

PART IV. STRUCTURAL UNEMPLOYMENT

6. SOME FACTS AND INTRODUCTORY THEORY ABOUT UNEMPLOYMENT

- **In the growth models** adjustments in the real wage ensured that **labour demand was always equal to labour supply**, because **markets were assumed to be perfectly competitive**. Literally speaking we assumed that there was **no unemployment** at any point in time. **In the real world there is always at least some unemployment**.
- Figure 6.1 shows average annual rates of unemployment for the USA and Denmark over a long historical period.

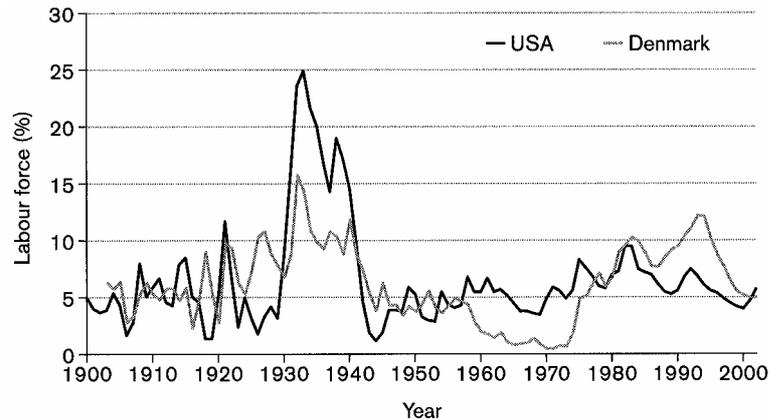


Figure 6.1: Rates of unemployment in the USA and Denmark during the twentieth century

■ As we explained in Lecture 1, the **movements in the rate of unemployment** can be viewed as consisting of **two components**: a **long-run trend** which could be described as a tendency towards a constant unemployment rate **around 5-7 per cent over very long**

periods, and **cyclical fluctuations** around the trend. The **fluctuations are sometimes large**, and perhaps so large that one would really not call them fluctuations. Occasionally unemployment has gone to very high levels in both countries. For instance, **in the 1930s the rate of unemployment went up to 25 per cent in the USA** and above 15 per cent in Denmark, and over the 1970s and early 1980s, unemployment rose to rates of around or above 10 per cent in both countries.

■ **The fact that the long run “gravity” rate of unemployment is not zero** but is rather in the range of 5-7 per cent **is not a problem for the growth theory**. We can simply **reinterpret the L_t** appearing in the growth models **as total employment when the labour supply is used at a normal, or natural, rate**. Our growth models were **just silent about what determines the natural rate of utilization**.

■ For society it is **important how high the long-run rate of unemployment is**. It makes a difference if the average rate of utilization of the most important economic resource, labour, is 96 per cent or 92 per cent. This lecture, and the next two, are focused on the **forces that determine the long-run or so-called natural rate of unemployment**.

The social cost of unemployment

- **High unemployment is a major economic and social problem** and a concern of economic policy makers mainly for **two reasons**. At the **individual level**, when unemployment is high many persons will have to go through **long spells of joblessness**. They therefore suffer substantial **income losses** that may force them and their families to move from their homes, change the children's schools, take a cut in their standard of living, etc.
- Although **unemployment insurance** is available in most countries, it **does not insure a person's income fully**, and it only covers a **limited period**. In addition to the loss of income, **longer periods of involuntary unemployment may inflict serious psychological costs** on the jobless, because an unemployed **person may feel excluded from society** and therefore **lose self-esteem**. Unemployment thus gives rise to serious individual problems.
- At the **level of society**, unemployment is a **social waste**, because **income** that could have been earned to the benefit of the individual as well as society **is forgone**. The income that

unemployed persons would have earned, had they had jobs, **would have been taxed**, and the tax revenue could have been used to the benefit of other citizens. When unemployment is high, the associated loss of tax revenues will be substantial. Thus the **income loss of an unemployed person is partly suffered by the unemployed himself and partly by other members of society**. In any case it is a waste of resources to have **people who are both qualified and willing to work at the going wage rates, unable to do so**.

■ Economists explain the **social waste associated with involuntary unemployment** in more detail as follows. Let the **marginal product of** (a particular type of) **labour** be *MPL*, that is, *MPL* is the **increase in production that will arise if one more worker is put to work**, or the decrease that will result if one individual is taken out of work. Usually we think of the **marginal product of labour** as being **decreasing in employment** because of the **presence of fixed factors**, e.g. capital or land, or because the **most productive workers are hired first**.

■ The **marginal product of labour must be held up against the marginal rate of substitution between consumption and leisure**, *MRS*, also referred to as the **marginal**

disutility of work. A worker's *MRS* is the amount of goods needed to compensate him for the leisure and the value of the home production he must give up when taking a job. Typically different workers will have a different *MRS*. A person will obviously want to work if offered a real wage above their *MRS*, so the total labour supply induced by a given real wage is the number of workers having an *MRS* below that wage rate.

■ If a worker's marginal product is larger than his or her *MRS*, then a social loss occurs if he or she does not work, since putting him or her to work gives an additional amount of output sufficient to compensate the worker and to leave a surplus that can be shared with other members of society (through taxation) to the benefit of everybody. A situation where $MRS < MPL$ thus implies inefficiency in the use of labour resources.

■ Now, if there is involuntary unemployment and firms maximize profits, there will indeed be jobless workers with marginal products exceeding their disutilities of work. An involuntarily unemployed person would like to work at the going real wage rate, W/P , so this wage rate must be greater than his or her disutility of work, $MRS < W/P$.

- **Profit maximization implies that the last worker hired has a marginal product at least as great as the going real wage rate, that is, $W/P \leq MPL$, since otherwise the firm could increase its profits by firing the marginal worker.** On the plausible assumption that the marginal product of labour decreases gradually with employment, **there will be unemployed workers with marginal products close to that of the last worker hired.**

- In other words, **there will be unemployed workers for whom the condition $W/P \leq MPL$ is (very close to being) fulfilled.** Collecting what we have found, **if there is involuntary unemployment, then there must be unemployed workers for whom $MRS < W/P \leq MPL$, implying $MRS < MPL$.** Hence their **joblessness involves a social loss.**

- For these reasons it is of great interest to know **what determines the rate of structural unemployment** and **what policy measures** could bring the natural rate of unemployment down from, say, 8 per cent to 4 per cent. These are exactly the questions to which we now turn. This lecture lays the basis for answering these questions by going through some **empirical regularities concerning unemployment** and by presenting some introductory theories. The next two lectures will present two main theories of structural unemployment.

The rate of unemployment

Labour force, employment and unemployment

■ The rate of **unemployment is a stock variable** that can be measured at a given point in time, say on a specific day. Let the total number of persons who would like to work on day t be L_t . This is the **labour force**, which can be viewed as the **size of the population of working age**, P_t , **times the participation rate**, π_t , that is, $L_t = \pi_t P_t$. One can further subdivide into various groups such as **women and men**, $L_t = \pi_t^w P_t^w + \pi_t^m P_t^m$, where π_t^w and π_t^m are the participation rates of women and men, respectively. **Total employment** on day t , E_t , is the number of persons actually having a job on that day. The **number of unemployed** is then simply $U_t = L_t - E_t$, and the rate of unemployment is

$$u_t \equiv \frac{U_t}{L_t} = \frac{L_t - E_t}{L_t} = 1 - \frac{E_t}{L_t} \equiv 1 - e_t$$

where we have denoted the rate of employment by e_t . Table 6.1 shows an estimate of the labour forces in the USA and Denmark for the month of January 2002, and it also shows the decomposition of the labour forces into employed and unemployed.

Table 6.1: Labour market data, January 2002

(in 1000 persons)	USA	Denmark
Population in working ages*		
– Women	92,186	1,735
– Men	88,154	1,775
Participation rates		
– Women	69%	78%
– Men	83%	87%
Labour force		
– Women	64,043	1,355
– Men	72,744	1,537
Total Labour force (L)	136,787	2,893
Employed (E)	128,013	2,782
Unemployed ($U = L - E$)	8,774	169
Rate of unemployment (U/L)	6.4%	6.1%

- The rate of **unemployment contains an element that is not as readily measurable as GDP**, employment, inflation, etc., namely the **number of persons, L_t , who *would like to have a job***. Out of these the E_t employed actually have a job, so we can infer that indeed these people want to work. The U_t unemployed, however, are persons who would like to work and yet do not do so. How do we measure the number of such people?
- **One way** is to **limit attention to those covered by unemployment insurance** and to assume that individuals who plan to be active in the labour market will want to insure themselves against unemployment. One can then let L_t be the total number of people holding unemployment insurance, and let E_t be the number of insured people who have a job.
- **Another way** is to let L_t be the sum of all those who have a job (E_t) and all **those who are registered at some kind of (public) institution as looking for a job but not having one (U_t)**. A **third way** is to let L_t consist of all **persons who either have a job (E_t) or receive unemployment benefits or social assistance benefits motivated by joblessness (U_t)**.

- A fourth way is to estimate the number of unemployed by **survey techniques** asking a representative sample of individuals **whether they are available for work**. The **three latter ways are the most common**, and all the data for unemployment you will see in this lecture are of these types.
- Although the rate of unemployment by definition pertains to a specific day, the data for unemployment most often shown are annual (or quarterly or monthly) rates. Figure 6.1, for instance, shows annual rates. The **annual rate of unemployment is simply the average** over all the working days in the year of the daily rates of unemployment as defined above.

The duration of unemployment

- When you hear that the annual rate of **unemployment was 12 per cent in Denmark in 1993**, you **might think that 12 per cent of the people in the labour force were unemployed during all of 1993**. This was **not the case**.

- Indeed, **many more people than 12 per cent of the labour force experienced some unemployment during 1993**, but **most of these people were unemployed for considerably less than all of the year**.
- Table 11.2 shows that in Denmark in 1993, the **fraction of people in the labour force who experienced some unemployment was 29 per cent**, but 21 per cent of these people were unemployed for less than five weeks, 44 per cent were unemployed less than 14 weeks, while 64 per cent were unemployed for less than half the year. A considerable 36 per cent of those affected by unemployment, that is, 10.4 per cent of all people in the labour force, were unemployed for more than half the year.

Table 6.2: Duration of unemployment

1993			1998		
Percentage of people experiencing unemployment during the year, who were unemployed for	USA		Percentage of people experiencing unemployment during the year, who were unemployed for	USA	
	USA	Denmark		USA	Denmark
Less than 5 weeks	37	21	Less than 5 weeks	42	39
5–14 weeks	29	23	5–14 weeks	31	25
15–26 weeks	15	19	15–26 weeks	12	16
27 or more weeks	20	36	27 or more weeks	14	20
	100	100		100	100
Persons having experienced unemployment as a percentage of the labour force	20	29	Persons having experienced unemployment as a percentage of the labour force	16	23
Unemployment rate, %	7	12	Unemployment rate %	5	7

■ **In the USA the annual rate of unemployment was substantially lower than in Denmark in 1993, namely 7 per cent, and the fraction of people in the workforce who experienced**

some unemployment was 20 per cent. Of these people, 20 per cent were unemployed for more than half the year, implying that **only 4 per cent of the people in the labour force were unemployed for more than half the year.**

■ **This illustrates a general fact** that we will return to below. **When overall unemployment is high, a greater share of total unemployment is long-term unemployment.** The figures for 1998 also confirm this. In Denmark the annual rate of unemployment had come down to 7 per cent, and now only 20 per cent of those affected by unemployment were unemployed for more than half the year, as opposed to 36 per cent in 1993 when the overall unemployment rate was 12 per cent.

■ When it comes to the individual costs of unemployment, it is **long-term unemployment that is most severe.** If no people were ever unemployed for more than, say, one month during a year, the individual loss would not be severe. However, those who are unemployed for long periods may be badly hurt by unemployment. **A close positive relationship between the overall rate of unemployment and the rate of long-term unemployment provides one of the main reasons for trying to avoid high unemployment** in general.

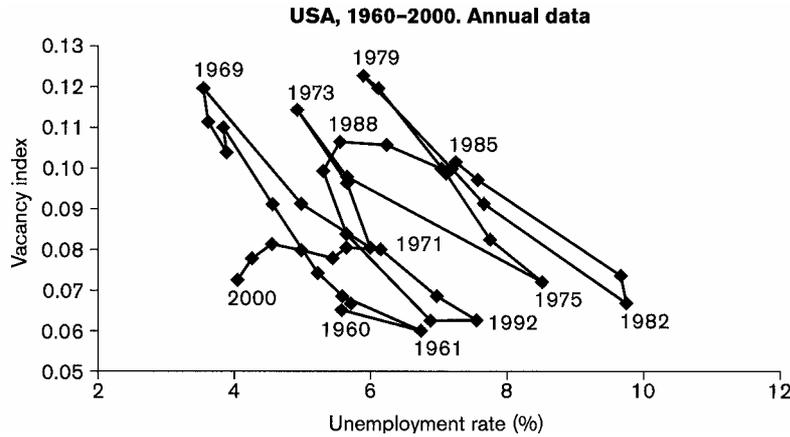
The Beveridge curve

■ **If there is (involuntary) unemployment, can there be vacant jobs at the same time?** At first, one would perhaps say no. If there are **unemployed people truly seeking jobs**, they should **take the vacant jobs until there are no more vacancies**. If there is unemployment there should be no vacancies, and if there are vacancies there should be no unemployment. This would correspond to a **perfect matching in the labour market** between people who want jobs and the employers who offer jobs. However, the **matching is never that perfect**.

■ Just as one can define a rate of unemployment at a given time, one can define a **rate of vacancies**. Let J_t be the total number of jobs offered by employers on day t , and let E_t be total employment on that day. The number of vacancies is then $V_t = J_t - E_t$, and the **vacancy rate** is $v_t \equiv V_t/J_t$.

- To obtain data for vacancy rates requires that we can **measure the number of vacant jobs**, V_t . This involves **even more practical problems** than measuring the number of unemployed people, U_t , but one can try in different ways.
- In the **USA** a “**vacancy index**” is computed as a **proxy for the rate of vacancies**. The vacancy index equals a “**help wanted**” **index divided by employment**, where the **help wanted index measures the number of job advertisements in major US newspapers**.
- In **Denmark** a vacancy rate can be computed, at least for some years, based on the **number of vacant jobs reported by the employers to the public employment agency**. None of these ways are perfect, but **if the measurement error is the same at different dates**, a **time series for a vacancy rate or index** constructed this way will give a **correct indication of the direction of changes in labour market conditions**.
- The **perfect matching** between “people wanting jobs” and “jobs wanting people” described above **would imply that in a diagram with u_t along the horizontal axis and v_t along the vertical axis, only points (u_t, v_t) on one of the two axes would be observed**.

■ Figure 6.2 shows how the points are actually situated in the US for the period 1960-2000, and in Denmark for the period 1974-1988.



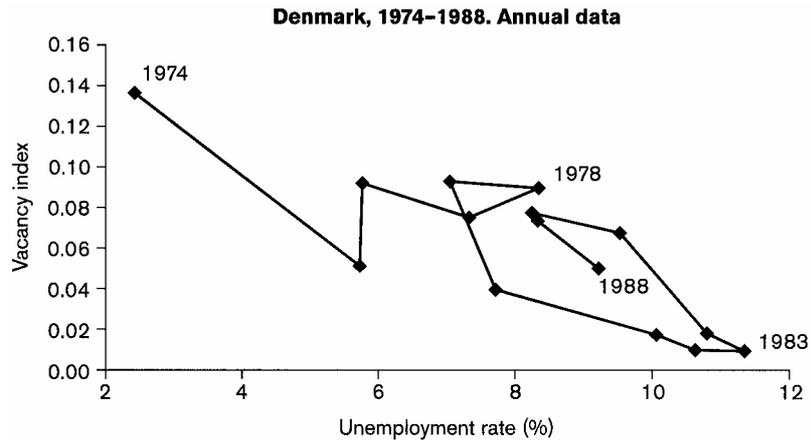


Figure 6.2: Beveridge curves

Sources: OECD, Bureau of Labor Statistics (US), and data material for K. Albaek and H. Hansen, “The Rise in Danish Unemployment: Reallocation of Mismatch?”, Working Paper, Department of Economics, University of Copenhagen, 2001.

- **The points for Denmark** seem to be situated on a fairly stable downward-sloping curve. This curve is called a **Beveridge curve**. **The fact that the curve does not just follow the axes is an indication of “mismatch” in the labour markets.**
- **The further out to the northeast the curve is situated, the more severe are the problems of mismatch.** The position of the Beveridge curve can thus be seen as an **indicator of structural problems in the labour market**. This is exactly why the Beveridge curve is useful.
- **If the position of the curve shifts over time, this indicates shifts in the matching efficiency in the labour market.** Look at the Beveridge curve for the USA based on the vacancy index. Between 1960 and 1970 or 1971 the points are located on a nice downward-sloping curve just as for Denmark. **Then there is a shift outwards.** The points for 1975 to 1985 are again situated relatively nicely on a downward-sloping curve, but the curve has shifted considerably to the north-east. This indicates that **during the decade 1975 to 1985 people and jobs had much greater problems finding each other** than during the decade 1960-1970.

■ One would expect this to be **part of the reason why there was more unemployment** in the latter of these decades. Since 1985 there seems to have been an almost continually ongoing improvement of the basic structures of the American labour market.

Stylized facts about unemployment

■ We mentioned that the **rate of unemployment contains an element that is not easy to measure**, namely the number of **people who do not have a job but would have liked to have one**.

■ For this reason there is some disagreement among economists about **how much to trust statistics on unemployment rates**. **Should these be included among the time series that theories are held up against**, or should one only include series of “truly measurable” variables? Yet most economists believe that one can **safely trust reported statistics of unemployment to give at least some indication** of the extent of involuntary unemployment.

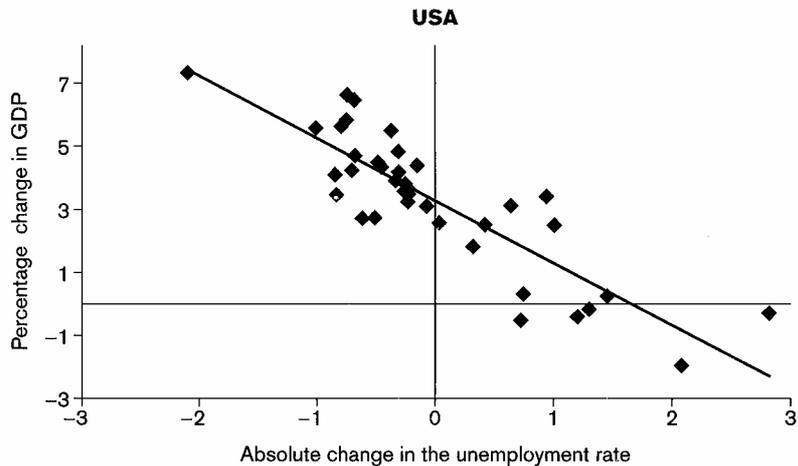
- To see why, we may start by asking **if there is a way to test if those who report that they are involuntarily out of work would actually take a job at the going wages if they were offered one?**

- Assume that due to “good times” there is a **sudden increase in the demand for labour. If this reduces unemployment without driving up real wages too much**, it can be taken as a **sign that those who reported being unemployed actually did want jobs at the going wages**, since they indeed took jobs at these wages when they had the chance.

- In other words, **if we observe a clear relationship between increases in GDP and decreases in the rate of unemployment** and, at the same time, do not observe that real wages increase sharply as soon as GDP goes up, then this suggests that the **officially reported rates of unemployment indeed contain true information**.

- Later we will return to the **empirical facts of the business cycle**. One fact is that **real wages are not strongly correlated with GDP over the cycle**, and in particular there is no strong tendency that increases in GDP are associated with increases in real wages. At the

same time there is a **clear tendency that increases in GDP are accompanied by decreases in unemployment**, as shown in Figure 6.3 for USA and Denmark.



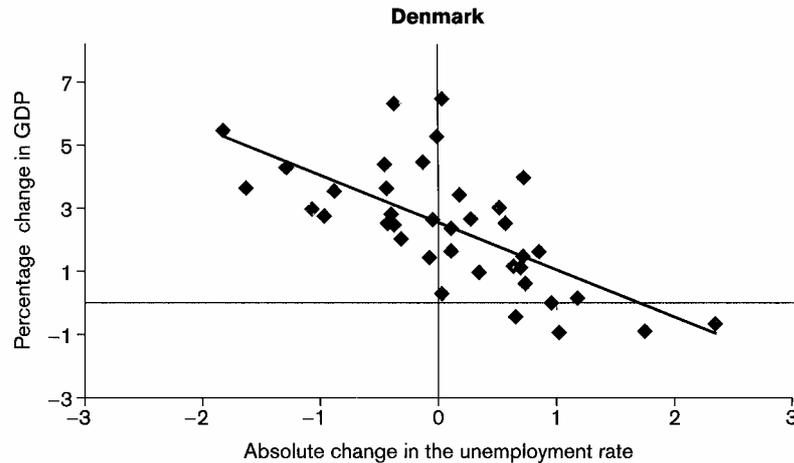


Figure 6.3: Okun's Law

The scatterplots show the annual percentage change in GDP (1995 PPP US dollars) against the annual absolute change in the rate of unemployment in the period from 1965 to 2002. Each dot corresponds to a single year.

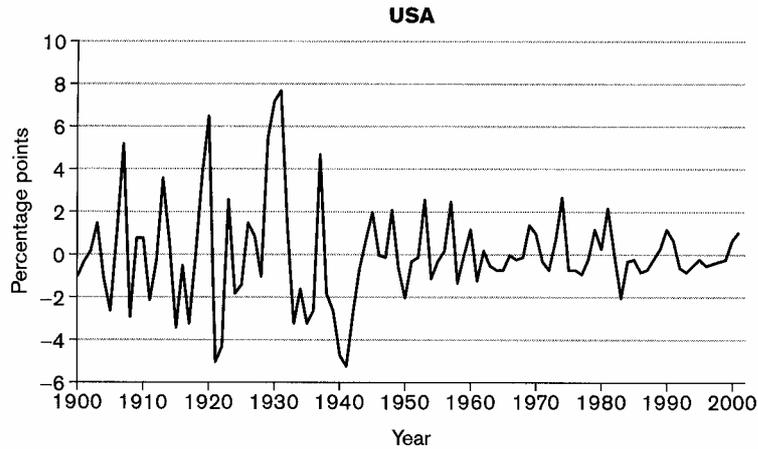
Source: OECD, Economic Outlook.

■ The relationship illustrated by Figure 6.3 is both important and useful. It shows, for instance, that **at a constant rate of unemployment, economic growth in the US is around 3 per cent per year, while a one-time increase in the growth rate of GDP of two percentage points reduces unemployment by about one percentage point.** For Denmark, a one percentage point reduction in unemployment seems to require only an additional one percentage point of economic growth. The relationship reported in Figure 6.3 has a name: **Okun's Law.**

Stylized fact 1. (Okun's Law). There is a **clear negative relationship** between the rate of growth in GDP and the absolute change in the rate of unemployment.

■ **The rate of unemployment is a fraction and by definition it has to stay between 0 and 1. Therefore it cannot increase by a certain percentage each year over many years, since this would eventually make it larger than 1. It could, of course, have an increasing trend in other ways, for example it could tend to increase from one level to another higher level.**

■ Figure 6.4 (as well as Figure 6.1) indicates that **nothing like that is true**. The figure uses the same data as Figure 6.1 and shows the **annual absolute change in the rate of unemployment** for the USA and Denmark. Over time spans of 100 years, increases and decreases seem to offset each other so that there is **no upward or downward long-run tendency**.



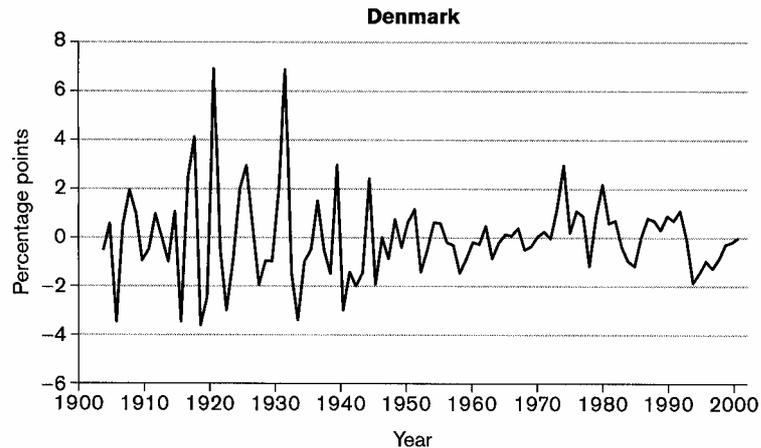


Figure 6.4: Annual absolute change in the rate of unemployment

Stylized fact 2. There is **no upwards or downwards trend** in the rate of unemployment in the (very) long run.

■ Note, however, that over quite **substantial periods there can be a tendency for unemployment to rise or fall**. Consider Figure 6.1 again and assume that for the US you only had the data from the early 1940s to the early 1980s, a period of about 40 years. For this long period there seems to be a sustained upward movement in the rate of unemployment. Something similar is true for Denmark for the period from the early 1970s to the early 1990s.

Figure 6.1 and Figure 6.4 also bring evidence of another fact which is well known:

Stylized fact 3. There is **a lot of variability** in the rate of unemployment in the short run.

■ A fact that is perhaps not so directly visible from Figure 6.1 and Figure 6.4 is the **persistence in the rate of unemployment: if the rate of unemployment is high in a specific year, then it was probably also high the year before (and will be the year after)**.

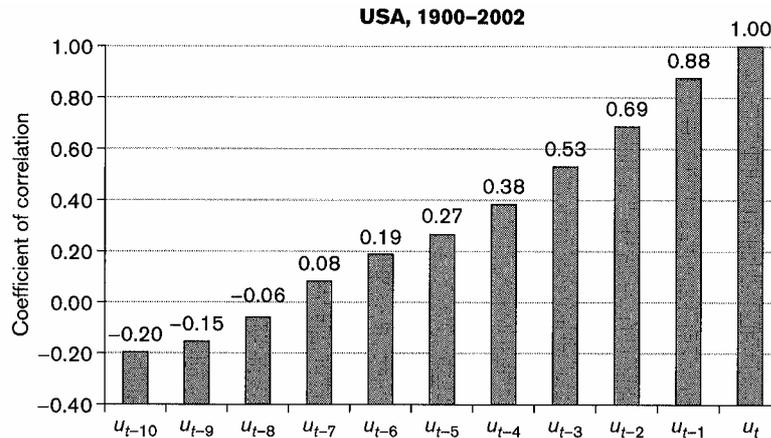
■ We can measure this persistence by the **coefficient of correlation** between the current unemployment rate and its own past values. The coefficient of correlation between two time series, u_t and x_t , running through $t = 1, \dots, T$ and with averages $\bar{u} = \frac{1}{T} \sum_{t=1}^T u_t$ and

$$\bar{x} = \frac{1}{T} \sum_{t=1}^T x_t \text{ is:}$$

$$\rho \equiv \frac{\sum_{t=1}^T (u_t - \bar{u})(x_t - \bar{x})}{\sqrt{\sum_{t=1}^T (u_t - \bar{u})^2} \sqrt{\sum_{t=1}^T (x_t - \bar{x})^2}}$$

■ It should be visible from the formula that the coefficient ρ measures the degree of (linear) **covariation** between the two series, that is, roughly the **degree to which one series is above average when the other is above average**. One can show that $-1 < \rho < 1$, and $\rho = 1$ and $\rho = -1$ correspond to complete linear covariation along a straight line, $u_t = a + bx_t$, with positive and negative b , respectively. If u_t is the annual rate of unemployment and one lets x_t

= u_{t-1} and computes ρ for the two series u_t and x_t (for $t = 2, \dots, T$), one gets the coefficient of correlation between the rate of unemployment in one year and the year before. One can then let $x_t = u_{t-2}$ to get the correlation with unemployment two years before, etc. Figure 6.5 shows such coefficients of correlation in unemployment for the USA and Denmark.



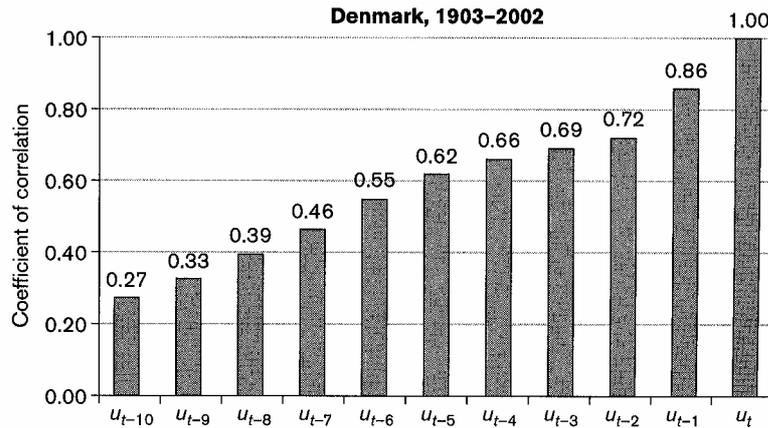


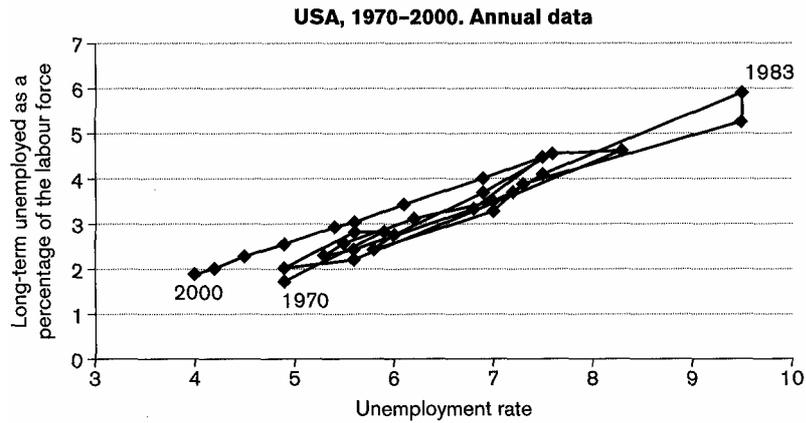
Figure 6.5: Correlation in unemployment over time

The columns illustrate the coefficient of correlation between the unemployment rate at time t and time $t - k$. Thus, the column u_{t-3} shows the degree of correlation between the unemployment rate and the unemployment rate three years before.

■ There is a **clear positive correlation between the current rate of unemployment and the rates of unemployment in several previous years**, and the degree of correlation decreases as one goes back in time. The tendency for high unemployment in one year to imply high unemployment in several previous and succeeding years is what we mean by the persistence in unemployment.

Stylized fact 4. There is **a lot of persistence** in annual rates of unemployment.

■ In connection with Table 6.2 we examined the **relationship between overall unemployment and long-term unemployment**. We can compute the annual rate of **long-term unemployment** over several years, defining this rate as, for example, the **percentage of all people in the labour force who were unemployed for more than half of the year**. We can then plot the rate of long-term unemployment against the overall rate of unemployment. This is done for the US and for Denmark in Figure 6.6.



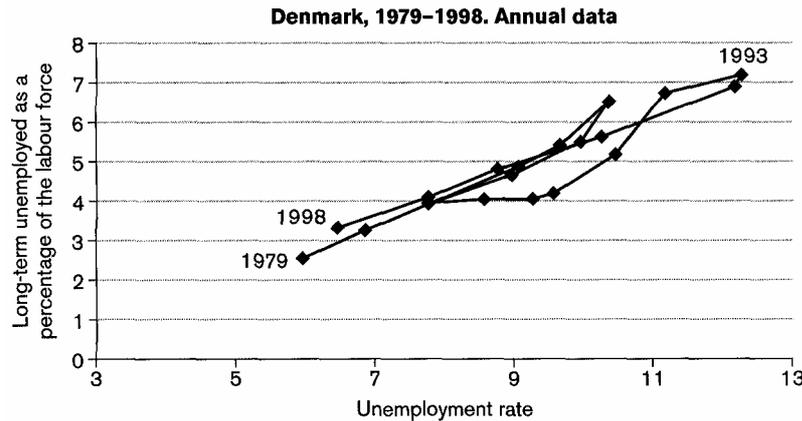


Figure 6.6: Long-term unemployment against overall unemployment

These figures plot the percentage of people in the labour force being unemployed for more than half the year, against the overall unemployment rate. Each dot corresponds to a single year.

Sources: Bureau of Labor Statistics (US); Statistics Denmark.

- What is remarkable is not just that the **relationship is positive**, but also the **strength of the positive correlation**. As **unemployment increases**, **long-term unemployment increases relatively more**.
- From the figure it seems that for both countries a **100 per cent increase in the rate of unemployment implies an approximately 200 per cent increase in long-term unemployment** (perhaps somewhat less for the US), pointing to an **elasticity of long term unemployment (as defined here) with respect to overall unemployment of around 2**.

Stylized fact 5. Long-term unemployment varies positively and more than proportionally with overall unemployment.

- As noted above the **most severe consequences of unemployment are felt by the long-term unemployed**. Since higher unemployment means even higher long-term unemployment, this may be one of the main **reasons for fighting high unemployment**.

■ **Does unemployment tend to be of equal size in different regions of the world?** Perhaps it does in the very long run, as suggested by Figure 6.1, but over substantial periods there can be **considerable differences between major regions**, as shown in Figure 6.7.

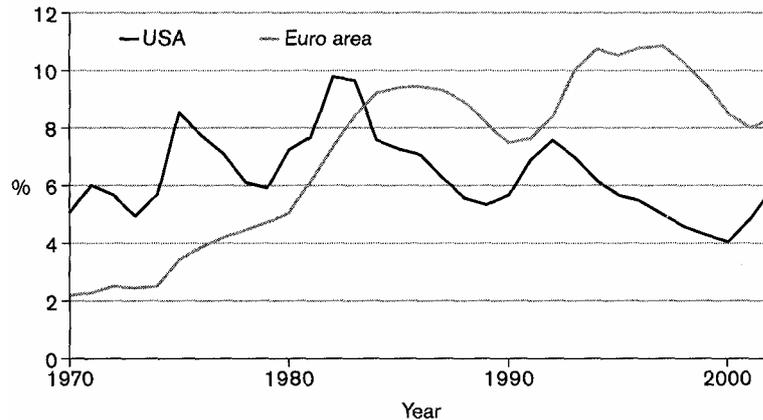


Figure 6.7: Rates of unemployment in the EU and USA

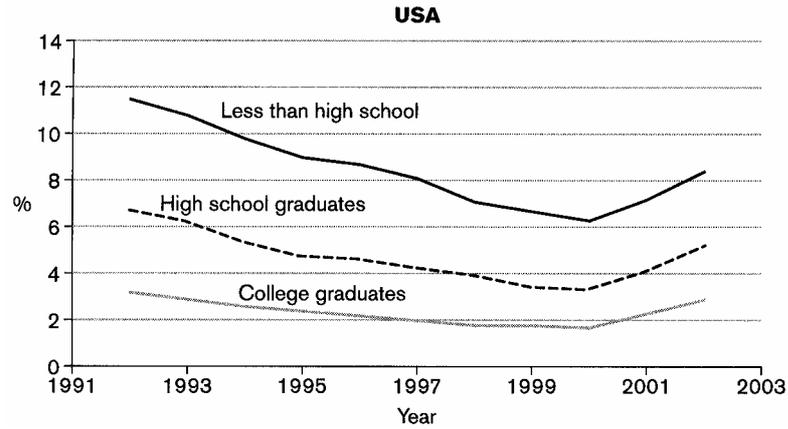
Sources: OECD, Main Economic Indicators.

■ **For a long time** until the early 1980s, **unemployment in Europe was lower than in America**, but since then joblessness has been substantially higher in the EU than in the US.

Stylized fact 6. There can be **large differences in unemployment across geographical areas** for long periods of time.

■ Other systematic variations are also important. Figure 6.8 shows rates of **unemployment across educational groups** for the US and Denmark. Although different educational categorizations have been used for the two countries, the general picture is clear:

Stylized fact 7. There are **considerable and long-lived differences in rates of unemployment across educational groups** with a broad tendency for **higher education** to mean **lower unemployment**.



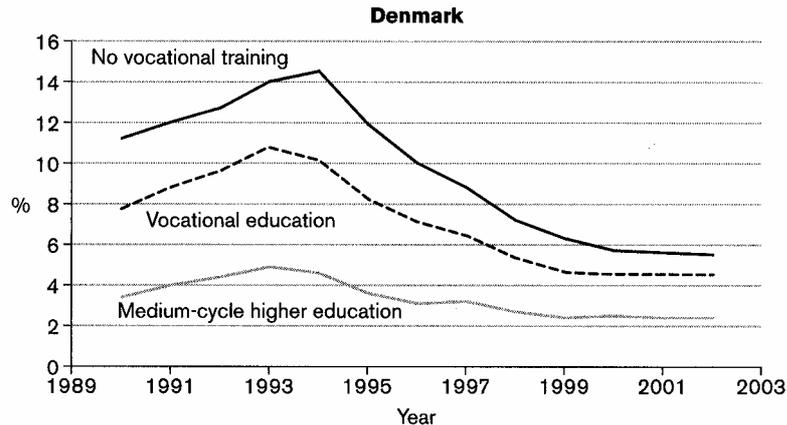


Figure 6.8: Unemployment by educational attainment

Sources: Bureau of Labor Statistics (US), Statistics Denmark.

■ Variations across other categories are of importance in different connections, e.g. **across race or sex**. However, a relatively high rate of unemployment for a particular section of the

population **may**, at least partly, **reflect that this group contains relatively many unskilled** people compared to the general population.

- The final “law” we will focus on here is an important one, and the remainder of this lecture is more or less centred around it. Figure 6.9 shows annual rates of unemployment for four countries for the period from 1965 to 2000.

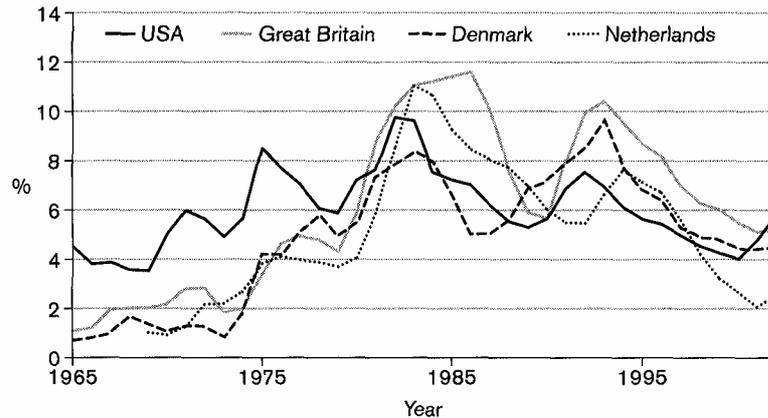


Figure 6.9: Rates of unemployment in Great Britain, Denmark, the Netherlands and the USA

Source: OECD, Economic Outlook.

- We see that (except for a special period in the 1960s and early 1970s), **even when the rate of unemployment is the lowest, there is still a considerable amount of unemployment**

with annual rates above 4 per cent. Furthermore, if the rate of **unemployment fluctuates around a certain “gravity level”**, as Figure 6.9 and in particular Figure 6.1 could indicate, this level seems to be somewhere **between 5 per cent and 7 per cent** in the countries considered.

■ **The period in the 1960s and early 1970s**, where unemployment rates in some of the countries went all the way down to below **2 per cent**, showed many signs that this was **not a sustainable or equilibrium situation: inflation rose sharply** in the countries in question. Accounting for this, the figures indicate that **even in the best of times the lowest possible rates of unemployment** are considerable, perhaps **around 4 per cent**, and gravity rates of unemployment are around 5-7 per cent.

■ Figure 6.1 indicates a strong similarity in the (very) long-run behaviour of the rate of unemployment between the USA and Denmark. In both countries the rate of unemployment seems to fluctuate around a common “natural” level of, say, 5 to 7 per cent. However, there may also be some indication, particularly from Figure 6.9, that the **natural rate of**

unemployment can shift over time, and Figure 6.7 indicates that the natural rate can differ between countries or regions.

Stylized fact 8. When rates of unemployment are at their lowest, there is still a substantial amount of unemployment, seemingly around 4 per cent, and the natural unemployment rate that the annual rates fluctuate around is higher, around 5-7 per cent. The natural rate of unemployment seems to shift over time and can be different in different regions.

Short-run cyclical and long-run structural unemployment

■ This section links the various types of unemployment, short-run cyclical and long-run structural, to the different types of wage and price rigidity that economists think are associated with them.

Unemployment and excess supply of labour

- Figure 6.10 illustrates a **situation of unemployment in a labour market (disregarding mismatching)**. The figure assumes that the individual **suppliers of labour take the nominal wage rate, W , as well as the nominal price level, P , as given.**
- The **labour supply curve, L^s** , is drawn as an **increasing function of the real wage rate, W/P** , but nothing in our arguments would change if the labour supply curve were vertical. The **firms that demand labour** are also assumed to **take the nominal wage rate as given**, and the **demand curve for labour, L^d** , is **decreasing in the real wage rate**.

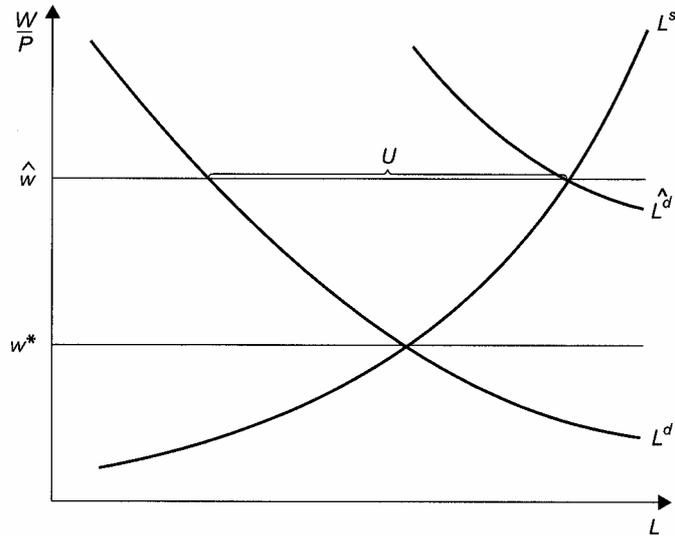


Figure 6.10: A labour market

- **If this labour market were perfectly competitive, the market forces** (working on the nominal wage rate, W) would **imply a real wage at the level w^*** , where supply equals demand and there is **no unemployment**.

- A situation of **unemployment**, as illustrated in the figure, means that the **real wage rate** is at some level \hat{w} **at which the supply of labour exceeds the demand for labour** by the amount U .

- **Should the excess supply of labour not imply downward pressure on the nominal wage rate**, forcing the real wage down to w^* , thus eliminating unemployment? This is a **key question that any theory of unemployment has to face**.

- Let us first just state **two trivial**, but nevertheless important, and **highly related points** in connection to this question:
 1. **In a labour market characterized by full competitive wage flexibility, there can be no unemployment**, since the nominal wage rate adjusts immediately to generate a

real wage that equates the competitive (wage-taking) supply of and demand for labour.

2. **For unemployment to be possible, there must be factors preventing the (real) wage from adjusting** to a level that would equate the competitive supply of labour and the competitive demand for labour.

Wage rigidity in the short run and in the long run

■ If we define “**wage rigidity**” as any factor that prevents a full, competitive equilibration of the labour market, we can also summarize the two above statements like this: for unemployment to exist there must be some wage rigidity. Usually economists distinguish between **two types of wage rigidity** and **two associated types of unemployment**.

■ **Short-run nominal wage rigidity and cyclical unemployment.** If a situation like the one illustrated in Figure 6.10 prevails (for some time) for the mere reason that **it takes time for the nominal wage rate to adjust to circumstances**, we say that a **short-run nominal wage**

rigidity is at work. The part of **unemployment caused by short-run nominal wage rigidity** we call **short-run, or cyclical, unemployment**.

■ **Short-run nominal wage rigidity can take different forms.** One possibility is that the adjustments of the nominal wage rate are really governed by competitive market forces, that is, by discrepancies between wage-taking supply and demand, but it simply **takes some time for an excess supply of labour to bring about a full downward adjustment of the nominal wage-rate.**

■ The reason is that an **excess supply of labour has to be there for some time before it can invoke a downward pressure on the nominal wage rate.** There will therefore be a period where the real wage rate can be at a level like \hat{w} in Figure 6.10 simply because the **nominal wage adjustments that should bring it down have not yet occurred.**

■ We would expect **cyclical unemployment caused by such a nominal wage rigidity to be eliminated by market forces alone in the longer run** when nominal wages have had time to adjust fully. However, **if the economy is hit by new shocks all the time, the nominal wage**

rate may be on a never-ending job of adjustment, and during this continual adjustment, there will occasionally be unemployment and occasionally excess demand for labour or “overemployment”.

■ **Another possibility** is that the **nominal wage rate is really set by an economic agent**, let us say a **trade union** that organizes the wage-taking individual workers. **If the nominal wage rate is set optimally at the outset and there are (small) “menu costs” associated with nominal wage adjustments**, it will be optimal for the trade union not to react to shocks as long as these are not too large and of a temporary nature.

■ The **real wage, W/P , may be flexible under short-run nominal wage rigidity** because the **nominal price level, P , may adjust in response to conditions in the product markets**. The implied adjustments in the real wage should not be expected to eliminate unemployment since they do not come in response to circumstances in the labour market.

■ **Long-run real wage rigidity and structural unemployment**. Consider again the situation in Figure 6.10 where the **wage-taking labour supply exceeds employment**, and assume that

the **real wage rate has already fully adjusted in accordance with the real wage flexibility** that the economy possesses. In that case we say that **a long-run real wage rigidity is at work**, and the part of unemployment that is caused by long-run real wage rigidity we call **long-run, or structural, or natural unemployment**.

■ Note that this is **different from short-run nominal wage rigidity**. It is not that the **nominal wage rate has not yet adjusted to circumstances** or that wage setting agents have preferred not to react to temporary and opposing shocks. Here we assume (artificially) that the **economy has not been exposed to new shocks for a long time** so that **all relative prices have fully adjusted** to circumstances in accordance with the economy's long-run price and wage flexibility, and **yet excess supply of labour prevails**.

■ We should, of course, be interested in the exact **reasons why an excess supply of labour would not imply a downward adjustment of the real wage rate in the long run**. We briefly consider such reasons below.

- The division of all unemployment into short-run and long-run unemployment is closely related to the **Stylized fact 8** above, and to the nature of the unemployment fluctuations illustrated in Figure 6.1 and Figure 6.9.
- **From time to time there is a sudden increase in the rate of unemployment**, for instance by two percentage points over just one year. It is **natural to see this as caused by a negative shock to which the economy reacts** not only **with lower production**, but also (temporarily) with **higher unemployment** because of short-run nominal wage rigidity.
- This **can explain the fluctuations** in the rate of unemployment, but **not the trend level** of 5-7 per cent that the unemployment rate fluctuates around. Over time spans such as the 35 years in Figure 6.9, or the 100 years in Figure 6.1, we **cannot possibly view the economy as being all the time reacting to negative shocks**.
- **Sometimes the shocks must have been mainly positive**, sometimes the labour market must have been close to equilibrium where wage rates are adjusted in accordance with the economy's wage flexibility. The **permanent part of unemployment must therefore be due**

to long-run real wage rigidity, i.e., to the fact that the price and wage flexibility of the economy is simply not such that it tends to eliminate all unemployment, not even after a long time without new shocks. Figure 6.11 illustrates the **categorization of unemployment** that we are explaining.

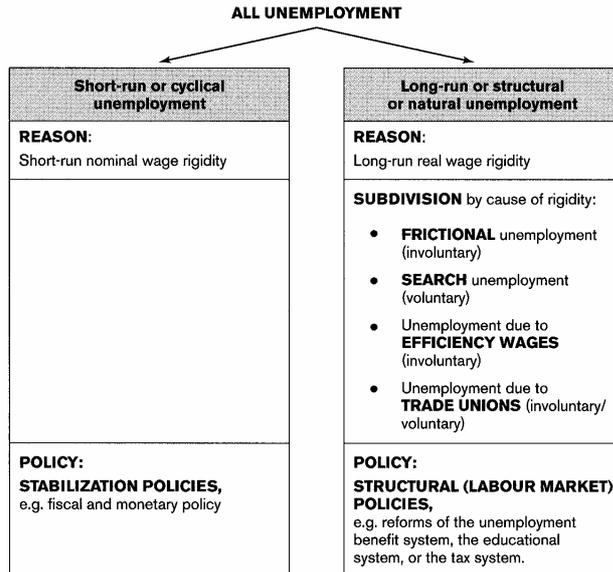


Figure 6.11: Different types of unemployment

- One of the main reasons why economists find it useful to distinguish between the fluctuating or **cyclical part** of unemployment associated with short-run nominal wage rigidity, and the **permanent or “natural” part of unemployment** associated with long-run real wage rigidity is that the **kind of policies that can be expected to work** in fighting the two types of unemployment **are different**.

- **Long-run unemployment can only be affected by policy measures that have an impact on the price and wage flexibility of the economy.** We call such policies **structural policies**. One example could be **reforms of the unemployment insurance** system designed to **make the unemployed exert a stronger downward pressure on wage rates**, but a **policy which increases the degree of product market competition** can also help to reduce structural unemployment.

- **Short-run unemployment**, on the other hand, **can be affected by stabilization policies**, such as traditional **fiscal and monetary policy**.

Causes of long-run structural unemployment

■ For long-run real wage rigidity and structural unemployment to exist, there must be some **reason why unemployment does not impose a downward pressure on wages**. Why should the presence of **unemployed people not give rise to downward pressure on wage rates, not even in the long run**? Let us go through some **possible reasons**.

■ **Abuse**. One potential reason is that **some people registered as unemployed may not really be looking for jobs** but may only be **interested in** collecting the publicly subsidized **unemployment benefits**. Hence they do not contribute any downward pressure on wages. There is hardly any doubt that **such abuse occurs to some extent**, but we have argued above that **probably most of registered unemployment is not of this type**, and in the following we will disregard it.

■ **Frictional unemployment**. Another reason is that some of the unemployed have already **found a job, but have not yet started** in it. Usually people are not hired immediately, but, say, from the first day of the next month. There will then be a period of time during which

they are **unemployed, and involuntarily so, but they do not look for jobs since they already have a job** starting a few weeks later.

■ **Due to the natural development of the economy** there will all the time be **some people who lose their jobs**. For instance, as time goes by the **products of some firms become outdated**, the **firms must close**, and the employees lose their jobs. Even at times when these people do not have difficulty finding new jobs, there will be **some unemployment due to a number of people being on their way from one job to another**, since the transition takes some time for **technical and formal reasons** beyond people's control. We call this **frictional unemployment**, and frictional unemployment is **one part of structural unemployment**.

■ It is of interest to try to estimate **how much structural unemployment is frictional**, and we will return to that. The conclusion will be that **probably only a minor part of long-run unemployment is frictional**. Hence there is still a lot of structural unemployment to explain, and indeed **some view the non-frictional part of long-run unemployment as the real structural unemployment**.

- **Search unemployment.** If the people who lose their jobs **spend some time before taking a new job**, not for reasons beyond their control, but **as a matter of choice** (they may **turn down job offers for some time**), we call the associated unemployment **search unemployment**. Just like frictional unemployment, **search unemployment cannot be expected to exert downward pressure on wages**.
- **The two types of unemployment are closely related, differing only in the reason why the unemployed turn down job offers.** In the case of **frictional** unemployment it is because they have **already accepted a job offer**. In the case of **search** unemployment it is because the **unemployed choose to wait**, or search, for better job offers.
- Who says that the first offer received is the best one the unemployed worker can get? Perhaps it is **wise to spend some time searching**. Search unemployment is thus closely related to **uncertainty about available job offers**: it is caused by **imperfect information about job possibilities**. Furthermore, **search unemployment is voluntary**.

- The **level of search unemployment depends on** a basic **trade-off** for the unemployed person. On the **cost side**, **longer search** for a new job implies a **larger income loss** during the waiting time. On the **benefit side**, it implies a **higher expected future income** from the day employment starts, assuming that **more search ultimately leads to a better job offer**.
- **The more important the benefit side is relative to the cost side, the more (voluntary) search unemployment there will be.** Generous **unemployment benefits** help to keep the cost side down; they work as a **subsidy to search**. Therefore, lower benefits would tend to reduce search unemployment, and this is one **example of a structural policy** that could be used to fight a type of structural unemployment.
- Should policy makers try to **reduce search unemployment as much as possible? No**, there are some **positive aspects of search unemployment**. It is in the general **interest of society** that the **qualifications of the labour force are used optimally**, that each individual is **employed where his or her productivity is the highest**, since this means higher incomes.

- The search by individuals may work to ensure that people are placed in jobs where they earn well because they have high productivity. So, **for society there is also a basic trade-off** related to search unemployment. When people are “separated” from their jobs, we want them to **search for some time** in order for them to find new jobs where they have high productivity, but we do **not want them to search for too long**, because then the **output loss during the search period will outweigh the productivity gain from further search**.

- The job for policy makers is thus not to reduce search unemployment to a minimum, but to create **incentives through the tax and benefit systems for an appropriate level of search unemployment**.

- **Efficiency wages**. The **efficiency wage theory** of the co-existence of unemployment and fully-adjusted wages represents a **minimum departure from the fully competitive model of wage adjustment**. Since it is the subject of the next lecture, we will be brief about it here. Just note that there is a **hidden assumption behind a supply and demand diagram** like Figure 6.10, or more **precisely behind the labour demand curve** in it.

- The **labour demand curve is given by the decreasing marginal product of labour**, since labour is demanded up to the point where the marginal cost of an additional unit of labour – the real wage – equals the marginal revenue product.
- However, behind this construction is the tacit **assumption that the wage paid to the workers does not affect their productivity**. In the next lecture we argue that if we keep all other characteristics of the competitive labour market, but add the feature that **productivity may depend positively on real wages**, then the traditional labour demand curve “disappears”, and **firms may choose a combination of a real wage and a number of people demanded inside the labour supply curve**.
- The result may well be **unemployment without any tendency for falling wages**. Wages fail to adjust because **firms do not want lower wages**, and **unemployment is involuntary since individual unemployed workers would really like to work at the going wage rate**.
- **Trade unions**. Unionization of the labour market represents a more “brutal”, but realistic and therefore important, **departure from the competitive model**. It is simply assumed that

the **supply side of the labour market** (and sometimes also the demand side) is **not atomistic**, since the **workers are organized in a trade union** that takes care of their interests.

- The **trade union sets the wage rate** and the labour market therefore does not work competitively, but more like a **monopoly market**. As we shall see in the separate lecture, this may well imply that the **wage rate chosen by the trade union will be so high** that the wage-taking **labour supply of all the workers on the labour market exceeds the labour demand of the firms**.

- Hence there is **unemployment, but there is no tendency for falling wages**, since the wage rate is what those who set it want it to be. The **unemployment will be involuntary at the individual level**, since the unemployed workers would really like to work at the wage rate set by the union.

- At the **collective level**, however, the **unemployment has something voluntary about it**, since it is due to the fact that **workers have decided to organize to exert influence on the**

wage rate and, having obtained market power through a union, let this union choose a wage rate that is so high that unemployment results.

■ We will **focus mostly on efficiency wage setting and trade union behaviour** to explain why real wages do not adjust to eliminate long-run unemployment. To motivate this focus, we will now argue that **a large part of long-run unemployment cannot be explained by frictional or search unemployment.**

How large is frictional and search unemployment?

■ Let us now return to the simple **formula that relates the number of unemployed workers to the labour force** and the number of employed workers, say in a specific month, $U_t = L_t - E_t$. For simplicity **assume that the labour force is constant**, $L_t = L$ in all months t , so that the formula is $U_t = L - E_t$. How can the **number of unemployed workers possibly change** from month t to month $t + 1$? In exactly **two ways**.

- Some people who are **employed** in month t may **lose or quit their jobs** from t to $t + 1$, causing an increase in unemployment. We denote by s_t the “**separation rate**” of month t , that is, the fraction of the employed in period t who lose their jobs from t to $t + 1$. Then the **increase in the number of unemployed coming from job separation** can be written as $s_t E_t$.
- Some people who are **unemployed** in month t may **find a job** from t to $t + 1$, which gives a reduction in unemployment. If we denote the “**job finding rate**” of month t by f_t , this reduction in unemployment is $f_t U_t$. The flow diagram in Figure 6.12 shows the two ways the number of unemployed workers can change.

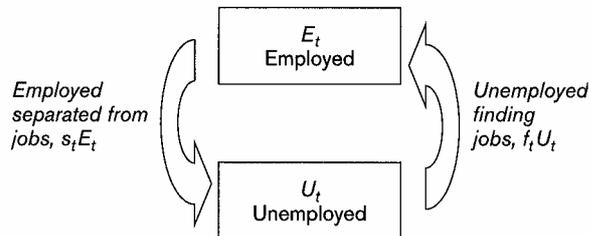


Figure 6.12: The flows in and out of unemployment

- The total change in the number of unemployed workers from month t to $t + 1$ is thus:

$$U_{t+1} - U_t = s_t E_t - f_t U_t.$$

- If we divide both sides by L and remember that in any month the rate of unemployment is $u_t = U_t/L$, we get:

$$u_{t+1} - u_t = s_t \frac{E_t}{L} - f_t u_t$$

Now use $E_t = L - U_t$ to get:

$$u_{t+1} = (1 - s_t - f_t)u_t + s_t$$

- Given the evolution of s_t and f_t , and an initial rate of unemployment, this **equation describes how the rate of unemployment evolves** over time. This **law has nothing in particular to do with frictional or search unemployment**. It is simply an **identity that has to hold** for unemployment in general (given a constant labour force).

- We will now focus on a “**stationary environment**” where **both s_t and f_t are constant over time**, that is, $s_t = s$ and $f_t = f$ in all months, t . **You may find this assumption strange**. **Shouldn't the possibility of finding a job**, the job finding rate f_t , **depend on how much unemployment there is?**

- We **make this assumption deliberately** since we want to **focus entirely on frictional and search unemployment**. We **do not want it to be particularly difficult to find a job**. We want to find out how much unemployment there will be if the only reasons for unemployment are that when people lose their job for some reason, they do not start in new jobs immediately, either for purely technical/practical/formal reasons, or because they decide to search for an attractive job offer.

- The dynamics of the rate of unemployment now simply become:

$$u_{t+1} = (1 - s - f)u_t + s \quad 6.1$$

■ Here we should think of s as a **small positive fraction**, perhaps between 0.01 and 0.02, corresponding to 1 or 2 per cent of the employed workers losing their jobs each month. In their article “The Cyclical Behaviour of the Gross Flows of US Workers”, *Brooking Papers on Economic Activity*, 2, 1990, Olivier **Blanchard** and Peter **Diamond** find a **monthly job separation rate** for the US over the period January 1968 to May 1986 of **2.9 per cent**. In the period from 1968 to 1986 there was an **increasing trend in the rate of unemployment** in the USA (see Figure 6.9), so the **separation rate** under the stationary conditions we want to focus on here is **probably somewhat smaller**.

■ **If everyone who loses a job starts in a new one “the first day of the next month”, the job finding rate would be 1**, but since **voluntary job search will pull f down**, we should probably think of f as a fraction that is somewhat smaller than 1, e.g. $f = 0.8$. This will imply

that the **parenthesis $(1 - s - f)$** in front of u_t in (6.1) is a **positive number smaller than one**, so the dynamics given by (6.1) are such that u_t converges monotonically to a constant level u (draw a diagram with u_{t+1} as a function of u_t and iterate) given by $u = (1 - s - f)u + s$, or:

$$u = s/(s + f) \qquad 6.2$$

■ One can **compute the u** given by (6.2) **for various values of s and f** . From the above, a value for s in the interval 0.01-0.02 could be realistic. If the value of f is to be explained only by frictions or search, a value of 0.8 seems small. A large s and a small f tend to make the u in (6.2) large, so inserting $s = 0.02$ and $f = 0.8$ should give an indication of a large rate of frictional and search unemployment. With these parameters the **computed u is around 2.4 per cent**. Even if we send f all the way down to 0.5, which is surely low, the computed u will still be lower than 4 per cent (3.8 per cent to be precise).

- We conclude that there seems to be **important elements of structural unemployment that cannot be explained by frictions or search**. There seems, therefore, to be good reasons to **investigate other explanations of structural unemployment**.

Summary

- Unemployment implies individual costs in the form of income losses that cannot be fully insured as well as psychological stress. Unemployment implies a social cost as well. For an involuntarily unemployed worker the real value of the goods and services needed to compensate for the sacrifice of leisure (MRS) is smaller than the going real wage. When firms maximize profits, the real wage equals or is smaller than the marginal product of labour (MPL). Hence involuntary unemployment implies $MPL > MRS$. This means that a social gain could be achieved if some unemployed workers got jobs, since the extra output generated by additional employment would more than suffice to compensate the newly employed workers. Because unemployment is a social waste, it is a main concern of economic policy makers.

- The rate of unemployment is the fraction of unemployed in the total labour force, measured at a given point in time. The annual rate of unemployment is the simple average of the rates of unemployment in each day or month of the year. A large number of workers are affected by unemployment in each year, typically around 20 per cent of the labour force in countries like the USA and Denmark, but only some of the unemployed are out of work all of the year, whereas the rest have unemployment spells of varying but shorter duration.

- The long-term unemployed during a given year are those who were unemployed more than a given fraction of the year, for example more than half of the year. Long-term unemployment is the part of overall unemployment carried by the long-term unemployed. It is mainly the long-term part of unemployment that causes serious individual costs, but for the social cost the overall (average) unemployment rate is also important.

- Unemployment and vacancies can coexist because the labour market's match between “people wanting jobs” and “jobs wanting people” is not perfect. The Beveridge curve is a plot over time of the vacancy rate against the unemployment rate and gives an indication of the degree of mismatch in the labour market. For given structural mismatch problems, the

Beveridge curve should be a stable decreasing relationship. If it shifts inwards or outwards, it can be an indication of decreased or increased structural problems in the labour market, respectively.

- The empirical evidence shows that (i) there is a clear negative relationship between the rate of growth in GDP and the change in the rate of unemployment, (ii) there is no upward or downward trend in the rate of unemployment in the very long run, (iii) there is a lot of variability in the rate of unemployment in the short run, (iv) there is a lot of persistence in annual rates of unemployment, and (v) long-term unemployment varies positively and more than proportionally with overall unemployment.
- When annual rates of unemployment are at their lowest, there is still a substantial amount of unemployment, seemingly around 4 per cent, and annual unemployment rates seem to fluctuate around a natural unemployment rate of about 5-7 per cent. The natural rate of unemployment seems to shift over time and can be different in different regions of the world.

- The presence of unemployment reflects that wage rigidities prevent the real wage from adjusting to equalize supplies and demands for labour. Economists find it useful to distinguish between short-run nominal wage rigidities, which are fundamental for explaining the cyclical fluctuations in unemployment, and long-run real wage rigidities, which cause the positive and constant trend level of structural unemployment.
- This lecture briefly presented the following four causes of long-run real wage rigidity and structural unemployment: (i) labour market frictions, (ii) job search, (iii) efficiency wages, and (iv) market power of trade unions.
- Studying a model of the flows in and out of unemployment, we derived a simple formula linking the rate of unemployment to the separation rate (the fraction of employed who lose their jobs in a month) and the job finding rate (the fraction of unemployed finding a job from one month to the next). Assuming a stationary environment with constant separation and job finding rates, and assuming realistic values for these rates, we found that only a minor part of structural unemployment seems to be due to labour market frictions or search.