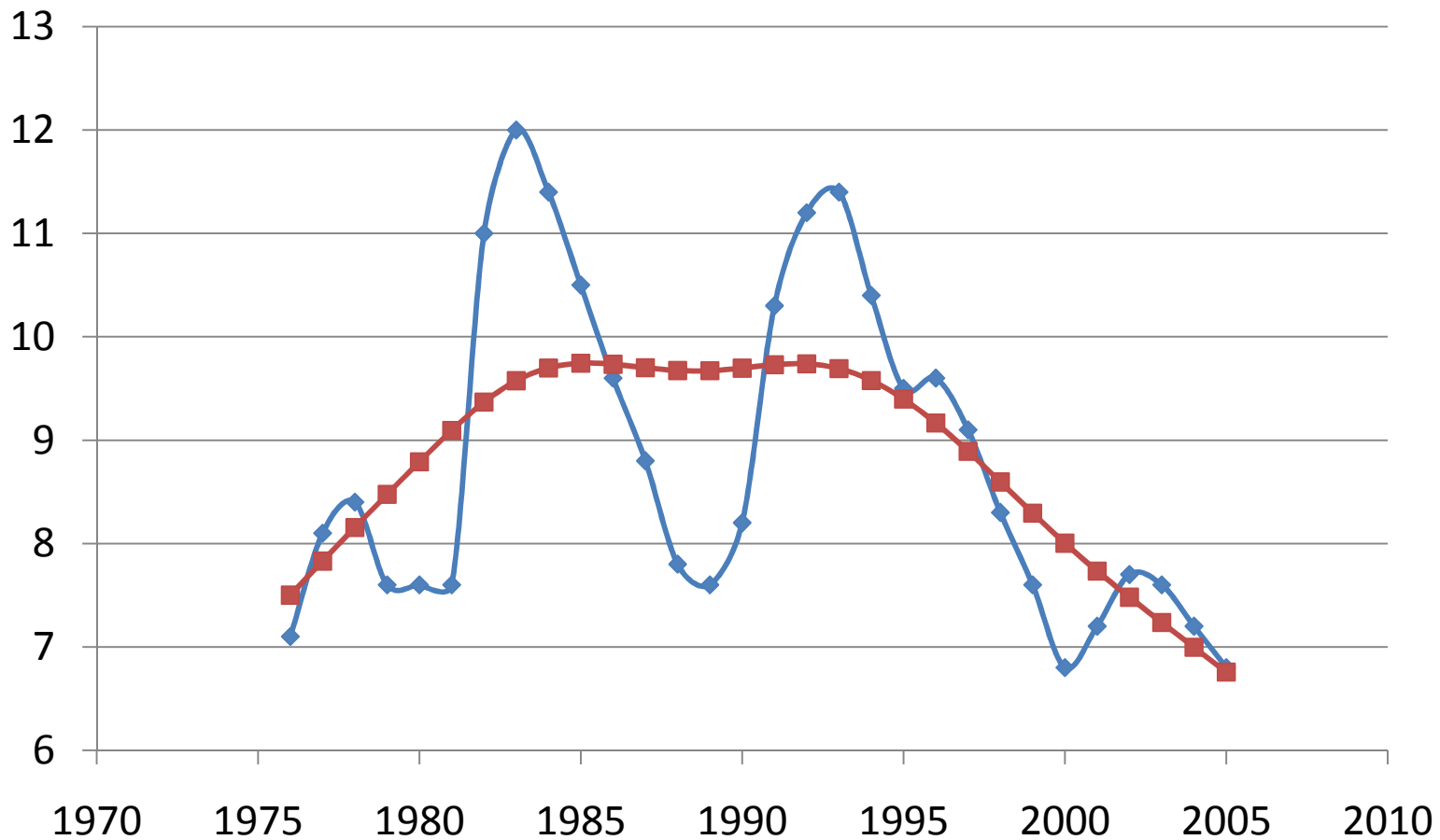
Structural Unemployment

- Structural Unemployment: long term and chronic unemployment, even when the economy is not in a recession
 - low skilled and unskilled workers always have a hard time finding jobs
 - industrial reallocation: if several firms (a sector) are shutting down, several people lose jobs

Natural and Cyclical Unemployment

- Natural rate of unemployment \bar{u} : rate of unemployment that prevails when output and employment are at the full-employment level (roughly 6%)
- Cyclical unemployment: difference between the actual rate of unemployment and the natural rate ($u - \bar{u}$)

Trend and Cycles



Okun's Law

- Relates Output and Unemployment
- Okun's Law: the gap between the economy's full-employment output, and the its actual level of output increases by 2% for each 1% increase in the unemployment level

$$\frac{\bar{Y} - Y}{\bar{Y}} = 2(u - \bar{u})$$

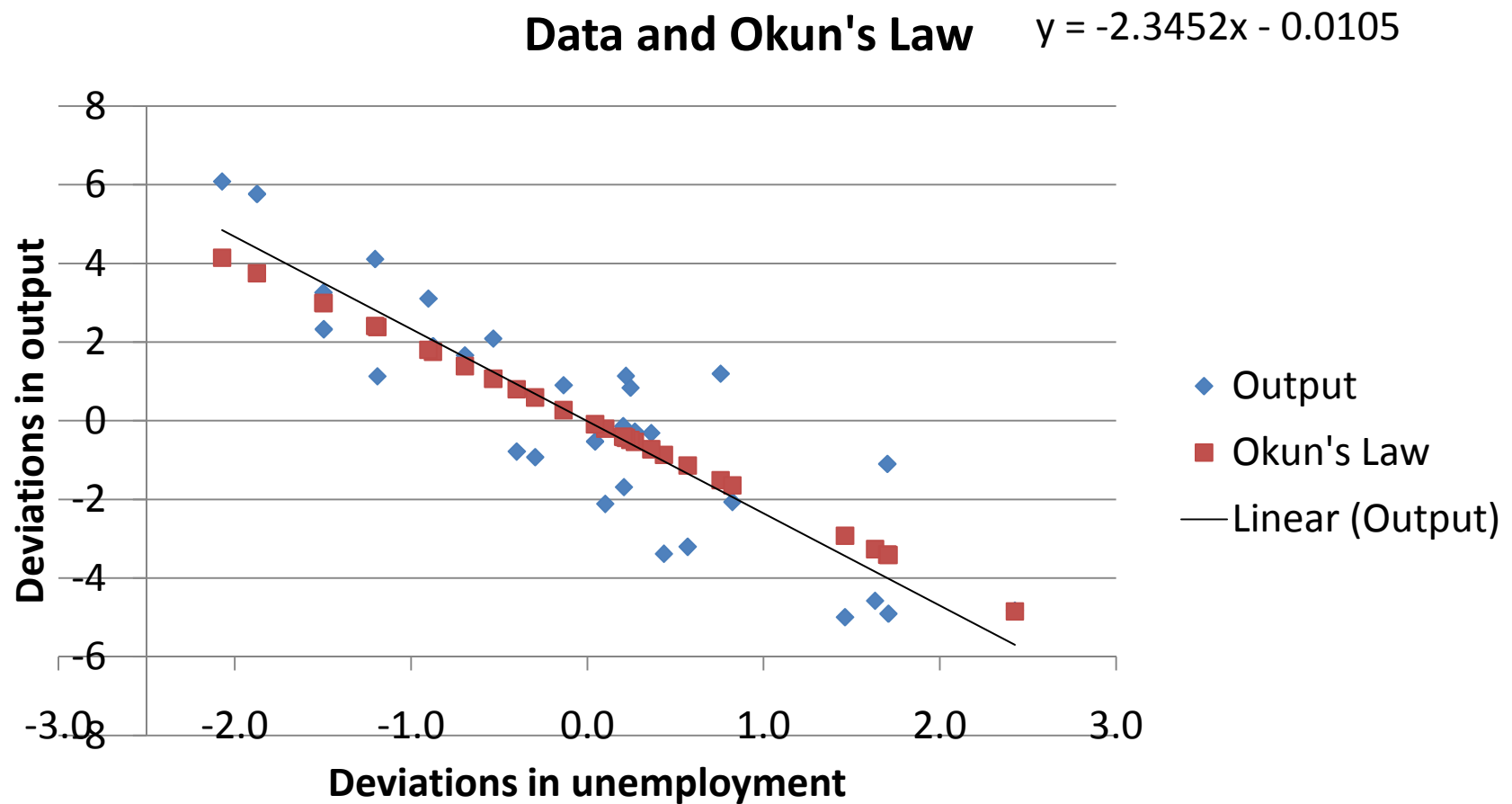
Okun's Law (2)

- Okun's law can be rewritten in a slightly different fashion

$$\frac{\Delta Y}{Y} = 3 - 2\Delta u$$

- Tells us there is a negative relationship between output growth and the change in the unemployment rate
- Is it true in the data?

Okun's Law



Source: StatCan

FIGURE 3.17

OKUN'S LAW IN CANADA, 1967–2003

This figure shows the relation between the growth rate of real GDP (vertical axis) and the change in the unemployment rate (horizontal axis). Each point represents one year and shows the change in the unemployment rate and the change in real output that was realized in that year. The black line is the line of best fit running through these points. The slope of this line is -1.6 , indicating that a 1 percentage point change in the unemployment rate is typically associated with a change in the growth rate of output equal to 1.6 percentage points in the opposite direction. The blue line shows Okun's law. It has a slope of -2 . The rule of thumb described by Okun's law does a reasonable job of describing the relation between the growth rate of output and the change in the unemployment rate in Canada.

Source: Adapted from the Statistics Canada CANSIM database <<http://cansim2.statcan.ca>>, Series V2062815, and from the Statistics Canada publication *Canadian Economic Observer*, Catalogue no. 11-010, vol. 18, no. 03, March 2005.

