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FOUR PAPERS ON THE THEORY OF UNEMPLOYMENT

BY
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PREFACE

This report presents four closely connected papers about Keynesian and classical unemployment written by professor Fritz Holte, Agricultural University of Norway. The main purpose of these papers is to draw more attention to certain ideas about what can cause unemployment and contribute to the analyses which are carried out on this subject in the Central Bureau of Statistics. The papers contain a presentation of the basic elements of the theory of keynesian and classical unemployment and some further developments. On this basis it is discussed why it is so difficult to find an economic policy which reduces the unemployment in the OECD-countries substantially.

Central Bureau of Statistics, Oslo, 20 May 1987

Gisle Skancke

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INTRODUCTION

The main purposes of these papers are (i) draw more attention to certain ideas about what can cause unemployment, and (ii) try to contribute to the further development of some of these ideas. I am particulary interested in why in the 1970s and 1980s there has been so much unemployment in the OECD-countries.

The first three papers are closely connected. In these papers I use what I call "genuine macromodels", i.e. models where we ignore that in real societies there are different types of products and different types of labour.

The first chapter of the first paper provides the main link between the first three papers. This chapter presents in a very simple but perhaps somewhat unusual way some basic elements of the theories of Keynesian and classical unemployment. The purpose of the chapter is to get well-known theory into a form which is suitable for an analysis of some of the problems I want to discuss.

The rest of the first paper deals mainly with various aspects of classical unemployment. Among other things I discuss how the probability of getting this type of unemployment is affected by investments and by the fact that labour services are becoming more expensive compared to services from machines.

The content of the second paper is reflected in its title, which is: "An attempt to use theories about Keynesian and classical unemployment to explain why it is so difficult to find an economic policy which reduces substantially the unemployment in the OECD-countries". The discussion in that paper is too a large extent based on economic theory presented in the first chapter of the first paper.

The core of the third paper is presentation and discussion of a dynamic model which can be regarded as a further development of theory presented in the first chapter of the first paper.

The content of the last paper is also described by its name, which is "A study in unemployment caused by a combination of (i) mismatch in the labour market, (ii) a certain type of of price-fixing behaviour, and (iii) a demand policy for avoiding accelerating inflation". It is an essential element of the model used in this paper that it contains different types of products and different types of labour.

One of the tasks which economists are expected to do, is to present the core of their theories in ways which are understandable also to those who have not studied economics. In some of the sections of these papers I have tried to contribute to how this can be done.

Economists who read the papers, will therefore sometimes find that I explain what is not necessary to explain to them. But the papers also contain sections which are intended for economists who are interested in macroeconomic theories of unemployment, and which without doubt are unreadable to people who are not used to algebraic models.

There are few symbols and no equations in the first two papers, and very little of this in the fourth paper. But there is some algebra in the third paper.

With one exception, anyone of the papers can be read without having read the other papers. The exception is that the first chapter of the first paper should be read before reading the second paper.[1]

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1) I want to thank Rolf Golombek, Henning Strand, Nils Martin Stølen and Tore Thonstad for valuable comments to drafts of these papers.

NOTES ON THE THEORIES OF KEYNESIAN AND CLASSICAL UNEMPLOYMENT

KEYNESIAN AND CLASSICAL UNEMPLOYMENT

In a modern society a producer can face different problems. Here are two of them: (a) He does not find buyers for his products. - (b) The costs of producing and selling the last units he produces, are larger than the gross income received from selling these units.

Let us look at some theories about what these two problems can imply for the employment.

Keynesian unemployment

We shall first assume that we have a closed society where the producers meet only the first of these problems. In other words: It can be difficult for them to sell the products, but they always make a profit on all units they sell.

Under such conditions it seems reasonable to expect that the demand for labour is determined by how much labour is needed to produce that quantity of products which is demanded. We can then get an unemployment of a type usually called Keynesian. Here is a strongly simplified version of a theory dealing with such unemployment[1]:

The quantity produced is a monotonously increasing function of the employment. This is expressed by the production curve in fig. 1.

Employment results in production, production creates income, and income results in demand for products. Under otherwise equal conditions larger employment therefore means larger demand for products. This is expressed by the demand curve in figure 1.

Suppose that the curves describing production and demand for products have the positions they have in figure 1, and that the supply of labour is as indicated in the figure. We then get an unemployment which is equal to the difference between a) the supply of labour, and b) that employment which makes production and demand for products equal. (Cf. fig.1.).

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[1] In simple diagramatic analyses of this theory demand for products is usually expressed as a function of GNP. But if we assume that GNP is a monotonously increasing function of employment, we can of course instead, as it is done in figure 1, express demand for products as a function of employment.

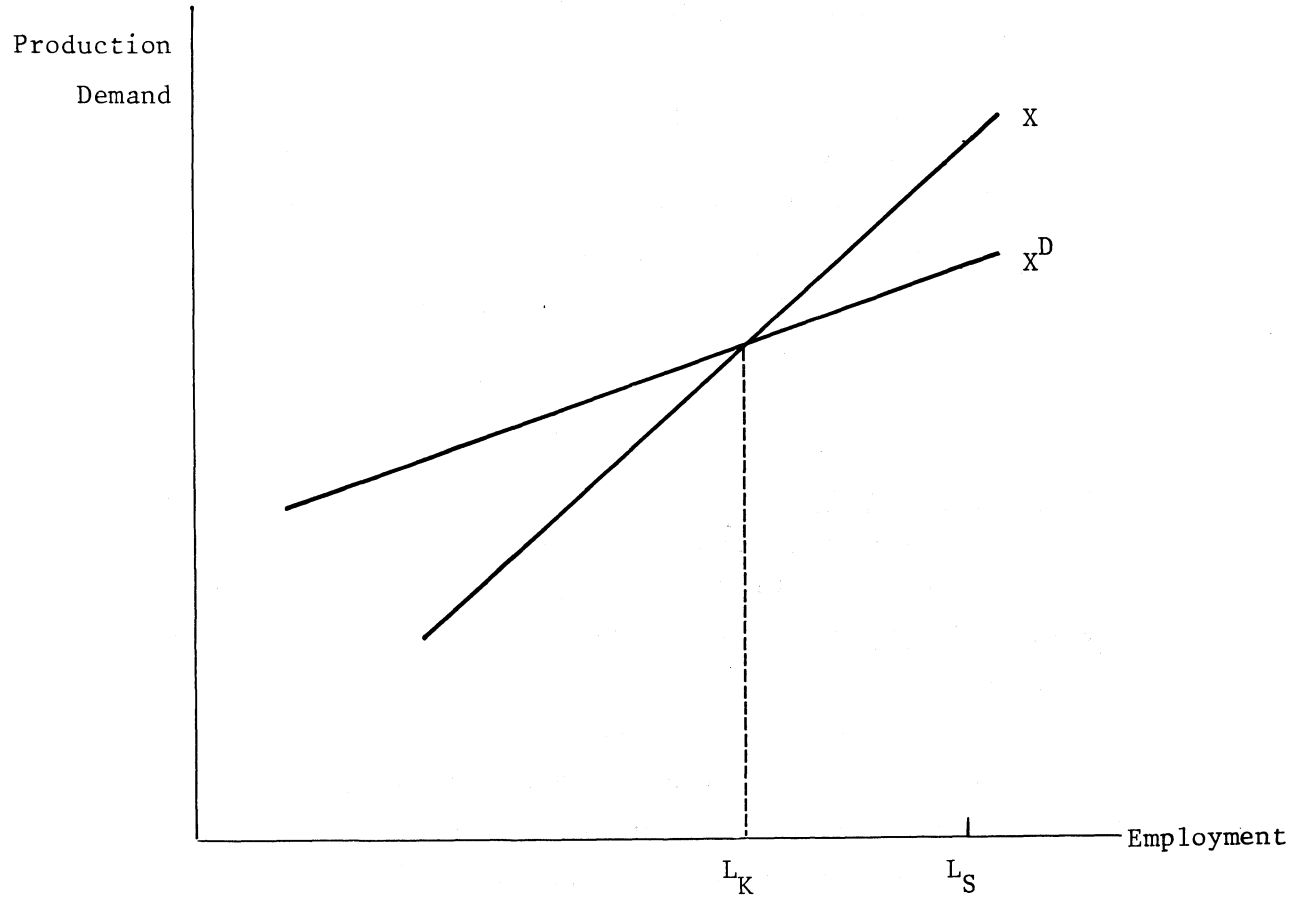

Figure 1. Production and demand for products

X = Aggregate production, measured in fixed prices

X^D = Aggregate demand for products, measured in fixed prices

L_S = Supply of labour

L_K = That employment which makes demand for products and production equal

Classical unemployment

Let us change the assumptions. Until otherwise stated we shall now assume that (i) the producers must be aware of the possibility that if they produce "too much", they will loose money on the last units they produce, but (ii) that the producers always can sell as much as they want.

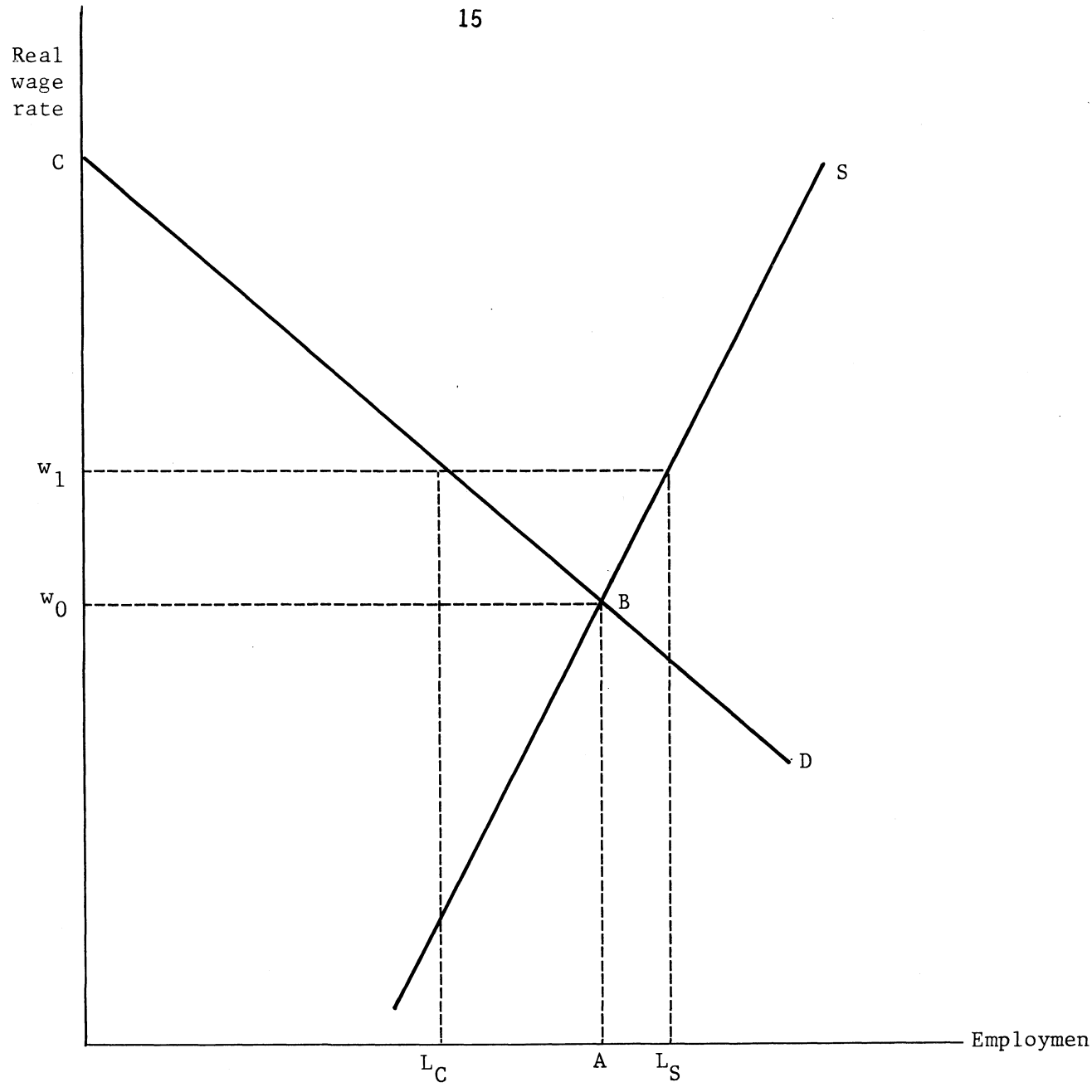

Figure 2. The labour market

D = The demand curve for labour

S = The supply curve for labour

L_C = The demand for labour when the real wage rate is w_1

L_S = The supply of labour when the real wage rate is w_1

We shall also assume that we deal with a society where there is only one labour market, and where all work is equally well paid. Here is a theory about such a society:

The more expensive labour is, compared to products, the fewer possibilities there are for profitable production. Higher real wage rate therefore means smaller demand for labour.

Supply of labour is an increasing function of the real wage rate.

We see from fig. 2 that when the positions of the curves describing demand for labour and supply of labour are as shown by this figure, then there is one and only one value on the real wage rate that makes demand for labour and supply of labour equal. Suppose that the real wage rate is somewhat higher than this value, for instance w_1. We see from fig. 2 that in that case the demand for labour is L_C, while the supply of labour is L_S.

If demand and supply are different, then it is the smallest of these two quantities which determines the employment. This implies that in the case described by fig. 2, the employment is L_C. We then get an unemployment which is equal to the difference between the supply of labour and the realized employment, i.e. equal to $(L_S - L_C)$.

Three limits for the employment

Let us finally assume that the producers may have to deal with both sales problems and the risk of loosing money on the last units they sell. We can discuss such a case by combining the preceding two analyses. But then it is probably best to change a name. The curve we in fig. 2 called "the demand curve for labour", shall now be called "the neoclassical demand curve for labour". This curve represents an upper bound for the demand for labour, a bound which is derived from the profitability considerations we described when we sketched the theory of classical unemployment. The demand for labour can be below this bound, but it cannot be above it.

On the basis of the discussions in connection with figures 1 and 2, we find three limits for how large the employment can be.

First, the producers are not interested in producing goods which are not sold. This creates a limit for the size of the production, and therefore also for the employment. This limit we shall call "the Keynesian limit". (Cf. L_K in figure 1.) - It is possible that in some periods the employment is larger than the Keynesian limit. But in such periods the production is larger than the sale, and this means that the producers increase their stocks of own products. The producers cannot do this permanently. Consequently, sooner or later the employment will take a value which implies that it is not produced more than it is sold. - Unless otherwise stated I shall in this paper assume that the employment does not exceed the Keynesian limit.

Second, the producers are not interested in production where the costs are larger than the gross income. This creates a limit for their demand for labour, and therefore also a limit for the employment. This limit we shall call "the neoclassical limit". (Cf. L_C in fig. 2.)

Third, the employment cannot be larger than the supply of labour. This limit we shall call "the supply limit". (Cf. L_S in fig. 2.)

Three types of unemployment

It is conceivable that the three limits for the employment usually are equal. But it need not be so. We shall assume that if the limits are different, then it is the smallest of them that determine(s) the size of the employment.

If the supply limit is higher than at least one of the other limits, we get unemployment. There are three possibilities.

(i) The Keynesian limit is lower than both the other limits. In such a case we get Keynesian unemployment[1].

(ii) The neoclassical limit is lower than both the other limits. This results in classical unemployment.

(iii) The Keynesian and the neoclassical limits are equal, and both of them are lower than the supply limit. The type of unemployment we get in such a situation, we shall call Keynesian/classical.

Much of the discussion about unemployment seems to take it for granted that a given unemployment is either Keynesian or classical. When it is assumed that there exists a combination of these two types of unemployment, this is usually done by assuming that there is Keynesian unemployment in some industries and/or areas, and classical unemployment in other industries and/or areas[2]. I will therefore emphasize that the unemployment can be Keynesian/classical in the sense explained above.

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[1] In economic literature we find different definitions of Keynesian unemployment. In addition to the definition given above, or something which obviously is equivalent to it, we also find the following one: We have Keynesian unemployment if and only if there excess supply both in the labour market and in the product market. More about this on p. 70.

[2] Cf. for instance Malinvaud (3) p. 39.

GENERATION AND ELIMINATION OF UNEMPLOYMENT

The questions

In this chapter I shall discuss some aspects of the following questions:

(1) Sometimes there is a change from a situation where there is full employment to a situation where there is either Keynesian or classical unemployment. What can cause such a change?

(2) Suppose that we have either Keynesian or classical unemployment. Do there exist "economic mechanisms" which, if given sufficient time to function, will eliminate the unemployment?

A theory used by Malinvaud

1. We shall start by looking at a simple version of a theory which was used by Malinvaud in 1977 in his book "The Theory of Unemployment Reconsidered". Here it is:

Let us assume that a certain society is in a Walrasian equilibrium, i.e. in a situation where demand and supply are equal in all markets. Then there takes place a change either in an autonomous component of the demand for goods, or in the assets held by consumers, or in the labour requirements per unit of product.

Prices and wage rates change slowly. When dealing with the short run, it is therefore a reasonable approximation to assume that they remain fixed.

Induced demand for goods, supply of goods, demand for labour and supply of labour change more rapidly. Also in the short run these quantities change if there are changes in the factors influencing them.

Shortly after the above-mentioned change in an exogenous quantity we therefore have the following situation: Many quantities are different from what they where in the initial Walrasian equilibrium, while prices and wage rates are the same as they where in that equilibrium. This implies that prices and wage rates are not adjusted to demand and supply. Consequently the society is not in a Walrasian equilibrium. Depending on how the quantities have changed from the initial situation, we have, except in singular cases, either Keynesian unemployment, classical unemployment or repressed inflation.

In addition to dealing with why we can get repressed inflation, this theory is a theory about why we can get Keynesian and classical unemployment. The theory deals with what happens in the short run[1].

2. On p. 92 - 93 in "The Theory of Unemployment Reconsidered" Malinvaud says: " Let us assume for a minute that individual assets, autonomous demand for goods and technical possibilities remain absolutely constant through time,. . . Then the long-run equilibrium resulting from price theory will be the Walrasian equilibrium . . . We may take it for granted that, under the stationary assumptions made, this equilibrium will, indeed, be realized." (My underscore.)

Why should we take it for granted that, under the assumption made, the Walrasian equilibrium will be realized? My best guess is that if Malinvaud in 1977 had been asked that question, then he would have answered along the following lines:

(i) Under reasonable assumptions about how the economic structure can be, there will to each possible alternative for the positions of the demand and supply curves correspond one and only one set of prices and wage rates which results in a Walrasian equilibrium.

(ii) When we deal with a longer time period than the short run, prices and wage rates are flexible, and they change according to the following rules: Excess demand raises prices and wage rates, and excess supply lowers prices and wage rates.

(iii) Let us suppose that after the autonomous demand, consumers assets or some parameters describing technical possibilities have changed, there is a long period where both these quantities and all parameters describing economic behaviour remain constant. Because prices and wage rates change as described in (ii), they will then sooner or later take that set of values which gives a Walrasian equilibrium.

3. If the economic theory presented above give a good description of what happens, then the reaction of prices and wage rates to changes in quantities are important both for the generation and for the elimination of Keynesian and classical unemployment. Inflexibility of prices and wage rates in the short run plays an important role in the generation of such unemployment. Flexibility of prices and wage rates in a somewhat longer run, can play an important role in the elimination of it.

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[1] Malinvaud does not define "the short run" in "The Theory of Unemployment Reconsidered". But in his book from 1980, "Profitability and unemployment", he says that what he there calls "the short term" is something like "a few months". (Cf. Malinvaud (2), footnote on p.9.)

4. We may in particular note that according to the above theory the wage rate is determined exclusively by demand for labour and supply of labour. If we at a certain point of time have a wage rate which makes demand and supply unequal, this is explained as follows: The present wage rate reflects partly the positions the curves describing demand and supply of labour had some time ago. Since then one or both of these curves have changed, and the wage rate has not yet had time to adjust to this change.

In the next section we shall present an alternative theory about the generation of the values on the wage rate. If that theory is valid, then we can not take it for granted that the economy will reach a Walrasian equilibrium if we have "stationary conditions" for a sufficiently long time.

The influence on the wage rate of normative ideas

1. Let us look at a very unlikely case. We shall for a moment assume that the curves describing aggregate demand for labour and aggregate supply of labour in Norway have positions which imply that they intersect a wage rate which is such that if this rate is realized, then we get the following income distribution: The wage earners' share of private income is 10 per cent, while those who own the capital used in production get most of the rest.

A large majority of the Norwegian population would without doubt regard this distribution as unjust, and such a distribution would certainly not be accepted by the trade unions. The trade unions demand that the wage earners shall get what the unions regard as a fair share of the income, and they would not regard 10 per cent as fair. Their resistance to such an income distribution would be so strong that it seems safe to say that one would not get that distribution. Consequently, one would not get that wage rate which equalizes aggregate demand for labour and aggregate supply of labour.

2. This example illustrates that ideas about what is a just income distribution, can have consequences for the wage rate. Here is an extremely simple theory based on that fact:

The wage rate will be such that the wage earners get k per cent of the aggregate income in the society. k is a parameter whose value depends only on the existing ideas about how income ought to be distributed.

If we use this theory, then we will like to be able to explain the process which transmits ideas about what is a just income distribution into decisions about the wage rate. Here is one possibility:

The wage rate is determined after negotiations between trade unions and organizations of employers. During these negotiations the participants are concerned only with what is a just distribution of income.

3. On p. 19 was presented a theory which says that the wage rate is determined exclusively by demand and supply of labour. In this section I have presented another theory which says that the wage rate is determined exclusively by ideas about how income ought to be distributed. Applied to modern industrialized societies both theories are gross simplifications. There are reasons to believe that we can get a better description of reality by combining them. Here is a sketch of a theory which is such a combination:

In a modern society there are many different wage rates.

Some of the wage rates are determined after negotiations between trade unions and employers. These rates are influenced by ideas - especially the trade unions' ideas - about what is a fair income distribution. But they are also influenced by the situation in the labour market. Under otherwise equal conditions the trade unions and the employers will agree on higher wages when there is excess demand in the labour market than when there is excess supply in that market.

Other wage rates are determined without negotiations where the trade unions participate. These rates depend to a larger degree on the conditions in the market. But usually they do not depend only on those conditions. Ideas about what is "reasonable" are also of some importance. These ideas are partly derived from those rates which are determined after negotiations where trade unions participate, partly from what is the usual standard of living in the society, and partly from other influencing factors.

4. It is outside the scope of this paper to try to elaborate on and to make more precise the theory sketched here. The purpose of the paper is to discuss macroeconomic problems, and I will therefore usually simplify by assuming that there is only one wage rate. But when making assumptions about how the value on that rate is determined, I shall use the core of the theory indicated above. In other words, I shall assume that the wage rate depends both on the positions of the curves describing demand and supply of labour, and on ideas about what

is reasonable. This can be done in different ways. Here is a simple version[1]:

Let W^{CE} denote that value on the wage rate which makes demand and supply of labour equal. And let W^{ID} denote that value the wage rate would have taken if it had been determined only by the existing influence on it of ideas about what is a fair distribution of income.

If W^{ID} is higher than W^{CE}, and if exogenous conditions and behavioural and technical parameters remain unchanged for a sufficiently long time, then the wage rate will take a value which is a weighted average of W^{CE} and W^{ID}. The weights depend on the relative strength of the two forces influencing the wage rate.

If W^{ID} is equal to or smaller than W^{CE}, and if exogenous conditions and behaviour and technical parameters remain unchanged for a sufficiently long time, then the wage rate will become equal to W^{CE}.

In this theory there is an asymmetry. Ideas about how income ought to be distributed, can cause the wage rate to be above its equilibrium value, but not below that value. This assumption is not obvious, but I believe that in most cases it is realistic.

Different types of classical unemployment

On p. 18 we presented a theory which says as follows[2]:

(i) Because prices and wage rates are inflexible in the short run, we can get classical unemployment if autonomous demand, consumers assets or production functions change.

(ii) This unemployment will be eliminated if autonomous demand, consumer assets and parameters describing production functions and economic behaviour, remain constant for a sufficiently long time.

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[1] This version is not suited for econometric application, mainly because it will be difficult to give an operational definition of W^{ID}. But I am not concerned with econometrics in this paper. The version is chosen because it has the advantage of being simple. (More about this version on p. 105-108).

[2] The theory presented there, deals with both Keynesian and classical unemployment. But here we are only interested in that part of it which deals with classical unemployment.

There also exist theories saying that we can get classical unemployment for other reasons than the ones indicated in the theory sketched above. In this paper we shall consentrate on one such theory.

We shall assume that there is only one wage rate, and that this rate is determined in such a way that it is influenced by the trade unions' and/or the public opinions' ideas about how income ought to be distributed. (Cf. p. 20-22.) We shall further assume that in the labour market both the producers and the wage earners are "quantity adjusters", i.e. that each of them assume that his demand or supply has no discernible influence on the wage rate. This means that when discussing demand for labour and supply of labour we can use a diagram of the type illustrated by fig. 2 on p. 15.

Under such conditions the situation is as follows:

(iii) We can get classical unemployment if that value on wage rate which equalize demand and supply of labour, implies an income distribution which is unacceptable to the trade unions and/or to the public opinion.

(iv) Classical unemployment with such a background will not necessarily disappear in the long run. It will last as long as the equlibrium wage rate implies an unacceptable income distribution.

The type of unemployment dealt with in (iii) and (iv) will in this paper be called classical unemployment of the ID type. (ID is short for "caused by ideas about how income ought to be distributed ".)

In the rest of this paper I shall restrict the discussion of classical unemployment to a discussion of classical unemployment of the ID type.

MORE ABOUT CLASSICAL UNEMPLOYMENT OF THE ID TYPE

Introduction

Unless otherwise stated we shall in the rest of this chapter discuss societies where there are only one labour market, one type of labour and one wage rate, and where we can disregard both the possibility of getting Keynesian unemployment and the possibility of getting classical unemployment which is caused by short run inflexibility of the wage rate.

The steepness of the neoclassical demand curve for labour

1. Let us return to the society which is described by fig. 2 on p. 15.

We see from fig. 2 that if the real wage is w_0, then demand for labour and supply of labour are equal.

The area of the triangle BCw_0 in figure 2 may be called "producers' surplus when they use A units of labour and the real wage rate is w_0". (Cf. the concept "consumers' surplus".) The figure is drawn in such a way that this area is large. This means that if the real wage rate is w_0, then the producers get a large share of the income created by the production. Such an income distribution will probably not be regarded as acceptable by the wage earners and the trade unions, and we shall assume that for that reason the real wage rate will be somewhat higher than w_0, for instance w_1.

It follows from fig. 2 that if the real wage rate is w_1, then we get classical unemployment.

2. Let us next turn to fig. 3. This figure describes a society where the supply curve for labour is the same as it is in the society described by fig. 2, but where the neoclassical demand curve for labour is close to being horizontal. At the real wage rate where there is balance in the labour market, the wage earners' share of the income is so large that it seems unlikely that the trade unions will try to get a higher real wage rate. It therefore also seems unlikely that we will get classical unemployment of the ID type in this society, even if the trade unions wage have some influence on the real wage rate.

3. If we compare the societies described by fig. 2 and fig. 3, we can conclude as follows: It is the fact that the neoclassical demand curve for labour is steep in the society described by fig. 2, that makes it likely that there will be classical unemployment in this society.

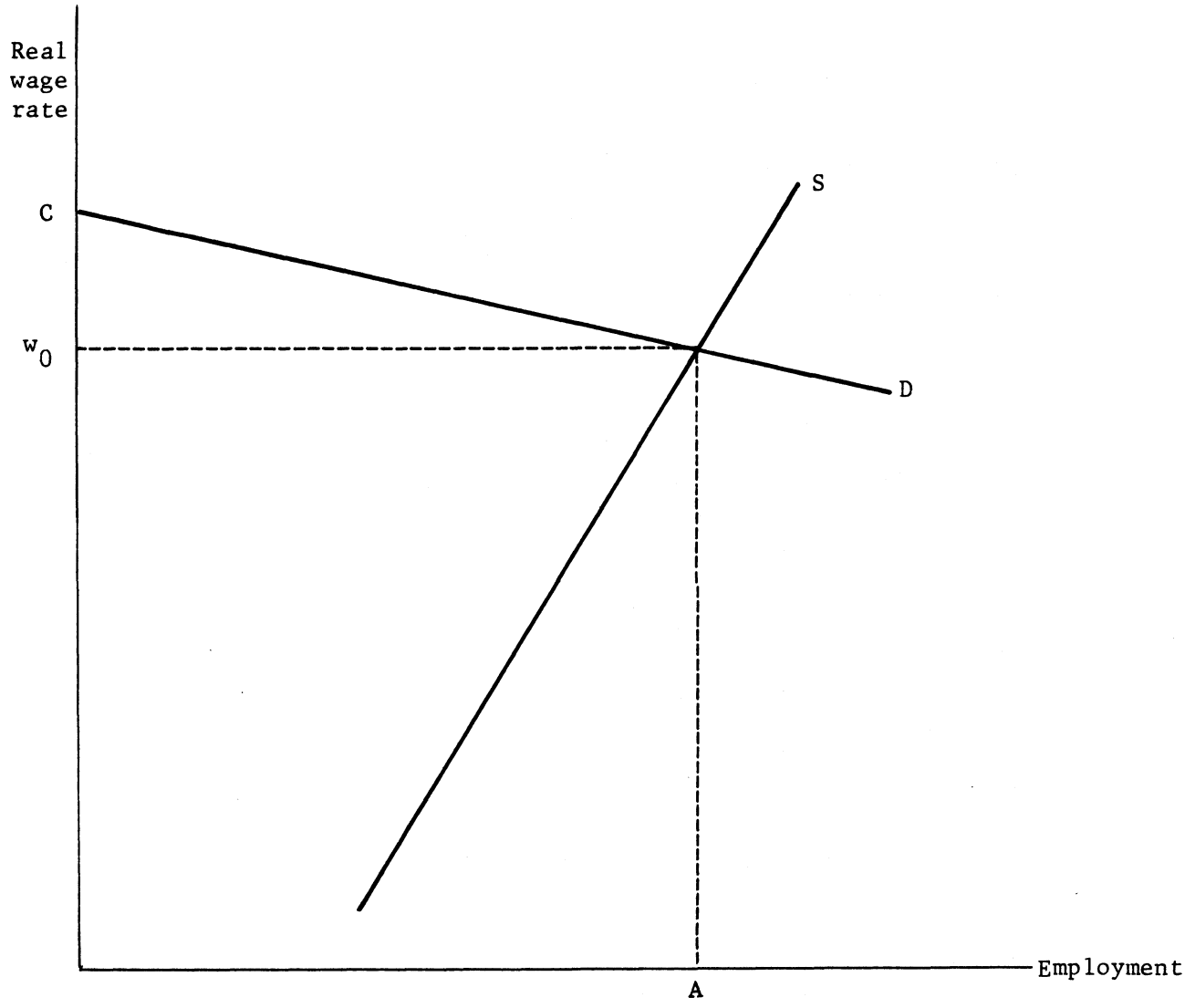

Figure 3. The labour market

D = The neoclassical demand curve for labour
S = The supply curve for labour

More general and more precise conclusions can be reached on the basis of a more thorough analysis along the lines sketched above. Here are some of these conclusions: Whether or not we get classical unemployment of the ID type, and how large this unemployment will be if we get it, depends partly on the steepness of the neoclassical demand curve for labour. If this curve is comparatively flat, then we will probably get little or no such unemployment. But if the curve is steep, then we will probably get large unemployment of this type.

The differences in wage potentials

1. With the wage potential of a certain use of labour we shall mean the highest value the real wage rate can take without making it unprofitable to use labour in this way.

Suppose for a moment that we have a society where there is only one product, and where every producer can regard both the product price and the wage rate as given quantities which are uninfluenced by what he does. In this case the wage potential of the use of an extra unit of labour in a certain production process, is equal to the marginal productivity of labour in that process.

Under such simple conditions there is a simple answer to the question: What determines the wage potentials? The answer becomes more complicated if we assume that there are several different products and/or that there are producers whose decisions have a discernible influence on the price(s) and/or the wage rate. In these cases the wage potentials depend both on the marginal productivities of labour and on conditions in the markets.

2. Following neoclassical tradition we shall make this assumption: The producers will try to utilize all those, but only those, production possibilities which have wage potentials which are at least as large as the real wage rate.

3. When we talk about the differences in wage potential in a society, we shall mean the "differences between the wage potentials of the jobs that will be filled up if the the wage rate and the product prices are such that demand and supply are equal both in the labour market and in all product markets"[1].

4. In fig. 2 the neoclassical demand curve falls steeply when we go from the left to the right. This can be explained as follows: What we may call "the set of jobs it is profitable for the producers to fill up if the products get sold" increases with diminishing real wage rate. New jobs are added to this set, in turn according to their wage potentials, if we start with a situation where the real wage rate is high and let this rate gradually become smaller. The steepness of the neoclassical demand curve in fig. 2 must mean that in the society

[1] We shall assume that there exist one and only one set of values on the wage rate and the product prices which imply equality between demand and supply in all markets. But we shall not discuss which conditions are necessary and sufficient to make this assumption correct.

described by this figure, the wage potentials of the new additions to that set fall rapidly when the set increases. This must mean that the differences in wage potential are large.

On the other hand, the flat neoclassical demand curve for labour in fig. 3 must mean that this figure describes a society where the differences in wage potential are small.

5. On the basis of the above discussion I shall draw the following conclusions: The steepness (elasticity) of the neoclassical demand curve for labour depends on the differences in wage potential. The larger these differences are, the steeper (the more inelastic) the curve is.

6. Let us combine what is pointed out here, with what is said on p. 24 regarding the connection between the steepness of the neoclassical demand curve for labour and classical unemployment of the ID type. We then reach the following conclusions: Whether or not we get classical unemployment of the ID type, and how large that unemployment will be if we get it, depends partly on the differences in wage potential. If these differences are small, then we will probably get little or no such unemployment. But if the differences are large, then it is much more likely that we will get large unemployment of this type.

A conflict of goals

What is pointed out above, shows that there can be a conflict between

(i) the goal that the real wage rate shall be so low that it does not cause classical unemployment, and

(ii) the goal that the real wage rate shall be so high that the wage earners get what is regarded as a reasonable share of the income created by the production.

This conflict is due to the fact that in a market economy the wage rate has the following two functions:

(a) Together with other data the wage rate gives the producers information about how much labour it is profitable for them to use.

(b) The wage rate plays an important role in the distribution of income.

Different wage rates

1. In real societies labour is not homogeneous. Differences in formal education, job experience, intelligence, physical and/or

psychic strength etc., imply that two different wage earners can have different qualifications for doing a certain type of work.

In real societies there are also many different wage rates. Most of the differences between wage rates are related to the inhomogeneity of labour. But that inhomogeneity does not explain all differences between wage rates. It is not difficult to find examples showing that wage earners with the same qualifications get different wage rates.

In previous sections we have assumed that we deal with a society where labour is homogeneous, and where there is only one wage rate. In order to keep our analysis simple, we shall continue to assume that labour is homogeneous. But in order to indicate how the use of different wage rates can reduce the possibility of getting classical unemployment, we shall in this section drop the assumption that there is only one wage rate.

2. Let us first assume that there are two different wage rates; a high rate used in connection with some jobs which have high wage potentials, and a low rate used in connection with the other jobs. (Cf. fig. 4.)

The position of the neoclassical limit is determined by the size of the low rate. (Cf. fig. 4)

The use of two different rates implies that the neoclassical limit is higher than it would have been if all work had been paid by the high rate. The use of two different rates also implies that the wage earners' share of income is higher than it would have been if all work had been paid by the low rate. The use of two wage rates therefore makes it easier to handle the conflict sketched in the above section called "A conflict of goals".

3. There can of course be more than two different wage rates. Suppose for a moment that we deal with a society where there are many different wage rates and large differences between them. It is easy to see that in such a society it is possible to avoid classical unemployment even if (i) there are large differences in wage potential, and (ii) the wage earners get a large share of the income.

4. However, using widely different wage rates can come in conflict with existing ideas about how income ought to be distributed.

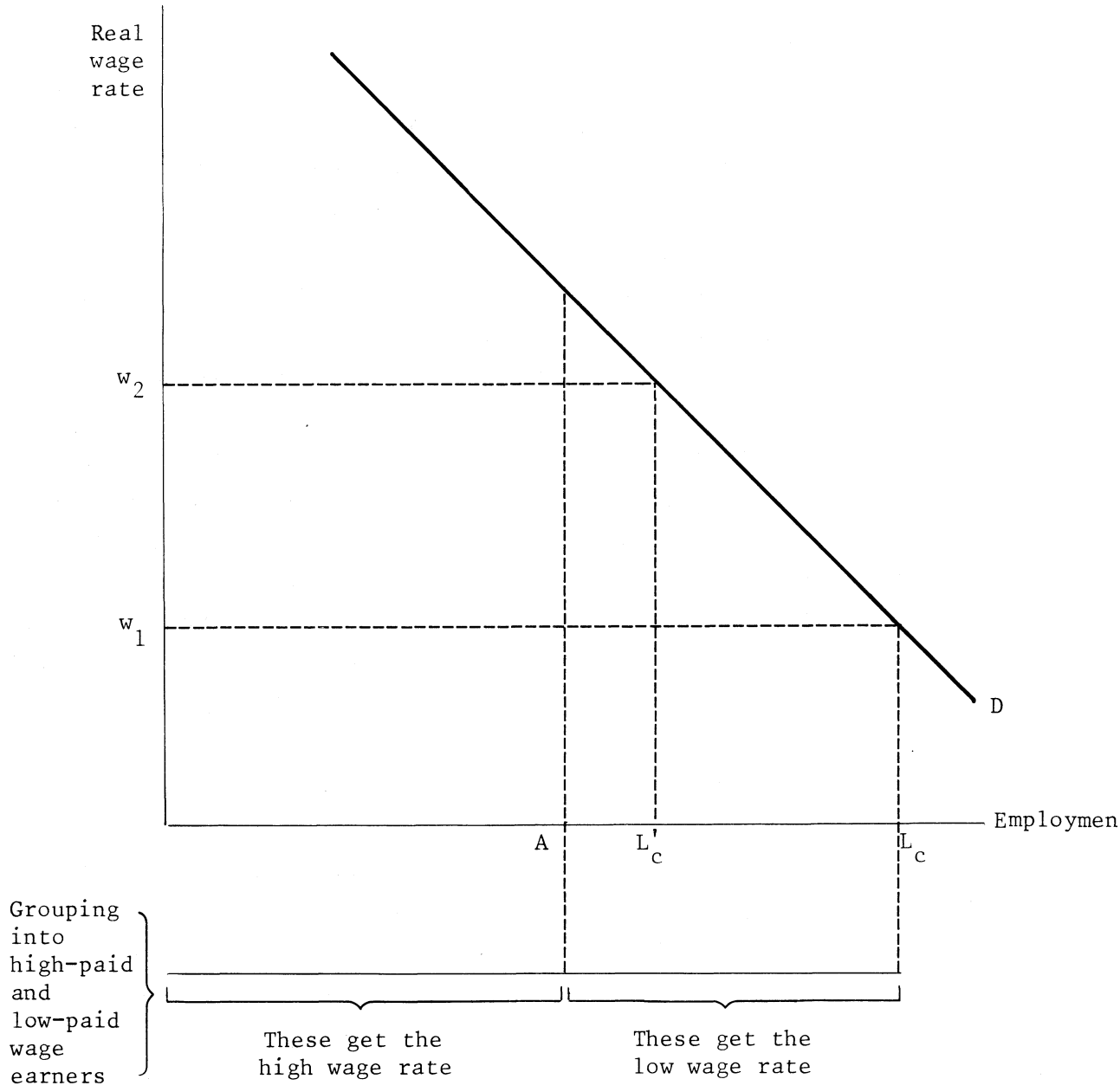

Figure 4. Two different wage rates

D = The neoclassical demand curve for labour

w_1 = The low real wage rate

w_2 = The high real wage rate

L_C = The neoclassical limit for the employment

L_C = The position the neoclassical limit would have had if all labour had been paid by the high wage rate

Aggregate wage income is $(Aw_2 + (L_c - A)w_1)$. If all wage earners had been paid according to the low rate, then aggregate wage income would have been $L_C w_1$

In this example all who qualify for being paid according to high wage rate have a wage potential which is higher than that rate. This is not an essential aspect of the example.

How large can the wage differences in a certain country become?

There is usually a "floor", which few if any wage rates will be below. A law setting a minimum wage rate, can establish such a floor. Public subsidies to unemployed persons can do the same. If all unemployed persons can get a dole, then we will seldom find a wage rate which is so low that working full time for this rate gives an income which is smaller than the dole.

How high the minimum wage rate and/or the dole will be, depends mainly on what is considered to be "the lowest standard of living that the society will accept that anyone of its members can have". And what that is, depends among other things on the average standard of living in the country. Here is an example: What most Norwegians regard as "that standard of living which is the lowest which can be accepted in Norway today", is much higher than standards of living which could be accepted in Norway fifty years ago. Part of the explanation for this is that the average standard of living in Norway is today much higher than it was fifty years ago.

The differences between wage rates are also, though less in some countries than in others, influenced by the following facts: Each group of wage earners will probably regard it as unjust if their wage rate is considerably smaller than the rate paid to another group which has a type of work similar to their own work. The same attitude towards getting less than what "the others" get, can be found also in many cases where two groups have widely different work.

What is pointed out above, indicates that in each country there are limits to the acceptable variation between the wage rates, and therefore also limits to the use of widely different rates as a means to avoid classical unemployment of the ID type. The more narrow these limits are, the more difficult it will be to avoid such unemployment.

Summary

It follows from the analysis above that we will get classical unemployment of the ID type if all the following conditions are satisfied:

(i) Labour is used only where it has a wage potential which is at least as large as the real wage rate which must be paid for it.

(ii) The wage rates are to some extent influenced by both (a) the idea that the wage earners ought to get a large part of total income, and (b) ideas that set limits to the amount of variation between wage rates.

(iii) There are large differences in wage potential.

Point (i) describes what we may call "the essence of the employment mechanism of our economic system", and point (ii) describes a characteristic of what we may call "the wage-generating mechanism" of that system. The differences in wage potential, which are in focus in point (iii), depend on how large the supply of labour is, and on what is available of technology, production equipment and natural resources. This means that both

(a) the supply of labour, and

(b) some fundamental aspects of our economic system, and

(c) what is available of technology, production equipment and natural resources,

are of importance for whether or not there will be classical unemployment of the ID type.

Final remarks

1. It is often reasonable to assume that aggregate demand is an increasing function of the wage earners' share of total income, and for that reason also an increasing function of the real wage rate. Suppose for a moment that we can disregard neither the possibility of getting classical unemployment, nor the possibility of getting Keynesian unemployment. We may then want a real wage rate which is low enough to avoid getting classical unemployment, but also large enough to result in an aggregate demand which is sufficient to avoid Keynesian unemployment. The economic situation in a society may be such that both these conditions cannot be met.

2. We have pointed out that whether or not we get classical unemployment of the ID type, depends among other things on the differences in wage potential. We may ask: How do various types of economic development affect those differences? Some aspects of that question will be discussed in the next chapter.

EFFECTS ON THE NEOCLASSICAL LIMIT OF HAVING MADE INVESTMENTS

Introduction

With "investments" we shall here mean what more precisely could be called "private investments in fixed capital intended to be used in the production".

The effects of an investment can be divided into two groups we shall call "effects of making the investment" and "effects of having made the investment". Here is an example: Let us assume that when building a shoe factory we use among other things labour, steel and cement. This use is an effect of making that investment which consists of building the factory. After we have built the factory, the society's production function for shoes will be different from what it was before. This change in the production function for shoes is an effect of having made that investment which consists of building the factory.

In the preceding chapter we discussed the connection between differences in wage potential and classical unemployment of the ID type. On the basis of that discussion it seems reasonable to make the following assumptions about how having made investments will affect the neoclassical limit for the employment: Investments which increase the differences in wage potentials will probably lower the neoclassical limit. Investments which reduce the differences in wage potential will probably raise that limit.

The question of how having made an investment influences the neoclassical limit, can come in different forms. We shall look at two of them.

Unemployment caused by lack of production capacity

Sometimes it is said that too small production capacity is a possible cause of unemployment. I shall try to elucidate this statement through a highly simplyfied example.

We shall discuss the employment in a hypothetical society where Keynesian unemployment does not occur, and where the producing units can be divided into A-plants and B-plants. At a given point of time all jobs in the A-plants have one wage potential, while all jobs in the B-plants have another, and lower, wage potential. The stepformed curve in the left-hand part of fig. 5 describes the neoclassical demand for labour. The highest step, to the left in the figure,

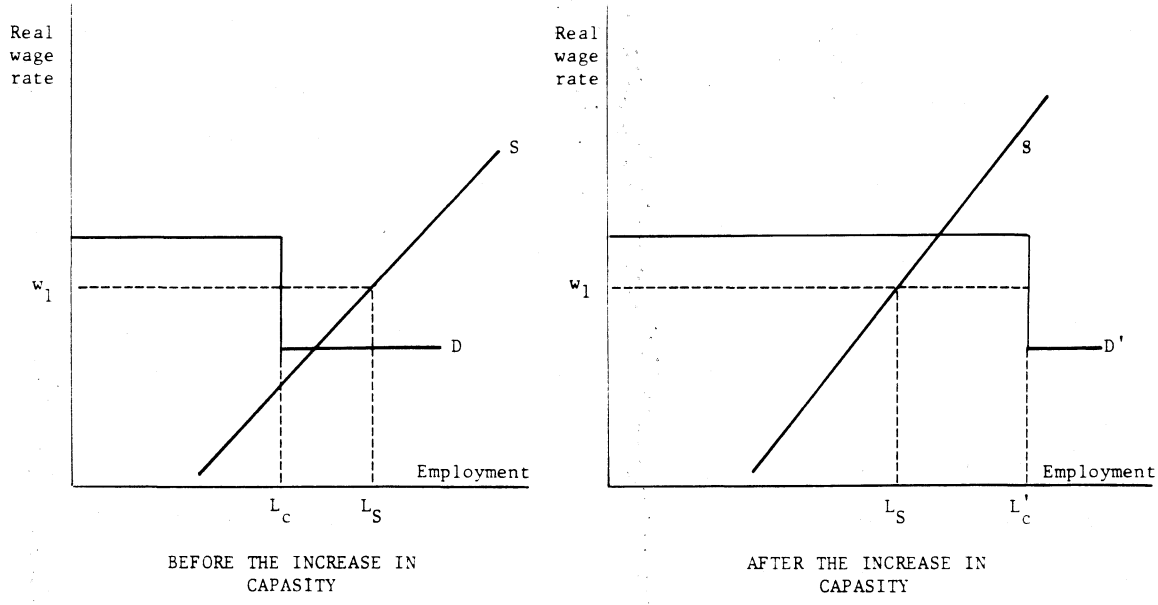

Figure 5. The consequences of increase in capacity in the A-plants. (It is assumed that the demand for products is large enough to insure that there will be no Keynesian unemployment.)

S = The supply curve for labour, both before and after the increase in capacity

w_1 = Current real wage rate, both before and after the increase in capacity

L_S = The supply limit for the employment, both before and after the increase in capacity

D = The neoclassical demand curve for labour, before the increase in capacity

L_C = The neoclassical limit for the employment, before the increase in capacity

D' = The neoclassical demand curve for labour, after the increase in capacity

$L_{C'}$ = The neoclassical limit for the employment, after the increase in capacity

expresses the demand from the A-plants, while the lowest step expresses the demand from the B-plants.

In the situation described by the left-hand part of fig. 5 there is classical unemployment. But then the A-plants expand their production capacity by getting more of the same types of production equipment they already have. Consequently there will be more jobs in the A-plants , and the new jobs will have the same wage potential as the "old" jobs in those plants. Because of the increase of jobs in the A-plants the highest step of the neoclassical demand curve for labour becomes longer, and this change in that curve implies that the unemployment will be eliminated. (Cf. the right-hand part of fig. 5. We assume that the real wage rate remains unchanged, not only in the short run, as assumed by the fixed-price theory, but also in the long run.)

What is pointed out above, will perhaps be commented as follows: The unemployment in the initial situation was eliminated through an increase of production capacity. This shows that the unemployment was caused by too small production capacity.

Here are a few remarks to such a comment:

1. Whether or not there will be unemployment, depends also on the real wage rate. Figure 5 describes a situation where there to the given wage rate cannot be any profitable production in the B-plants. Because of that, we will perhaps direct our attention exclusively towards the A-plants. But if the real wage rate had been somewhat lower, then also the production capacity in the B-plants would have been of interest, and then we would probably have concluded that also in the intial situation the production capacity was large enough to make full employment possible.

We have here an example illustrating that in a situation where there is classical unemployment, we can give several diagnoses which are different, but which all in some sense are correct. "Too low production capacity in those plants where the wage potential is at least as high as the current real wage rate" and "too high real wage rate" are two of these diagnoses.

2. When evaluating the relevance of what is pointed out above, we may ask: Are there today a substantial capacity in the "B-plants" in the OECD-countries? In other words: Are there in these countries a substantial unused production capacity which is ignored because it is

not profitable to use it at the current real wage rate? I believe that the answer is yes. Perhaps that type of capacity is rather limited in capital-intensive goods-producing industries. But I believe that at any rate in the production of many types of services, there are today large possibilities of increasing the production without needing more capital equipment than we have today.[1]

3. It follows from the example illustrated by fig. 5 that a real wage rate which is high, in a rather direct way can cause classical unemployment. A high real wage rate can also conceivably do this in the following, more indirect, way: (i) A high real wage rate makes the profits low. - (ii) Because profits are low, both the desire to invest and the ability to invest are small. The desire to invest is small because low profits today make potential investors expect that future profits will also be low. The ability to invest is small because investments are financed partly from profits. - (iii) Because both the desire to invest and the ability to invest are small, investments will be small. - (iv) Because investments are small, future production capacity will be small. Perhaps it will be so small that it will lead to classical unemployment in the way illustrated by fig. 5. (Cf. Malinvaud (2), p. 13-19.)

4. In many cases the consequences for employment of increased production capacity are different from those illustrated by fig. 5. Replacing the machines in a plant with new and more efficient machines, can result in increased production capacity but nevertheless a smaller number of jobs in that plant. We can also get this development: Some producers increase their capacity by replacing their old machines with new and more efficient machines, and therefore increase the wage potential of the jobs in their plants. This increase results in a higher real wage rate in the society, and that causes loss of jobs in plants where the wage potential has not

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1) We may here note this: In USA there was a large increase of jobs in the first half of the 1980s. A considerable part of that increase consisted of low-paid jobs in the production of services. This may also be seen in relation to the following idea, expressed on p. 30: The wider the limits to the use of different wage rates are, the easier it is to avoid classical unemployment of the ID type. If those limits became wider in USA in the first half of the 1980s, then this is perhaps part of the explanation of why it was possible to create so many new jobs in USA in that period.

increased.

We can therefore conclude that only under certain conditions will increased production capacity lead to less classical unemployment.

A further discussion of this problem will for a large part have to deal with the question: What are the consequences for the differences in wage potential of investments which increase the production capacity?

Unemployment caused by cheap capital services

In most cases where a new production technique is introduced, it is embodied in particular types of capital equipment. The acquisition of new capital is therefore usually essential for the utilization of a new technique. Consequently, a discussion of the effects of having made investments, should among other things be a discussion of the effects of technological change.

Here is a theory about the current and future economic development in industrialized countries with market economy: Changes in technology make services from machines increasingly cheaper, compared to labour services. Labour is therefore being replaced by machines in the production, and that causes unemployment. This development will continue in the future, and that means that an increasing share of the population will be unemployed.

When evaluating this theory we must not forget that those who loose their jobs because labour is replaced with machines, perhaps will get new jobs. To what extent that will happen, depends among other things on what consequences the changes in technology will have for the differences in wage potential. We shall illustrate this with an example.

Figur 6 describes a hypothetical society where aggregate demand for products always is large enough to insure that there is no Keynesian unemployment. We assume that at a given point of time there are small differences in wage potential. The neoclassical demand curve for labour is therefore rather flat, and consequently it is probable that there is no classical unemployment. (Cf. p. 24) In accordance with this it is assumed in fig. 6 that in the initial situation the real wage rate has a value which makes demand for labour and supply of labour equal.

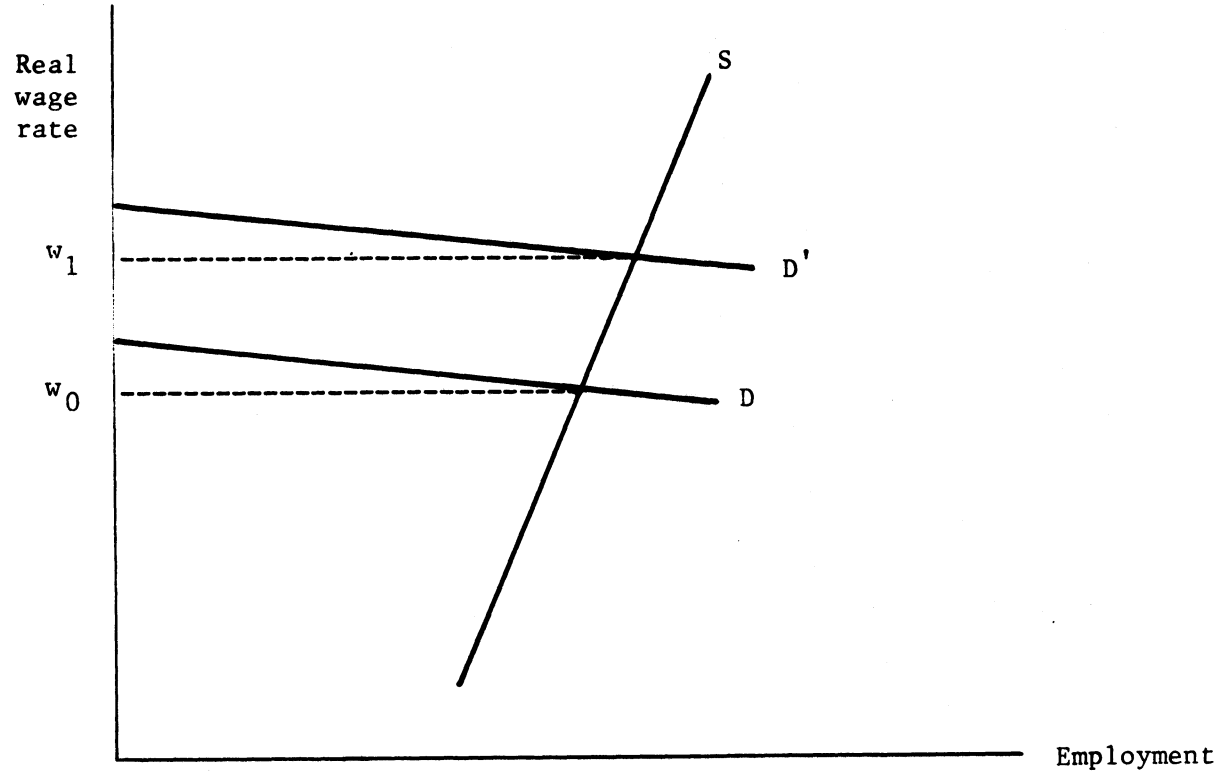

Figure 6. Consequences of a change in technique

S = The supply curve for labour

D = The neoclassical demand curve for labour before the technique has changed

w_0 = The real wage rate, before the technique has changed

D' = The neoclassical demand curve for labour after the technique has changed

w_1 = The real wage rate after the technique has changed and supply of labour equal.

Then a new technology is introduced, and plants which use this technology get a higher productivity than they had before. If the wage earners are able to prevent a decrease in their share of the income, then the higher productivity leads to an increase in the real wage rate. One of the consequences of this increase in the real wage rate is that services from machines become less expensive compared to labour services.

In order to make the example illustrate what I want it to illustrate, we shall assume that also after the technological change has taken place, the differences in the wage potential are small. Consequently the neoclassical demand curve for labour remains flat. It is therefore reasonable to assume that also after the technological change the real wage rate will be such that there is no unemployment. This assumption is expressed in fig. 6.

Fig. 6 shows one possibility. It is also possible, and in my opinion at least as likely, that technological change will result in increased differences in wage potential. In that case classical unemployment becomes more probable.

This section started by sketching a theory describing some possible consequences of the technical development which takes place in industrialized countries. My evaluation of this theory is as follows:

It is correct that machine services are becoming less expensive, compared to labour services. But from this we can draw no sure conclusions about what will happen to unemployment. If we are interested in how unemployment will be affected, it is more relevant to ask: "What are the consequences of the technological change for the differences in wage potential?" than to ask: "What are the consequences of the technological change for how inexpensive services from machines will become, compared to labour services?"

INVESTMENTS AS A MEANS TO HIGH EMPLOYMENT

Effects of investments on unemployment

If there is substantial Keynesian or classical unemployment in a closed society, then we can be almost sure that a large investment made in that society will reduce the unemployment while it is being made. One reason for this is that labour will be needed to build the buildings, construct the machines and produce the other items constituting the investment. In addition comes the fact that if there is Keynesian unemployment, then the investment activity is likely to have positive effects on other activities. (Cf. the theory of the multiplier.)

If the society has economic contact with other societies, the effects of domestic investments on domestic unemployment are less sure. But also in this case it is likely that a large investment will reduce the domestic unemployment while it is being made.

However, an investment has effects on unemployment not only in the period it is made, but also in subsequent periods.

In the preceding chapter we pointed out that having made an investment probably lower the neoclassical limit if the investment increases the differences in wage potential.

There are various possibilities for the effect on the Keynesian limit of having made an investment. Here is one of them: The investment increases the average productivity in the society. With a given employment the society will therefore produce more than before. This means that if the Keynesian limit shall remain unchanged, it is necessary to have a larger aggregate demand. Higher productivity also means higher income, and therefore larger aggregate demand. But because increased income also means that a larger share of the income is saved, the increase in aggregate demand is not large enough to keep pace with the increase in productivity. Having made the investment therefore lowers the Keynesian limit.

Above we have deliberately concentrated on possibilities where having made an investment lowers the neoclassical and/or Keynesian limit for the employment. By doing this we provide a basis for an

assumption we shall make in the next section. But it must not be forgotten that it is not difficult to find examples where having made an investment increases unemployment. (Cf. p. 32.)

Using investments to avoid unemployment

Let us assume that we have a society where there is unemployment, and where the following is true:

(i) While investments are being made, they tend to reduce the unemployment.

(ii) Having made investments usually tends to increase the unemployment.

(iii) Through its choice of economic policy the government can determine the size of the investments.

The background for the first two assumptions is given in previous section. The third assumption is not realistic. Potential investors' expectations means a lot for the amount of the investments, and it is unrealistic to assume that the government can control these expectations. However, let us for the sake of the argument accept both assumption (iii) and the other two assumptions.

Let 1 and 2 denote two consecutive time periods. Here is a conceivable scenario: (a) In order to avoid large unemployment in period 1, the government conducts a policy which leads to high private investments in this period. - (b) The large investments made in period 1 will, as intended, make the unemployment of that period small. (Cf. assumption (i)). But they also tend to make the unemployment of period 2 large. In order to keep the unemployment in period 2 on a low level, the government finds it necessary to conduct a policy which causes the private investments to be larger in period 2 than they were in period 1, both absolutely and measured as a share of BNP.

The development we have sketched, can continue along the same lines in later periods. This means that the government in every period is able to avoid large unemployment, and that this is done by a policy which implies that an increasing share of BNP is used for investments.

Arguments against using investments to avoid unemployment

It may be sensible to conduct a policy of the type sketched in the preceding section if (i) avoiding unemployment is a goal with high priority, and (ii) the government cannot find better ways of achieving this goal. But this policy is not necessarily the best method for avoiding unemployment. There are several objections which, depending

on the society, with more or less relevance can be raised against it. We shall look at some of them. The first suggests that the method may not work. The others are relevant only when it works.

Not reliable. The method is based on the assumption that the government through its choice of policy can determine the size of the investment. As pointed out above, this assumption will often be unrealistic. This implies that if a government tries to avoid large unemployment only or mainly through influencing the amount of private investments, it may not succeed.

Does not give an optimal distribution of GNP between consumption and investments. The following ideas are accepted by many economists: Consumption is the end purpose for all economic activity. The function of investments is to increase future consumption. What is the optimal distribution of GNP between consumption and investments in a given period, depends partly on what consequences investments will have for future production, and partly on how present and future consumption are weighed against each other.

If the amount of investments is decided from employment considerations, then we will usually get a distribution between present and future consumption which is not optimal according to the view sketched above.

Can make the economic development go "too fast". Large investments can cause rapid economic changes, and rapid economic changes can cause difficult adjustment problems. If we rely on large investments in our efforts to avoid unemployment, we can be confronted with a choice between (i) high unemployment, and (ii) an economic development which goes so fast that the society cannot adjust to it in a satisfactory way.

Can lead to a conflict between "ecological" goals and the goal of avoiding unemployment. In order to avoid pollution and in order to preserve irreplacable natural resources, a government can prohibit or restrict the use of certain production methods. But restrictions on how they shall produce, can discourage potential investors.

Let us suppose that large investments are considered as the means to avoiding mass unemployment. It can then be considered an unacceptable luxury to let the goal of avoiding pollution and the goal of preserving natural resource have a strong influence on economic policy, if doing this will result in investments which are too small to prevent large unemployment.

THE MAIN PURPOSE OF THIS PAPER

In the introduction to this collection of papers I said that the main purpose is to try to draw more attention to certain ideas about what can cause Keynesian and classical unemployment.

In this paper, which is the first of four, I want to draw more attention to the following ideas:

1. In addition to usually being influenced by differences between demand for labour and supply of labour, the wage rates can also be affected by several other sources of influence, including:

(i) the idea that the wage earners ought to get a large share of the income created by production, and

(ii) ideas which create limits to the amount of variation between wage rates.

2. We can get classical unemployment if the wage rates which equalize demand and supply of labour, imply an income distribution which is unacceptable to the trade unions and/or to the public opinion. Classical unemployment with such a background will not necessarily disappear in the long run. It will last as long as the equilibrium wage rates imply an unacceptable income distribution.

3. Whether or not ideas about how income ought to be distributed, will cause classical unemployment, depends partly on the differences in wage potential. If these differences are small, there will probably be no classical unemployment of the ID type. But if the differences are large, then it is more likely that we will have large such unemployment.

4. Whether or not investments which increase production capacity, will make it easier to avoid classical unemployment in the future, depends partly on if and how the investments change the differences in wage potential.

5. Many investments make services from capital equipement less expense relative to labour services. Whether or not such investments will make it more difficult to avoid unemployment in the future, depends partly on whether or not the investments increase the differences in wage potential.

6. It may be unsatisfactory to let large investments be the most important means for avoiding unemployment.

Appendix 1

A NOTE ON THE CLASSIFICATION OF UNEMPLOYMENT

We shall consider the following case: The supply limit is much higher than the other two limits. These two limits are close to each other, but the Keynesian limit is a little lower than the neoclassical one. There is large unemployment.

If we apply the classification of unemployment used in this paper, then we will say that in such a case the unemployment is Keynesian.

Let us assume that the government wants a substantial reduction in the unemployment. It bases its policy on the fact that the unemployment is Keynesian, and therefore conducts a policy which is designed to raise the Keynesian limit. It succeeds in doing this. But the policy has little or no positive effect on the neoclassical limit, perhaps it even has a negative effect. Unemployment is reduced, but the reduction is small because the employment soon reaches the neoclassical limit. A change in policy is then needed if the government wants a further reduction in the unemployment.

This case shows that knowing that an unemployment is Keynesian, may give an incomplete picture of what type of policy is needed in order to reduce the unemployment substantially. We can construct an analogous case showing that knowing that an unemployment is classical, can also be insufficient.

What is pointed out here, suggests that for some purposes it is probably recommendable to replace our classification with the following one:

Pronounced Keynesian unemployment. This is the type of unemployment we get when the Keynesian limit is substantially lower than both the supply limit and the neoclassical limit.

Pronounced neoclassical unemployment. This is the type of unemployment we get when the neoclassical limit is substantially lower than both the supply limit and the Keynesian limit.

Pronounced Keynesian/classical unemployment. This type can be divided into two subtypes, the exact and the approximate. We get the exact subtype when the Keynesian limit and the neoclassical limit are equal, and both these limits are substantially lower than the supply limit. And we get the approximate subtype when the Keynesian limit and the neoclassical limit are close without being equal, and both of them are substantially lower than the supply limit.

Approximately full employment. This is the type we get when the supply limit is higher than one or both of the other two limits, but where the difference between the supply limit and the lowest limit is small.

If we decide to use this classification, then we face the following question: How shall we, in this connection, define "substantially lower", "close to each other" and "small"?

Appendix 2

THE CONNECTION BETWEEN PRODUCTION AND DISTRIBUTION

A discovery made by John Stuart Mill

This appendix can be regarded as an illustration of the fact that today's economic problems too a large degree are old problems.

In 1848 John Stuart Mill published his "Principles of Political Economy - - - ". According to Heilbronner one of the contributions in this book was a discovery of monumental importance. (Cf. Heilbronner (1) p. 118). Here is Heilbronner:

"The discovery - - - consisted of pointing out that the true province of economic theory was production and not distribution.

What he meant was very clear: the economic laws of production concerns nature. - - - the economic rules of behaviour which tell us how to maximize the fruits of our labour are as impersonal and as absolute as the laws of expansion of gases or the interaction of chemical substances.

But - and this is perhaps the biggest but in economics - the laws of economics have nothing to do with distribution. Once we have produced wealth as best we can, we can do with it as we like. "The things once there," says Mill; " mankind, individually or collectively, can do with them as they please. They can place them at the disposal of whomsoever they please, and on whatever terms. - - - " - - - what Mill said was transparently obvious - once it had been said. Never mind if the "natural" action of the society was to depress wages or equalize profits or raise rents or whatever. If society did not like the "natural" results of its activities, it had only to change them. Society could tax and subsidize, it could expropriate and redistribute."

Meade's proposal for avoiding stagflation

According to professor James E. Meade stagflation "is basically caused by the combination of two developments: (1) the general adoption of a Keynesian policy of expanding total money expenditures, through budgetary and monetary policy; and (2) the increased ability or willingness of trade unions and similar monopolistic pressure groups to aim at given increases in real standards of living even though they exceed the available increases in real output; - - -" (Meade (1) p. 2-3.)

Meade belives that stagflation can be avoided if there is a change of goals both for budgetary and monetary policy and for wage

fixing. His proposal is that (1) budgetary and monetary policy shall be used to make money expenditure expand at a given steady moderate rate, while (2) for the wage fixers the goal shall be to choose those wage rates which maximize employment.

Meade is of course aware of the fact that if the income distribution to a large degree is determined by wage rates, then wage rates which maximize employment may result in an income distribution which is politically unacceptable. But he does not think this is a valid objection towards his proposal, arguing in the following way: "There is a whole battery of measures other than the fixing of wages which can and should be used for influencing the distribution of income and property between individuals and families." (Meade (1), p. 18-19.)

Meade's proposal can be regarded as an application of Mill's idea that the problems of production and the problems of distribution can be separated.

Can we separate production and distribution?

The fact that wage rates have consequences both for the income distribution and for how much labour is used, creates a connection between production and distribution, and that connection is of importance for the possibility of getting classical unemployment. (Cf. p. 27.) If we could cut off the connection, then we could avoid classical unemployment of the ID type.

Is it possible to cut off the above-mentioned connection, or at any rate make it much weaker than it is today? In spite of the above quotations from Mill, Heilbronner and Mead, I belive that in modern market economics it will be difficult or impossible to do this unless there are large changes in the economic system.

One aspect of this is that we shall also produce in the future. If we should produce only once, and at a later point of time distribute the products, then it would be easy to support Mill's statement that "The things once there, mankind, indivudually or collectively, can do with them as they please." The situation is different when we must consider that how we distribute today what was produced yesterday, has consequences for what will be produced tomorrow.

Another aspect of the problem is that today the governments of most OECD-countries have financial problems which make is difficult for them to increase their influence on the income distribution through higher taxes and larger subsidies. (More about this on p. 55 -56).

AN ATTEMPT TO USE THEORIES ABOUT KEYNESIAN AND CLASSICAL UNEMPLOYMENT TO EXPLAIN WHY IT IS SO DIFFICULT TO FIND AN ECONOMIC POLICY WHICH REDUCES SUBSTANTIALLY THE UNEMPLOYMENT IN THE OECD-COUNTRIES

INTRODUCTION

Why has there been so much unemployment in the OECD-countries in the 1970s and 1980s? Why don't we get an economic policy which makes the unemployment disappear or at least become considerably reduced? Is the explanation that under the present economic system it is difficult or impossible to find such a policy? Or is the goal of avoiding large unemployment given lower priority than one or more other goals, and therefore don't have a decisive influence on the choice of policy?

These questions constitute the background for this paper. The analysis is restricted to trying to find out if simple versions of the theories of Keynesian and classical unemployment can give part of the answers. This implies that many relevant aspects of the present unemployment in the OECD-countries are discussed very briefly or not at all. Here are some of those aspects: (1) The consequences of changes in techniques of production. - (2) The consequences of the fact that there are many different products and many different types of work. - (3) The consequences of imbalances in international trade and international payments. - (4) The consequences of changes in the size and the composition of the population.

The terminology and the theories I shall use in this paper are presented in the paper called "Notes on the Theories of Keynesian and Neoclassical unemployment". Unless otherwise stated I shall use the model sketched in the first chapter of that paper. (Cf. p. 13-17.) This model will be called "the basic model". It deals with a closed society with only one labour market and one wage rate.

A dynamic version of the basic model is described in the paper called "Keynesian/classical Dynamic Macro model". (Cf. p. 74-82.)

THE UNEMPLOYMENT IN THE OECD SOCIETY

Theory and reality

Today there is much trade between the OECD-countries, and the economic activity in anyone of them is to a large extent influenced by the activity in other OECD-countries. When discussing economic problems of these countries, it can therefore sometimes be useful to regard them as one society. I shall do this here, and when analysing that society I shall use the basic model.

There are large differences between the OECD society and the basic model. But there are also similarities. Let us look at two aspects of this.

Wage structure. In the basic model there is only one wage rate. What a wage earner is paid, is therefore not adjusted to the wage potential of the work he is doing[1].

In the OECD society there are many different wage rates, and without doubt may the wage differences reflect the fact that not all work have the same wage potential. But the OECD society is not a society where everyone is paid according to the wage potential of the work he is doing. This is partly due to the existence of wage agreements between organizations of wage earners and organizations of employers. Moreover, within each country the wage level in an industry is influenced by what is paid for work in other industries. Both these and several other traits of the OECD society make the wage differences in that society fewer and smaller than they would have been if the wage rates had been perfectly adjusted to the wage potentials of each job and each person.

The situation may be described as follows: The OECD society has a wage structure which is something between two extremes which are (i) that everybody is paid according to the wage potential of the work he is doing, and (ii) that there is only one wage rate. This means that there is both a difference and a resemblance between the basic model and the OECD society. My conjecture is that the resemblance is large enough to make the basic model a useful instrument when analyzing unemployment in the OECD society, provided that in certain other ways there is sufficient resemblance between model and reality.

Economic contact with other societies. The basic model is a model for a closed society.

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[1] The concept "wage potential" is defined on p. 26.

The OECD society has contact with other societies. But that contact is small both compared to the trade within OECD and the total production in OECD. In some connections it is therefore probably an acceptable simplification to regard OECD as a closed society.

If we want to reduce that difference between theory and reality we are discussing now, there are several possibilities. We can modify the model in such a way that it becomes a model for an open society. Or we can choose a different society as the object of our analysis. Instead of studying the unemployment in the OECD society, we can study the unemployment in a society which consists of the OECD-countries and some other countries. These other countries could for instance be the newly industrialized countries in Asia and Latin America. Through such a modification of our object of study we can make it more acceptable to use a model for a closed society. But a modification of this type will probably increase other differences between theory and reality.

In what follows we shall assume that it is an acceptable simplification to regard the OECD society as a closed society.

What type of unemployment?

In the 1970s and 1980s there has been much unemployment in the OECD society.

In what follows I shall analyse the implications of assuming that this unemployment can be explained by the basic model. This assumption implies that at least one of the other two limits for the employment must have been considerably lower than the supply limit for the employment.

There are three possibilities consistent with this assumption. We shall look at these possibilities in turn, and when discussing them we shall make the following assumptions: (i) The curves describing production and demand for products as functions of the employment, have been located in relation to each other as shown by fig. 7. - (ii) The supply curve for labour and the neoclassical demand curve for labour have been located in relation to each other as shown by fig. 8.

Let us first for a moment suppose that the neoclassical limit for the OECD society, in addition to having been considerably lower than the supply limit, also has been considerably lower than the Keynesian limit. We see from fig. 7 that this means that the demand for

products has been substantially larger than the production. It seems reasonable to assume that this would have created a situation where it is easy to sell products, but where it can be difficult to buy what one wants.

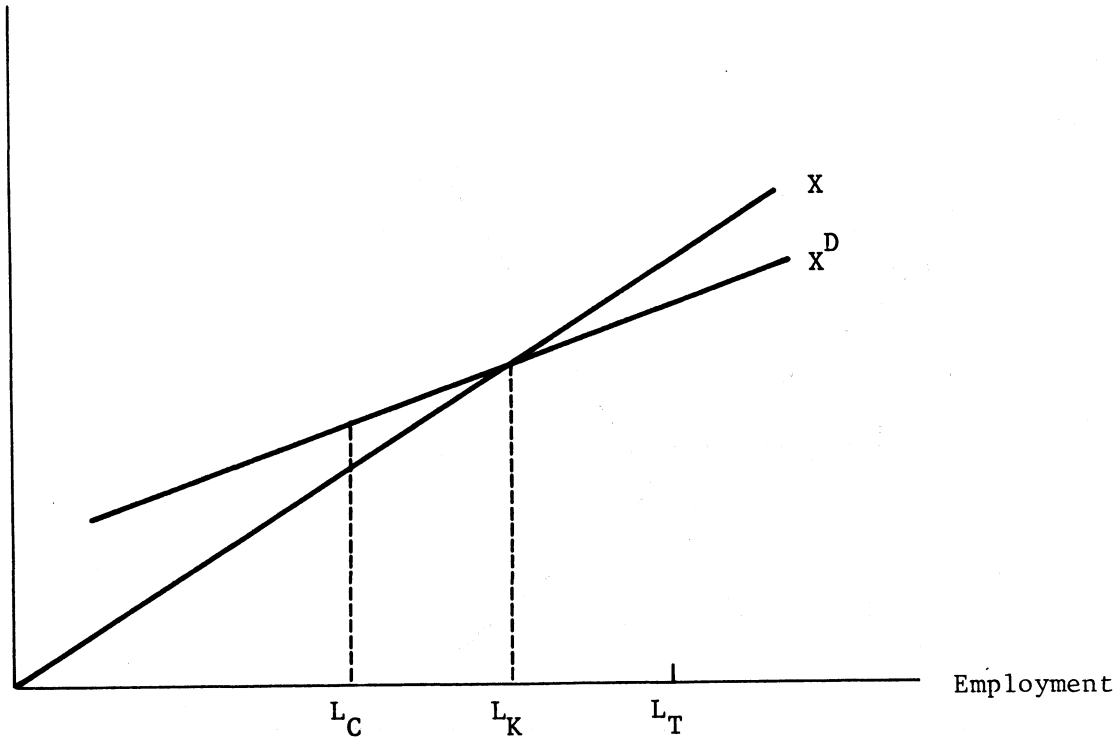

Figure 7. Production and demand for products

X = Production, measured in fixed prices

X^D = Demand for products, measured in fixed prices

L_C = The neoclassical limit for the employment

L_K = The Keynesian limit for the employment

L_S = The supply limit for the employment

From what I know and have heard about the 1970s and 1980s I doubt that this is a good description of those years. I shall therefore reject the hypothesis that the neoclassical limit in those years or in large parts of them has been considerably lower than the Keynesian limit.

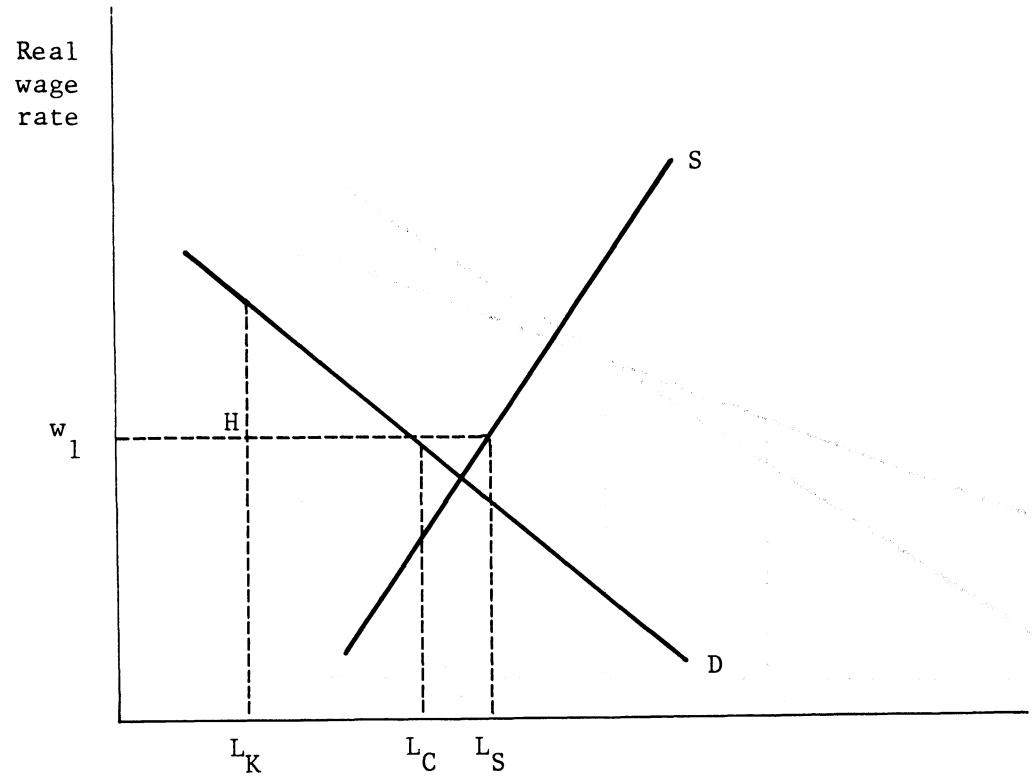

Figure 8. The labour market

S = The supply curve for labour
D = The neoclassical demand curve for labour
w_1 = The current real wage rate
L_K = The Keynesian limit for the employment
L_C = The neoclassical limit for the employment
L_S = The supply limit for the employment

Let us next for a moment suppose that the Keynesian limit, in addition to having been considerably lower than the supply limit, has also been considerably lower than neoclassical limit. We see from fig. 8 that this means that the producers have been in the following situation[1]: All production that takes place is so profitable that the producers, without getting any increase in product prices, can stand an increase in their wage costs - or in any other component of their costs - and still make a profit on all they produce.

What I have heard about the 1970s and the 1980s does not agree with such a picture of those years. It has often been said that in many industries profits have been low, and that it has been necessary for the producers to be cost conscious in order to survive. I will therefore reject the hypothesis that the Keynesian limit in those years or in a large part of them has been considerably lower than the neoclassical limit.

The third possibility is that the neoclassical and the Keynesian limits either have been equal or have been close to each other, and that these limits have been substantially lower than the supply limit. The unemployment we then get, can be called "pronounced Keynesian/classical". (Cf. p. 43.) - On the basis of what I have said above about other possibilities, I shall assume that it is this type of unemployment we usually have had in the 1970s and 1980s.

The OECD point of view and the national point of view

Here is a simplified picture of the current situation in the OECD society:

There is pronounced Keynesian/classical unemployment. (Cf. the preceding section). In order to get rid of that unemployment we must get both a higher Keynesian limit for the OECD society and a higher neoclassical limit for that society.

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[1] Fig. 8 is based on the assumption that the production takes place in the most profitable firms. This assumption is not necessarily satisfied when there is Keynesian unemployment. (Cf. Moene 1980.) But that is probably without consequence for the conclusion we draw here.

In each OECD-country it seems sensible to reason in the following way: The size of the domestic unemployment depends largely on how well we can compete with other OECD-countries. In the OECD society there is enough demand to make it possible for us to sell all we can produce - if we are competetive enough. If we want to avoid large domestic unemployment, it is both necessary and sufficient to make sure that our costs of production are so low that we can compete.

We can describe the situation in this way: When trying to avoid domestic unemployment, each OECD-country find it reasonable to forget that there exists a Keynesian limit for the employment, and instead direct all its attention towards those economic mechanisms which create classical unemployment. In other words: From a national point of view the unemployment is regarded as classical, even though from an OECD point of view it is Keynesian/classical.

In this picture we do not distinguish between various industries. If we make allowance for the fact that there exists different industries with different market situations, the description must be modified. It is in the industries facing international competion the attention can be restricted to the costs of production. When discussing the employment in industries that are sheltered from competion from abroad, it is necessary to remember also the Keynesian mechanism for creating unemployment. The main point in the simplified description nevertheless remains: The classical aspect of the unemployment becomes more important when the unemployment is seen from a national point of view than when it is seen from an OECD point of view.

ECONOMIC POLICY AND UNEMPLOYMENT

What type of policy will reduce the unemployment?

In what follows we shall use the term "the economic policy" to denote what more precisely could be called "the aggregate of the economic policies of the governments of the individual OECD-countries".

Let us take it for granted that today there is (exact or approximate) Keynesian/classical unemployment in the OECD society. (Cf. p. 53.) This unemployment can be reduced through a reduction in the supply of labour. But it seems unlikely that this will happen, or at any rate that it will happen to such an extent that the unemployment for this reason will become considerably smaller. We shall therefore assume that in order to get a substantial reduction of the unemployment, it is necessary to get both a substantially higher Keynesian limit and a substantially higher neoclassical limit.

It is conceivable that we can get a large raise in both these limits through an economic policy which concentrates on raising only one of them. Perhaps, if economic policy succeeds in raising one of the limits, "equalization mechanisms" within the private sector will raise the other one. (Cf. appendix 2 this paper.)

However, it is also conceivable that the equalization mechanisms which exist within the private sector, are too slow to have a decisive influence on the economic development. An economic policy which shall insure that there will be a substantial reduction in the unemployment must then contain both (i) means which, without help of equalization mechanisms within the privat sector, raise the Keynesian limit, and (ii) means which, without help of equalization mechanisms within the privat sector, raise the neoclassical limit.

Limits to increases in public expenses

Before discussing the various means a government can use in its employment policy, one more aspect of the present situation should be mentioned.

For a long time public expenses in the individual OECD-country have increased faster than GNP. This has resulted in harder taxation, and in many cases also in large deficits on public budgets. In some countries the deficits have resulted in public debts which are so large that the interest payments on them are a serious strain on public finances.

It has become a widely held view that this development cannot continue, and that it is necessary to reduce considerably the rate of growth in public expenses. This view has important consequences for what a government can and will do in order to reduce unemployment.

Will economic policy raise the Keynesian limit?

If we disregard unrealistic alternatives then we can get a substantial raise of the Keynesian limit for the OECD society only if we get a large increase in the aggregate nominal demand in that society. How likely is it that this will happen?

For analytical reasons we shall start by assuming that the government in "a typical OECD-country" wants a large increase in aggregate nominal demand from domestic economic sectors. That this probably is an unrealistic assumption, will be discussed later.

Aggregate nominal demand can be divided into (a) public demand, (b) private demand for consumption goods, and (c) private demand for investment goods.

An increase in public demand implies increased public expenses. On the basis of what is said above about attitudes towards these expenses, it seems unlikely that public demand will increase so much that this increase will result in a much larger aggregate demand.

The households' disposable income, and therefore also private demand for consumption goods, will increase if transfer payments from the public sector to the private sector increase, or if the taxes households have to pay, are reduced. But in the conditions the public finances are today, it seems unlikely that large increases in the transfer payments and/or large tax reductions shall occur in the near future in a typical OECD-country.

The private demand for investment goods depends to a large extent on potential investors' expectations, and these expectations the government does not control. For this and other reasons we cannot expect an economic policy which insures a large increase in this component of the aggregate demand.

Until now we have discussed nominal demand. Of greater interest for our analysis is whether or not the government in a typical OECD-country will conduct a policy which insures a large increase in real demand from domestic economic sectors.

Disregarding unrealistic alternatives, the situation is as follows: A policy which results in a large increase in real demand must both (a) imply a large increase in nominal demand, and (b) imply that the increase in prices is so moderate that one avoids having too much of the increase in nominal demand "eaten up" by price increase. But, partly for reasons just pointed out, it is probably limited what a government can do to increase the various components of nominal demand. Its possibilities for avoiding price increase are also limited, at any rate if this shall be done at the same time as there shall be a large increase in nominal demand.

From what is pointed out above, it seems reasonable to conclude: It is not very likely that the government in a typical OECD-country will conduct an economic policy which insures a large increase in aggregate real demand from domestic economic sectors. It is therefore unlikely that the aggregate of the economic policies of the individual OECD-countries will insure a large increase in aggregate real demand in the OECD society.

There are other circumstances which strengthen this conclusion.

Until now we have assumed that the government in a typical OECD-country wants a large increase in aggregate nominal demand from domestic economic sectors. This is probably not a very good description of what is likely to happen in the next years.

For most governments it is a goal that domestic prices shall not increase "too fast", and for that reason they want to avoid that aggregate nominal demand from domestic economic sectors becomes "too large". This contributes to creating a situation in the OECD society where aggregate real demand is less than what is needed to avoid large unemployment in that society.

One of the reasons why the governments want to avoid large increases in domestic prices is the fear that such increases will make domestic industries incompetitive, and therefore result in domestic unemployment. This means that preventing domestic demand from becoming "too high", among other things is part of a policy to avoid domestic unemployment. We can therefore describe the situation as follows: Efforts from the individual OECD-countries to fight against what they from a national point of view regard as classical unemployment, contribute to creating a situation where the aggregate real demand is smaller than what is needed to avoid large unemployment in that society. (Cf. p. 54.)

Many are aware of both that the aggregate demand in the OECD society is "too small", and that each country can find it unwise to increase the demand from domestic economic sectors if other countries don't do this. It has therefore several times been proposed that the OECD-countries simultaneously shall do something to increase demand. But it is difficult to reach an agreement about how this shall be done, among other things because each government regard it as very important to avoid that their country shall accept obligations which are unreasonably large compared to obligations accepted by other countries.

On the basis of the above discussion I draw the follwing conclusion: It is unlikely that the governments of the OECD-countries in the near future, either individually or in cooperation, will conduct a policy which in a rather direct way insures that the Keynesian limit for the OECD society will come much closer to the supply limit than it is today.

Will economic policy raise the neoclassical limit?

There can be a conflict between (i) wanting to avoid that the real wage rate is so high that it causes unemployment, and (ii) the wage earners' demand for what they regard as a reasonable income. (Cf. p. 27.) A government has some possibilities for reducing or eliminating that conflict.

1. The government can conduct a policy which implies that the wage earners' disposable real income is kept at a certain level, even if the real wage rate is reduced. The government can for instance introduce subsidies which reduce food prices, or it can reduce taxes.

If such a policy is used to obtain a substantial raise in the neoclassical limit, then there must be a large increase in public expenses and/or a large reduction in the public sector's income from taxes. On the basis of what is already said about attitudes towards public expenses, I regard it as unlikely that we will get a large increase in subsidies. I also find it hard to believe that believe that taxes will be reduced substantially in a typical OECD-country during the next years.

2. Through subsidising economic activity which cannot survive on its own, a government can make such activity profitable from a private point of view. This will also increase public expenses. But the sum needed to get a certain raise of the neoclassical limit in

this way, is probably much smaller than the sum needed to get an equally large raise of that limit through a policy which increases the disposable income of all wage earners, and thereby makes them accept a wage rate which are lower than they would otherwise accept.

We can describe the purpose of such a policy in the following way: Differences in wage potential are reduced through subsidising firms which, if they receive no help, are unprofitable from a private point of view. The subsidies make the neoclassical demand curve for labour less steep, and that makes it easier to avoid classical unemployment. (Cf. p. 26.)

However, I doubt that subsidising unprofitable firms to a much larger extent than it is done today, will become an acceptable policy for reducing unemployment. Many people have strong objections against supporting economic activity which cannot survive without help, especially if the same firms shall be subsidised for a long time.

3. The differences in wage potential depends among other things on what technology is known, and on what production equipment the firms have. Through a policy which influences the technological development and the size and composition of the private investments, the government can conceivably have an influence on how large the differences in future wage potential will be, and thereby also on the future position of the neoclassical limit. But it seems unlikely that the use of such influence will insure that we will get a substantial raise of the neoclassical limit. The government's possibilities for influencing the size of the private investments are limited, and both their possibilities and their will to guide the direction of the technological development and the composition of the private investments are probably small.

4. In the preceding section I concluded that it is unlikely that we in the near future will get an economic policy which insures that the Keynesian limit for the OECD society will come much closer to the supply limit than it is today.

On the basis of what is pointed out above in this section, I draw the following conclusion: It is even more unlikely that the governments of the OECD-countries in the near future will conduct a policy which insures that the neoclassical limit for the OECD society will be much closer to the supply limit than it is today.

Increased employment in the public sector?

In order to simplify I have until now reasoned as if all wage earners work in the private sector. But many of them are employed in the public sector. In that sector we usually find neither (i) profit considerations of the type that create a neoclassical limit for the employment in the private sector, nor (ii) sales problems which create a Keynesian limit for the employment in the private sector.

On the basis of that, it may seem sensible to try to get rid of the unemployment through increased employment in the public sector. For several reasons we can expect increased employment in this sector. But that will imply increased public expenses. From what is already said about the attitudes towards these expenses, it seems unlikely that there will be established so many new jobs in the public sector that this insures that the unemployment will be much smaller than it is today.

Conclusions

If we accept the analysis above, and also assume that in the next decades we will have roughly the same economic system in the OECD society as we have today, then it seems reasonable to draw the following conclusions:

1. It is unlikely that the governments of the OECD-countries in the next decades, either individually or through international cooperation, will conduct a policy which insures that the unemployment in the OECD society becomes much smaller than it is today.

2. Relying on attempts by each of the OECD-countries to reduce its own unemployment, is probably not a good method if one wants to reduce the unemployment in the OECD society. Trying to make one's own country more competitive against other OECD-countries, will often be the most important part of the economic policy of an OECD-country which has as its main goal to reduce domestic unemployment. But changes in how competitive the OECD-countries are against each other, will not solve the OECD society's unemployment problem.

3. Even if the governments of the OECD-countries probably will not conduct a policy which insures that the unemployment in the OECD society becomes much smaller than it is today, it is nevertheless possible that the unemployment, at least for some time, will be substantially reduced. The reason is of course that the employment depends not only on economic policy, but also on what happens in the private sector of the economy.

4. Even if it is possible that the unemployment will be substantially reduced, we have no guarantee that this will happen. My conjecture is that it is more likely that in the next decades there will always be much unemployment in the OECD society.

The above evaluations are not meant to suggest that we should take a fatalistic view towards the current unemployment in the OECD society. In my opinion we should give high priority in trying to reduce it. This implies that we should to a higher degree than we do today use those possibilities for reducing unemployment which exist under the present economic system. It also implies that we should consider how the system can be changed in such ways that it becomes easier to avoid large unemployment.

Let me add that my impression is this: When economists from USA and Western Europe today discuss how unemployment can be reduced, in most cases they discuss what a country with an open economy can do in order to reduce its domestic unemployment. The advice given on the basis of these discussions are often such that if it is followed, then it will not reduce, but perhaps even increase, the aggregate unemployment in the OECD society.

Appendix 1

THE UNEMPLOYMENT IN A HISTORICAL CONTEXT

Introduction

So far the discussions in this paper are ahistorical. If we look at the unemployment in the OECD society in a historical context, then we can raise many questions not discussed above. Here are some of them:

Were the causes of the large unemployment in the 1930s the same as the causes of the present unemployment? - Was it easier to find a "medicine" for getting rid of the unemployment of the 1930s than it is to find a medicine for getting rid of the current unemployment? - Why was there so little unemployment in the 1950s and the 1960s? - Has the OECD society during the last decades changed in such ways that it has become more difficult to avoid mass unemployment?

It is outside the scope of this paper to discuss these questions comprehensively. What follows are only a few conjectures about what may be part of the answers. These conjectures are to a large degree based on my knowledge and impressions of what has happened in Norway. That is a weak basis.

What follows is, like the rest of this paper, based on the assumption that the unemployment in the OECD society can be explained by the basic model. In an appendix to another paper I shall return to the history of the unemployment in the OECD society. (Cf. p. 133-140.) But there I shall use a different model.

Keynesian/classical unemployment also in the 1930s?

On p. 53 I have argued for the hypothesis that the present unemployment in the OECD society is pronounced Keynesian/classical. To my best knowledge we can argue in the same way for the hypothesis that the unemployment in the 1930s also was pronounced Keynesian/ classical.

Increased real wage rigidity and its consequences.

In the 1930s Keynes assumed that the workers were willing to accept a cut in the real wage rate if that rate fell because prices increased while the nominal wage rate remained constant[1]. Let us for a moment assume that we deal with a society where this assumption is

[1] Cf. Leviacic and Rebmann (1), p. 70.

correct, and let us also assume that there is Keynesian/classical unemployment in that society. We can then expect the following consequences of an economic policy which results in an upward shift in the curve describing how aggregate nominal demand for products varies with employment:

1) There are two consequences in the short run. The Keynesian limit is raised, and there is excess demand for products.

2) The excess demand for products results in an increase in the product prices. The nominal wage rate remains constant, and the real wage is reduced. The reduction of the real wage rate raises the neoclassical limit for the employment.

3) The increase in product prices also reduces aggregate real demand, and that reduction lowers the Keynesian limit for the employment. But it seems unlikely that this effect will be so strong that the Keynesian limit will come down to, or below, the position it had before the shift in the demand curve for products.

4) When all the effects described above have taken place, both the Keynesian and the neoclassical limit are higher than they were in the initial situation. Consequently the unemployment will be smaller than it was in that situation.

All this means that under the conditions we assume existed in the 1930s, an economic policy which increases nominal aggregate demand will, other things being equal, reduce the unemployment "permanently".

In Norway, and probably also in many other OECD-countries the workers' attitudes towards the consequences of increasing prices are today different from what, according to Keynes, these attitudes were in the 1930s[1]. At least for Norway it seems safe to say that if real wage rates are reduced because of increasing prices, the workers will as soon as possible demand and probably get full compensation in the form of higher nominal wage rates. And if this happens, then there seems to be little reason to believe that increased aggregate nominal demand, except for a short time, will raise the neoclassical limit.

What is pointed out above, can be summarized as follows: (i) If Keynes' assumptions about the workers' reaction was correct in the 1930s, and my assumptions regarding the workers' reaction today is

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[1] Cf. p. 61 in Malinvaud (1), where Malinvaud, when discussing full rigidity of real wages, refers to it as "a situation that was approximated recently in several Western European countries". I assume that Malinvaud is here talking about rigidity downward.

correct, then real wage rates are more rigid downward today than they were in the 1930s. (ii) The increased real wage rigidity downward has made increased aggregate nominal demand a less efficient means in the employment policy, and has therefore made it more difficult to avoid large unemployment.

The belief in the theories of Keynes

In the 1950s and the 1960s there was a widespread belief that mass unemployment could be avoided through the type of demand management prescribed by simple Keynesian theory. However, attempts in the second part of the 1960s and first part of the 1970s to practise such a policy, were disappointing. The unemployment was sometimes reduced in the short run. But usually it soon increased again to at least its former level.

The failure of these attempts can be explained by the theory presented in the preceding section if we assume that when the attempts were made (i) the unemployment was pronounced Keynesian/classical, and (ii) the real wage rates were rigid in the sense explained above.

How was the situation in the 1950s? Was the economic structure at that time different from what it was believed to be? Or were, in contrast to what apparently was the case later, the conditions such that if Keynesian unemployment policy was practised, then it would function as intended? There are several possibilities. Here are three of them :

(1) Reality was different from what was believed. But it was easier than it is today to believe in the theory, because at that time there was little empirical evidence about what could be achieved by a Keynesian policy.

(2) At that time the Keynesian limit was, at any rate in most countries, substantially lower than both the neoclassical limit and the supply limit. In other word, there was what on p. 43 is called pronounced Keynesian unemployment. Under such conditions Keynesian unemployment policy works as intended.

(3) At that time the unemployment was, at any rate in most countries, usually pronounced Keynesian/classical. But because the real wages were less rigid downwards than they became later, Keynesian unemployment policy could nevertheless be efficient.

Appendix 2

WANTED: WELL-FOUNDED THEORIES EXPLAINING WHY WE OFTEN GET PRONOUNCED KEYNESIAN/CLASSICAL UNEMPLOYMENT

It is my impression that pronounced Keynesian/classical unemployment is more usual than either pronounced Keynesian unemployment or pronounced classical unemployment[1].

If this is correct, then we can draw the following conclusions: There must exist "economic mechanisms" which tend to equalize the Keynesian limit and the neoclassical limit. If there also exist mechanisms tending to equalize the other pairs of limits, then those mechanisms are weaker than the ones tending to equalize the Keynesian limit and the neoclassical limit.

What is pointed out above, raises several questions. Here are some of them:

What are the most important of the mechanisms which tend to equalize the Keynesian limit and the neoclassical limit? Do we find them in the private sector of the economy, or is it economic policy which often makes these two limits approximately equal?

Is it usually "the neoclassical mechanism for creating unemployment" which roughly determines the size of the unemployment, while "the equalizing mechanisms" imply that the Keynesian limit becomes close to the neoclassical one? Or is the opposite true? Or do both "the Keynesian mechanism for creating unemployment" and "the classical mechanism for creating unemployment" play important roles in the creation of unemployment?

It is easy to suggest conceivable answers to these questions. But we want to find answers in such a way that there are strong reasons to believe that they are correct, and that is more difficult.

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[1] Cf. p. 53. The terms "pronounced Keynesian unemployment", "pronounced classical unemployment" and "pronounced Keynesian/classical unemployment" are explained on p. 43.

A KEYNESIAN/CLASSICAL DYNAMIC MACROMODEL

INTRODUCTION

Conditionally profitable production possibilities

With "a production possibility that is conditionally profitable" we shall here mean a production possibility it will be profitable for a producer to utilize if the products get sold.

In this paper we shall several times discuss whether or not all conditionally profitable production possibilities are utilized in the cases we analyse. It is therefore perhaps worthwhile to point out that some of the statements we shall make when discussing this question, under certain conditions are equivalent to certain statements regarding the marginal productivity of labour and the use of labour in the production.

Let us assume that

(i) there exist a well-defined real wage rate, and

(ii) no production possibility is utilized unless all production possibilities that are more profitable, also are utilized, and

(iii) there exist a well-defined macro production function which expresses the quantity that is produced, as a monotonously increasing function of the amount of labour used in the production.

Saying that "all those, but only those, production possibilities that are conditionally profitable, are utilized" is then equivalent to saying that "it is used exactly so much labour in the production that the marginal productivity of labour is equal to the real wage rate".

Saying that "there exist conditionally profitable production possibilities that are not utilized" is then equivalent to saying that "the marginal productivity of labour is larger than the real wage rate".

And saying that "the producers will start utilizing production possibilities that have not been utilized" is then equivalent to saying that "more labour will be used in the production".

Neo-Keynesian theory[1]

Neo-Keynesian theory deals with what happens in a period which is not long enough for price adjustments to occur. But quantity adjustments, which are assumed to be more rapid than price adjustments, can take place in that period. - The term "prices" are here used in a broad sense, and include both product prices and wage rates. Neo-Keynesian theory about what in that theory is called "Keynesian unemployment", deals with economic situations satisfying the follwing description:

(i) There is excess supply in the labour market, i.e. there is unemployment.

(ii) The supply of products is equal to that amount which will be produced if all conditionally profitable production possibilities are utilized.

(iii) The demand for products is smaller than the supply of products.

(iv) The production is equal to the smallest of the two quantities demand for products and supply of products.

(v) From (ii), (iii) and (iv) follows that some of the conditionally profitable production possibilities are not utilized.

(vi) The economy is in equilibrium in spite of the fact there is excess supply both in the labour market and in the product market. (Cf. the assumption that the prices are inflexible in that period which is considered).

(vii) An increase in the demand for products will, if it is not too large, lead to a new equilibrium of the same type as the initial one. Since the demand for products is larger in the new equilibrium than in the old one, the same will be true for the production. This implies that the transition to the new equilibrium will increase the amount of labour used in production, and therefore also reduce the unemployment.

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[1] With neo-Keynesian theory I shall here mean the quantity - constrained models discussed in chapter 17 in Leviacic and Rebmann (1). According to Leviacic and Rebmann these are models associated with the work of Barro and Grossman, Malinvaud (and the group of French Keynesian mathematical economists), Hahn, and more derivatively in the United Kingdom by Muelbauer and Portes. Cf. Leviacic and Rebmann, (1) p. 310.

Neo-Keynesian theory and the use of production possibilities

In neo-Keynesian theory it is assumed that the producers will not produce more than what is demanded, even if this means that they abstain from using some of the production possibilities that are conditionally profitable. Let us discuss that assumption.

Suppose that we deal with a situation which can be described as follows: The quantity which is produced, is equal to the demand for products. Consequently all products get sold. - There are many producers, and each of them has only a small share of the market. - There exist conditionally profitable production possibilities that are not utilized.

Let us for a moment assume that there exist a producer who has perfect information about the market.

Does it not seem likely that this producer will reason in the following way: Suppose that I increase my production by starting to utilize one or more of those conditionally profitable production possibilities that are not utilized today. If the products get sold, as there are strong reasons to believe that they will be, then I will make a profit. Of course, if I increase my production, and the production of all other producers remain constant, then the aggregate production will become larger than the aggregate demand for products, and this implies that at least one producer will not be able to sell all he produces. But the amount which will not be sold, will be a small part of the aggregate production. It is therefore likely that I, who have only a small share of the production, will not face any sales difficulties, or at any rate that my share of such difficulties will be inconsiderable. I have therefore more to gain than to loose by increasing my production.

Let us next consider a producer who does not know that aggregate demand and aggregate supply are exactly of the same size. He only knows that he is able to sell all he produces, and that the same is true for all other producers he knows. Does it not seem likely that this producer will increase his production if it is possible for him to start utilizing conditionally profitable production possibilities that are not being utilized?

On the basis of the above discussion I find that there is a need for more explanation than usually given by neo-Keynesians, of the following assumptions: The behaviour of the producers will result in a situation where aggregate production is equal to aggregate demand for products. The economy will be in a short run equilibrium when it

has reached such a situation, even if we assume (i) that in this situation there exist conditionally profitable production possibilities which are not utilized, and (ii) that the amount of production is a quantity which is flexible in the short run.

Introductory remarks on Model A

1. In this paper I present a macromodel which I call Model A. What is pointed out in the preceding section, gives one of the reasons for constructing this model.

When I constructed Model A, I had following ideas in mind:

(i) I wanted a model which could be used as a frame-work for discussions of Keynesian and classical unemployment.

(ii) The model should be explicit not only about (a) which production possibilities are conditionally profitable, but also about (b) which of them are utilized, about (c) why these production possibilities are utilized, and about (d) why the producers abstain from using those production possibilities which are not utilized.

(iii) I wanted the model to be as simple as possible, given that it should satisfy points (i) and (ii).

2. One of the ideas incorporated in Model A is that the use of the production possibilities is influenced by the difference between demand for products and supply of products, and by the size of the producers' stocks of their own products.

3. The fact that stocks of products play an important role in Model A, implies that this model describes a society where the products, as least mainly, are goods. In an appendix there are some notes on how we could conceivably contruct a model suited for discussing unemployment in a service-producing society.

4. Model A is dynamic. An economy behaving as described by Model A, approach a stationary state if (i) the values of the coefficients and the exogenous variables of the model are within a certain domain, and (ii) these values remain constant for a sufficiently long time. It can be shown that some sets of values on the coefficients and the exogenous variables result in stationary states with Keynesian unemployment, while other sets of values result in stationary states with classical unemployment.

5. Model A can be made more realistic by including in it more variables and more dynamic elements, and by replacing some of its linear functional forms with other functional forms. But that would

make the model more complicated, and is therefore not done in the main part of the paper. The purpose of the paper is to present certain ideas in a comparatively simple way.

6. My conjecture is that the conclusions I shall draw in my analysis of Model A, can be of value if we want to understand the functioning of more complicated models that can be derived from Model A by replacing some of its most unrealistic assumptions with more realistic assumptions.

A short survey of the rest of this paper

The next chapter presents Model A and discusses the assumptions incorporated in that Model.

In the following three chapters various types of stationary states of Model A are described and analysed.

Then follows a chapter where the theory embodied in Model A is compared with other economic theories.

In the last chapter conclusions from the analysis of Model A is combined with a simple price theory to derive a Phillips curve.

The paper has three appendices where various modifications of Model A are sketched.

MODEL A

The endogenous variables of Model A

An economic model which we shall call Model A, contains the following nine endogenous variables:[1]

N^{CD} = "neoclassical demand for labour". N^{CD} will be explained on p. 77 , where we comment on equation (1).

N^D = demand for labour, i.e. that amount of labour services the producers want to buy per unit of time. $\dot{N}^D$ denotes the derivative on time of N^D.

N^T = supply of labour, i.e. that amount of labour services which is available for purchase per unit of time

N = employment, i.e. that amount of labour services which are used in the production per unit of time

X = net national product per unit of time, measured in fixed prices. X can be interpreted both as (i) a volume of production, and as (ii) a real income generated by production.

X^D = demand for products, per unit of time, measured in fixed prices

X^S = supply of products per unit of time, measured in fixed prices. On p. 80-81, where we discuss equation (8), there are some remarks on what is meant by "the supply of products".

X^T = trade of products per unit of time, measured in fixed prices

Z = producers' stock of their own products, measured in fixed prices. $\dot{Z}$ denotes the derivative on time of Z.

1) All these variables are functions of time, and that could have been made explicit by the notation. For instance, instead of using X to denote net national product, we could have used X(t). But in order to simplify, this is not done here.

Exogenous variables

w = real wage rate. w is equal to $\frac{W}{P}$, where W is the nominal wage rate, and P is an index for prices on products. It is assumed that the same wage rate is used for all work.

X^{PD} = net contribution from financial policy to the demand for products. X^{PD} will be explained on p. 79 - 80, where we comment on equation (7).

Relations

(1) $N^{CD} = a_1 w + b_1$ $\qquad a_1<0,\ b_1>0$

(2) $N^{D} \leq N^{CD}$

Within the restriction given by (2) we have the following relation:

(3) $\dot{N}^{D} = a_3(N^{CD} - N^{D}) + b_3(X^{D} - X^{S}) + c_3(Z - Z_0)$ $\qquad a_3>0,\ b_3>0,\ c_3<0,\ Z_0 \gtrless 0$

The model also contain these relations:

(4) $N^{S} = a_4 w + b_4$ $\qquad a_4>a_1,\ b_4<b_1$

(5) $N = \text{Min}\ (N^{D}, N^{S})$

(6) $X = f(N)$ $\qquad f'>0$

(7) $X^{D} = a_7 X + b_7 w + X^{PD} + c_7$ $\qquad 0<a_7<1,\ b_7>0$

(8) $X^{S} = X + a_8(Z - Z_0)$ $\qquad a_8>0$

(9) $X^{T} = \text{Min}\ (X^{D}, X^{S})$

(10) $\dot{Z} = X - X^{T}$

What is meant by the condition "Within the restriction given by (2)" is perhaps not obvious. An alternative formulation of (2) and (3) is to say that the variables of Model A, in addition to satisfying quations (1) and (4) - (10), satisfy either

(2a) $N^{D} < N^{CD}$

and

$$(3a) \quad \dot{N}^D = a_3(N^{CD} - N^D) + b_3(X^D - X^S) + c_3(Z - Z_0)$$

or

$$(2b) \quad N^D = N^{CD}$$

and

$$(3b) \quad \dot{N}^D = h(X^D, X^S)$$

where the functional form h used in (3b) is defined as follows:

(i) If $b_3(X^D - X^S) + c_3(Z - Z_0) \geq 0$, then $\dot{N}^D = 0$

(ii) If $b_3(X^D - X^S) + c_3(Z - Z_0) < 0$,

then $\dot{N}^D = b_3(X^D - X^S) + c_3(Z - Z_0)$

Comments on the assumption about the real wage rate

In Model A it is assumed that the real wage rate is exogenous. This assumption can conceivably be justified in different ways. Here is one of them:

We assume (i) that the nominal wage rate is fixed after negotiations between employers and wage earners, (ii) that the outcome of these negotiations is determined completely by ideas about how income ought to be distributed, and (iii) that these ideas can be regarded as exogenous. (Cf. p. 21.)

We further assume that if the product prices change, then the nominal wage rate is adjusted in such a way that the real wage rate remains unchanged. It would be realistic to assume that such adjustments take time, but we do not introduce that complication here.

The assumption that the real wage rate is exogenous, is introduced in order to simplify the analysis. We may ask if the conclusions we shall derive from our model will be valid if this assumption is replaced by a more realistic assumption. Here is a first answer:

In a modified version of the model, presented in an appendix, it is assumed that the real wage rate is affected not only by exogenous ideas about how income ought to be distributed, but also by the difference between the demand for labour and the supply of labour. Preliminary analysis, reported in the appendix, indicates that at least for some types of cases this modification changes neither (i) our conclusions regarding the existence of a stable stationary state, nor (ii) our conclusions regarding the effects on this stationary state of changes in X^{PD}. (Cf. p. 105-108.)

Comments on relations (1) and (2)

Equation (1). With the neoclassical demand for labour we shall mean that amount of labour which will be demanded if the producers want to utilize those and only those production possibilities which are conditionally profitable.[1]

Equation (1) says that the neoclassical demand for labour is a decreasing function of the real wage rate. The theory behind this equation is that the higher the real wage rate is, the fewer are those production possibilities that are conditionally profitable.

Relation 2. We assume that the actual demand for labour will never be larger than the neoclassical demand for labour. This connection between the actual demand for labour and the neoclassical demand for labour is expressed by relation (2).

Comments on equation (3)

1. Equations (3) and (8) are less used in economic theory than the other relations contained in Model A. I shall therefore comment more comprehensively on (3) and (8) than on the other relations.

2. It may take time for a producer to reduce his demand for labour. He may for instance have contracts with his employees forbidding him to dismiss them immediately. It may also take time for him to increase his demand for labour, partly because many types of increases in production must be planned, and such planning take time.

In Model A it is assumed that changes in the demand for labour take time. In order to simplify the model it is further assumed that such changes are gradual. (Cf. that according to equation (3) $\dot{N}^D$ is a finite quantity.)

What is pointed out above, constitute one of the differences between Model A and neo-Keynesian theory. One of the simplifications used in neo-Keynesian theory is that the demand for labour, like all other quantities, changes momentarily. In Model A we do not simplify in that way.

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1 With notational demand for labour is usually meant that amount of labour which will be demanded if the producers assume that all economic activity take place at market-clearing prices and wage rates. If we assume that the producers want to maximize their profits, and that they behave rationally, then what we here call "the neoclassical demand for labour" is equivalent to the notational demand for labour.

3. Until otherwise stated we shall discuss cases where $N^D < N^{CD}$. This means that until otherwise stated it is version (3a) of equation (3) which is valid.

4. We shall say that a producer tries to utilize a certain production possibility if and only if he demands labour with the intention of using it to utilize that possiblity.

$N^D < N^{CD}$ means that there are production possibilities which (i) are conditionally profitable, and (ii) no producer tries to utilize. Here are some assumptions about how the producers behave when there are such production possibilities:

(i) Let us first suppose that there is balance or excess demand in the product market. This means that every producer is able to sell as much as he wants. We shall assume that under such conditions some of the producers will try to utilize "tomorrow" some of the conditionally profitable production possiblities that no one tries to utilize "today". In other words: These producers increase their demand for labour.

Let us next suppose that there is excess supply in the product market. We shall assume that under such conditions there are some producers who reason as follows: If I start utilizing a conditionally profitable production possibility that no one tries to utilize today, and the products get sold, then I will make a profit. Because there is excess supply of products, I cannot be sure that the products get sold. But I will take the chance, and this implies that I shall increase my demand for labour.

(ii) Assumption (i) says that the existence of conditionally profitable production possibilities that no one tries to utilize, results in increases in the demand for labour; and that this holds true regardless of whether there is excess supply, balance or excess demand in the market for products. We shall further assume that, other things being equal, this effect is stronger the more there are of such possibilities.

Letting $\dot{N}^D$ depend on $(N^{CD} - N^D)$ in the way it is done in equation (3a), is one way of using assumptions (i) and (ii).

5. We assume that $\dot{N}^D$ is also affected by $(X^D - X^S)$, the difference between the demand for goods and the supply of goods, and by $(Z - Z_0)$, the difference between (i) the existing size on the producers' stocks of own products and (ii) that size on those stocks which the producers regard as optimal. (Cf. equation (3a).)

6. Let us for a moment consider a case where $N^D < N^{CD}$ and $\dot{N}^D = 0$. In accordance with the theory sketched above, we shall assume that in this case the situation is as follows: (i) Some of the producers increase their demand for labour. They are producers who have decided to try to utilize conditionally profitable production possibilities which have not been unutilized. (ii) Other producers reduce their demand for labour. They are producers who face sales difficulties because there is excess demand for products, and/or have overoptimal stocks. (iii) Increases and reductions in the demand for labour cancel out, and this explains why $\dot{N}^D = 0$.

7. Let us finally consider the cases where $N^D = N^{CD}$. In these cases the demand for labour never increases. But excess supply of products and/or overoptimal stocks can make N^D decrease. (Cf. equation (3b).)

Comments on equations (4) - (7)

Equation (4) describes how the supply of labour is determined.

Equation (5) says that the employment is equal to the smallest one of the two quantities demand for labour and supply of labour. The equation implies that there is no frictional or structural unemployment.

Equation (6) says that the volume of production is a function of theemployment.

Equation (6) contains an unspecified functional form. Because we assume that the coefficient a_1 in equation (1) is different from zero, it would be unsatisfactory to let X be a linear function of N.

It simplifies the exposition to use an unspecified production function instead of using a specified non-linear production function.

Equation (7) describes the demand for products. This demand is equal to $(C_p + I_p + G)$, where C_p is private demand for consumption goods, I_p is private demand for investment goods, and G is public demand for goods. Let us assume that C_p is $(a_7(X - T) + d_7)$, where a_7 is the marginal propensity to consume, T is net tax, and $(X - T)$ is private disposable income. We then get the following demand equation:

(i) $X^D = (a_7(X - T) + d_7) + I_p + G$

From (i) we can derive

(ii) $X^D = a_7X + X^{PD} + c_7$,

where X^{PD} by definition is equal to $(G - a_7T)$, and c_7 by definition is equal to $(d_7 + I_p)$. Equation (ii) is a simplified version of equation (7) in Model A. The simplification consists of not letting w appear in (ii).

Alternatively, we could derive equation (ii) from other assumptions about how the public sector influences the demand for goods. But then we must use different, and usually more complicated, definition of X^{PD}. (Cf. the definition of Y^{PD} on p. 103.)

Equation (7) also needs another comment. Consider the following theory: The demand for products depends not only on aggregate private disposable income, but also on how this income is divided between wage income and non-wage income. The larger the share of the wage income is, the larger is the demand for products. - This theory is incorporated in the model in a very rough way by including w in equation (7) in the way we have done it.

On p. 103 there is a discussion of how we can include in equation (1) the theory that the demand for products is influenced by the real amount of money.

Comments on equation (8)

1. In what follows I shall, until otherwise stated, assume that $Z = Z_0$, i.e. that the producers' stocks of their own products are optimal. This implies that, also until otherwise stated, the producers will neither increase the supply of products by being willing to reduce their stocks, nor reduce the supply of products by holding back products in order to increase their stocks.

2. What is meant in Model A by the term "the supply of products", is different from what is meant by that term in neo-Keynesian theory. I shall make a few remarks on this difference, which is of the same type as the difference between what is meant in neoclassical theory by (i) the term "the supply in the short run", and (ii) the term "the supply in the long run".

The remarks I shall make, will necessarily be somewhat speculative, because in those neo-Keynesian articles and books that I have read, the authors have not found it necessary to state explicitly what they mean by the word "supply".

3. Supply is sometimes defined as "the amount which is available for purchase". That definition, which I shall here call "the basic definition of supply", is imprecise, because the word "available" is imprecise. From the basic definition we can therefore develope several more or less different concepts, for instance "supply in the short run" and "supply in the long run".

4. Both neo-Keynesian theory and Model A use versions of the basic definitions of supply when they use the term "the supply of products". But different versions are used.

5. The neo-Keynesians regard adjustments in the amount of the production as something which can take place "immediately". Provided that the supply of labour represents no relevant restriction on the size of the production, they therefore regard as "available for purchase at a certain point of time" all products which the producers would be willing to produce at that point of time if they could find buyers for all they produced. How large the production is at a given point of time, is something which, in neo-Keynesian theory, is irrelevant for the question of how large the supply of products is at that point of time.

From this view and the assumptions (i) that the producers want to maximize profits, and (ii) that they behave rationally, can be concluded that when the supply of labour represents no relevant restriction on the size of the production, then the supply of products is equal to that amount which will be produced if all conditionally production possibilities are utilized.

If we use the notation used in Model A, then we can express the neo-Keynesians view in the following way: The neo-Keynesians assume that what they call "supply of products", is always equal to $f(N^{CD})$ in all cases where $N^{CD} \leq N^{S}$.

6. In Model A we regard changes in the amount of production as something which take time. (Cf. the above comments on equation (3). See p. 77 .) Then it is not reasonable to regard products as available at a certain point of time unless they are being produced at that point of time. What is reasonable when we use this approach, is to say that the supply of products at a certain point of time is equal to that amount which is being produced at that point of time.

In other words: When we use Model A, then it is reasonable to say that the supply of products is equal to X, i.e. that it is equal to $f(N)$.

7. In the above discussion we have assumed that the producers' stocks of own products are optimal. We shall now drop that assumption. We shall assume that the supply of products is an increasing function of how much the producers' stocks of own products differ from what they regard as optimal.(Cf. equation (8).)

One may ask: Suppose that a producer has overoptimal stocks at a certain point of time we can call t. Will not this producer want to get rid of the excessive part of the stocks immediately? And should not this imply that this supply is infinite? I will answer this question by assuming that there is a limit to how large amount of products the producer will be able to deliver per unit of time. This implies that the producer's supply is finite also in situations where he has overoptimal stocks.

One may also ask: Why is the supply of products an increasing function of $(Z - Z_0)$? Here is part of the answer: The larger $(Z - Z_0)$ is, the larger is probably also the number of producers who try to get rid of overoptimal stocks.

Comments on equations (9) and (10)

Equation (9) says that the smallest of the two quantities demand and supply determines the quantity traded. This equation implies that there are no frictions in the product market.

Equation (10). $\dot{Z}$ is the derivative of Z with respect to time. If all products are either sold or stored,and all that is sold is taken either from stocks or from current production, then (10) must necessarily be true.

Consistency and independence of the relations.

It can be shown that:

(i) The nine equations (1) and (3)-(10) are consistent with each other and independent of each other.

(ii) If (a) an economy behaves as described by the equations (1) and (3)-(10), and (b) at a certain point of time satisfies relation (2), then this economy will satisfy relation (2) at all future points of time.

KEYNESIAN STATIONARY STATES

Three limits for the employment

Let g denote the inverse of the functional form f appearing in equation (6). g(X) is that amount of labour which is needed to produce X.

In the paper called "Notes on the Theories of Keynesian and Classical Unemployment" were introduced three limits for the employment. (Cf. p. 16.)

The Keynesian limit for the employment is that level of employment which makes demand for products and production equal. - From equation (7) and the definition of g follow that when Model A is valid, then the Keynesian limit is $g\left(\frac{b_7 w + X^{PD} + c_7}{1 - a_7}\right)$.

The neoclassical limit for the employment is that amount of labour which is needed to utilize all those, but only those, production possibilities that are conditionally profitable. - From equation (1) follow that when Model A is valid, then the neoclassical limit is $(a_1 w + b_1)$.

The supply limit for the employment is the same as the supply of labour. - From equation (4) follows that when Model A is valid, then the supply limit is $(a_4 w + b_4)$.

It should be noted that when Model A is valid, then the employment cannot exceed the neoclassical limit, nor can it exceed the supply limit. But it can exceed the Keynesian limit for a limited time period.

A subset of cases

In this chapter we shall assume that the following conditions are satisfied:

(I) $$g\left(\frac{b_7 w + X^{PD} + c_7}{1 - a_7}\right) < a_4 w + b_4$$

(II) $$g\left(\frac{b_7 w + X^{PD} + c_7}{1 - a_7}\right) < a_1 w + b_1$$

Condition (I) says that the Keynesian limit shall be lower than supply limit, and condition (II) says that the Keynesian limit shall be lower than the neoclassical limit. When both condition (I) and condition (II) are satisfied, then the Keynesian limit is the lowest of the three limits for the employment.

Model K

With Model K we shall mean a static model containing the following nine equations:

(1) $N^{CD} = a_1 w + b_1$ $\qquad a_1<0,\ b_1>0$

(3a') $0 = a_3(N^{CD} - N^D) + b_3(X^D - X^S) + c_3(Z - Z_0)$

$\qquad a_3>0,\ b_3>0,\ c_3<0,\ Z_0 \geq 0$

(4) $N^S = a_4 w + b_4$ $\qquad a_4>a_1,\ b_4<b_1$

(5a) $N = N^D$

(6) $X = f(N)$ $\qquad f'>0$

(7) $X^D = a_7 X + b_7 w + X^{PD} + c_7$ $\qquad 0<a_7<1,\ b_7>0$

(8) $X^S = X + a_8(Z - Z_0)$ $\qquad a_8>0$

(9a) $X^T = X^D$

(10') $0 = X - X^T$

The letter K in the name "Model K" is short for Keynesian. The reasons for associating Keynes with this model will become clear later.

Model K contains the same endogenous and exogenous variables as Model A. It can be shown that the equations of Model K are consistent and independent.

It can also be shown that when conditions (I) and (II) are satisfied, then a set of values on the variables of Model A is a stationary solution of that model if and only if this set is a solution of Model K[1].

As already mentioned, Model K contains nine consistent and independent equations in nine endogenous variables. From this property of Model K and what is pointed out in the preceding paragraph we can show the following is true: To each set of values on w and X^{PD} which satisfies conditions (I) and (II), there corresponds one and only one stationary solution of Model A. - It can also be shown that this stationary solution is stable[2].

What determines production and employment when Model K is valid?

Equations (7), (9a) and (10') constitute a determinate subset in X, X^D and X^T. When a society behaves as described by Model K, then the value of X is determined by this subset. And in such a society the value of N is determined by (i) the value of X, determined by the subset, and (ii) equation (6).

---

[1] Here are som hints about one way of proving this: An important point of the proof of the "if-part" is to show that if the conditions (I) and (II) and the equations of Model K is satisfied, then equations (2a), (5) and (9) of Model A are satisfied.

An important part of the proof of the "only-if-part" is to show that when conditions (I) and (II) and the equations of Model K are satisfied, then all the following three statements are false:

(i) There exists a stationary solution of Model A where $N^D = N^{CD}$.

(ii) There exists a stationary solution of Model A where $N^D > N^S$.

(iii) There exists a stationary solution of Model A where $X^D > X^S$.

[2] Here are some hints of one way of proving that the stationary solution is stable: With "the dynamic version of Model K" we shall mean a dynamic model containing equations (1), (3a) (4), (5a), (6), (7), (8), (9a) and (10). It can be shown that the dynamic version of Model K has a unique and stable solution, which can be found from Model K. It can also be shown that, regardless of the initial situation, the following holds true: Suppose (i) that Model A is valid, (ii) that f and the values of the coefficients and the exogenous variables are such that conditions (I) and (II) are satisfied, and (iii) that from a certain point of time both f and the coefficients and the exogenous variables remain constant. Then either from that point of time or from a later point of time the economic development will for an unlimited time be as described by the dynamic version of Model K.

If we solve equations (7), (9a) and (10') with respect to X, X^D and X^T, then we get the following expression for X:

$$(K.1) \qquad X = \frac{b_7 w + X^{PD} + c_7}{1 - a_7}$$

From (K.1) and (5) we get

$$(K.2) \qquad N = g\left(\frac{b_7 w + X^{PD} + c_7}{1 - a_7}\right)$$

where g is the inverse of the functional form f appearing in equation (5).

Since equations (9a) and (10') contain neither coefficients nor the functional form f, there is in (K.1) no trace of the roles played by these equations in the generation of values on X. We will therefore perhaps find it unnecessary to draw any attention towards (9a) and (10') when discussing what the value on X depends on. Consequently, we will perhaps say that the value on X is determined by equation (7). In other words, we will perhaps say that the size of the production is determined by the demand for products.

As indicated above, this statement is not correct if it is interpreted as unconditional. But it can perhaps be defended by arguing in the following way: When saying something, it is often impractical to mention all conditions necessary to make the statement true. The above statement points out that source of influence which account for all variation we get in the production when Model K is valid.

We can argue in the same way when we discuss what determines the employment. If we do that, we will perhaps say that when Model K is valid, then the size of the employment is determined by how much work is needed to produce the amount of products which is demanded. (Cf. the expression for N given by (K.2).)

Let us finally consider the following types of changes:

(i) Changes in the supply of labour.

(ii) Changes in the cost of production due to changes in the real wage rate.

(iii) Changes in the cost of production due to changes in technology.

It follows from what is pointed out in the preceding paragraphs that such changes have no influence on production and employment in the stationary state as long as they do not violate conditions (I) and (II).

Since the stationary states of Model A which satisfy Model K have the properties described above, we shall call them Keynesian stationary states.

Consequences of increasing X^{PD} when Model K is valid

In a Keynesian stationary state $N^S > N^D$ and $X^S > X^D$. $N^S > N^D$ means that there is unemployment, while $X^S > X^D$ means that there is excess supply of products.

From Model K we can derive $(N^S - N^D)$ and $(X^S - X^D)$ as functions of w and X^{PD}. It can be shown that

$$(K.3) \qquad N^S - N^D = a_4 w + b_4 - g\left(\frac{b_7 w + X^{PD} + c_7}{1 - a_7}\right)$$

$$(K.4) \qquad X^S - X^D = \frac{a_3 a_8}{b_3 a_8 - c_3}\left(a_1 w + b_1 - g\left(\frac{b_7 w + X^{PD} + c_7}{1 - a_7}\right)\right)$$

where g is the inverse of the functional form f appearing in equation (6) of Model K.

Derivating (K.1) with respect to X^{PD} we get

$$(K.5) \qquad \frac{\delta(N^S - N^D)}{\delta X^{PD}} = \frac{-g'}{1 - a_7}$$

Here g' is positive because f' is positive, and $(1 - a_7)$ is positive because $a_7 < 1$. Consequently $\frac{\delta(N^S - N^D)}{\delta X^{PD}}$ is negative.

By derivating (K.4) with respect to X^{PD} we get

$$(K.6) \qquad \frac{\delta(X^S - X^D)}{\delta X^{PD}} = \frac{a_3 a_8}{b_3 a_8 - c_3} \cdot \frac{-g'}{1 - a_7}$$

Both a_3, b_3, a_8, g' and $(1 - a_7)$ are positive, and c_3 is negative.

Consequently $\frac{\delta(X^S - X^D)}{\delta X^{PD}}$ is negative.

We can therefore conclude that when Model A is valid and conditions (I) and (II) are satisfied, then an increase in X^{PD} will have the following consequences for the stationary state: Both the unemployment and the excess supply of products will be reduced.

Stationary in the macrovariables but not in the microvariables

Let us assume that a society which behaves as described by Model A, is in a Keynesian stationary state. This implies that the macrovariables of the society remain constant. But according to point 6 on p. 79 it also implies that some of the producers increase their demand for labour and, consequently, their use of labour and their production. It further implies that other producers reduce their demand for labour and therefore also their use of labour and their production.

What is pointed out here means that what we call "a Keynesian stationary state" can be described in the following way: It is a state which is stationary in the macrovariables, but not in the microvariables.

CLASSICAL STATIONARY STATES

Another subset of cases

In this chapter we shall assume that the following conditions are satisfied:

$$(III) \qquad a_1 w + b_1 < a_4 w + b_4$$

$$(IV) \qquad a_1 w + b_1 < g\left(\frac{b_7 w + X^{PD} + c_7}{1 - a_7}\right)$$

Condition (III) says that the neoclassical limit shall be lower than the supply limit, and condition (IV) says that the neoclassical limit shall be lower than the Keynesian limit. When both conditions (III) and (IV) are satisfied, then the neoclassical limit is the lowest of the three limits for the employment.

Model C

With Model C we shall mean a static model containing the following nine equations:

$$(1) \qquad N^{CD} = a_1 w + b_1 \qquad a_1<0,\ b_1>0$$

$$(2b) \qquad N^{D} = N^{CD}$$

$$(4) \qquad N^{S} = a_4 w + b_4 \qquad a_4>a_1,\ b_4<b_1$$

$$(5b) \qquad N = N^{D}$$

$$(6) \qquad X = f(N) \qquad f'>0$$

$$(7) \qquad X^{D} = a_7 X + b_7 w + X^{PD} + c_7 \qquad 0<a_7<1,\ b_7>0$$

$$(8) \qquad X^{S} = X + a_8 (Z - Z_0) \qquad a_8>0$$

(9b) $X^T = X^S$

(10') $0 = X - X^T$

The letter C in the name "Model C" is short for classical.

Model C contains the same endogenous and exogenous variables as Model A and Model K. It can be shown that the equations of Model C are consistent and independent.

It can also be shown that when conditions (III) and (IV) are satisfied, then a set of values on the variables of Model A is a stationary solution of that model if and only if this set is a solution of Model C.[1]

Model C contains nine consistent and independent equations in nine endogenous variables. From this property of Model C and what is pointed out in the preceding paragraph, we can conclude: To each alternative for f and the values of the coefficients and the exogenous variables which satisfy conditions (III) and (IV), there corresponds one and only one stationary solution of Model A. - It can be shown that this stationary solution is stable.[2]

What determines employment and production when Model C is valid?

In Model C the value of N is determined in the following way: (i) Equation (1) and the value of w determines N^{CD}. - (ii) Equation (2b) and the value of N^{CD} determines N^D. - (iii) Equation (5b) and the value of N^D determines N.

Using the equations mentioned in the preceding paragraph, we get the following expression for N:

(C.1) $N = a_1 w + b_1$

Equation (C.1) says that the employment is equal to the neo-classical limit for the employment.

From (C.1) and (6) we get

(C.2) $X = f(a_1 w + b_1)$

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[1] This can be shown in a way resembling the way we use when we prove a similar property of Model K. See footnote 1 on p. 85.

[2] Cf. footnote 2 on p. 85.

Since equations (2b) and (5b) contain neither coefficients nor the functional form f, there is in (C.1) no trace of the role played by these equations in the generation of values on N. We will therefore perhaps find it unnecessary to draw any attention towards (2b) and (5b) when discussing what the value on N depends on. Consequently, we will perhaps say that the value on N is determined by equation (1). In other words, we will perhaps say that the employment is determined by how much work is needed to utilize all production possibilities which are conditionally profitable.

For similar reasons we will perhaps also say that the size of the production is determined by how much is produced when all conditionally profitable production possibilities are utilized. (Cf. equation C.2)

An important implication of what is pointed out above, is that changes in the demand for products have no influence on production and employment as long as such changes do not lead to a violation of condition (IV).

Since the stationary states of Model A which satisfies conditions (III) and (IV) have the properties described above, we shall call them classical stationary states[1].

Consequences of increasing X^{PD} when Model C is valid

When Model C is valid, then $N^S > N^D$ and $X^D > X^T$. $N^S > N^D$ means that there is unemployment, while $X^D > X^T$ means that there is excess demand for products.

From Model C can be shown that

$$(C.3) \qquad N^S - N^D = (a_4 - a_1)w + (b_4 - b_1)$$

$$(C.4) \qquad X^D - X^S = (a_7 - 1)f(a_1w + b_1) + b_7w + X^{PD} + c_7$$

It is immediate from (C.3) and (C.4) that

$$(C.5) \qquad \frac{\delta(N^S - N^D)}{\delta X^{PD}} = 0$$

1) This name is chosen in order to indicate that in states of this type there is classical unemployment. But there are arguments against this terminology. One possible view is that we should reserve the name "classical stationary states" for states where there is balance both in the labour market and the product market.

$$(C.6) \qquad \frac{\delta(X^D - X^S)}{\delta X^{PD}} = 1$$

We can therefore conclude that when Model A is valid and conditions (III) and (IV) are satisfied, then an increase in X^{PD} will will have the following consequences for the stationary state: The unemployment will remain unchanged, and the excess demand for products will increase.

MORE ABOUT STATIONARY STATES

Keynesian/classical stationary states

Let us next consider cases satisfying the following conditions:

$$(I) \qquad g\left(\frac{b_7 w + X^{PD} + c_7}{1 - a_7}\right) < a_4 w + b_4$$

$$(V) \qquad g\left(\frac{b_7 w + X^{PD} + c_7}{1 - a_7}\right) = a_4 w + b_4$$

Condition (I) says that the Keynesian limit is lower than the supply limit, and condition (V) says that the Keynesian limit and the neoclassical limit are equal. When both these conditions are satisfied, then we have the following situation: The Keynesian limit and the neoclassical limit coincide, and these limits are lower than the supply limit.

It can be shown that any case satisfying these conditions has a unique and stable stationary state where there is balance in the product market, and where there is an unemployment equal to $((a_4 - a_1)w + (b_4 - b_1))$. It can also be shown that the values taken taken by the endogenous variables in this stationary state can be found from any one of the two models, Model K and Model C.

Stationary states of this type we shall call Keynesian/-classical stationary states.

Suppose that an economy which behaves as described by Model A is in a Keynesian/classical state. An increase in X^{PD} will lead to a new stationary state. It can be shown that:

(i) The new stationary state will be of the classical type. Consequently there is excess demand for products in this state.

(ii) There will be unemployment in the new stationary state, and this unemployment will be of the same size as the unemployment in the Keynesian/classical state.

The relevance of stationary states

If Model A shall represent a real society, then it seems unlikely that the coefficients and the exogenous variables of the model will remain constant long enough to make the society reach a stationary state. In spite of this, such states are given a lot of attention in the above discussion of Model A. Is that reasonable?

Let me first make a general comment. In economic analysis we always simplify. Whenever we use a static macromodel, we make, in addition to other simplifications, the following one: We assume that the dynamic processes of the society we describe, can be divided into two groups; one group which we, when discussing certain problems, can ignore because the processes in that group are so rapid; and another group which we, when discussing the same problems, can ignore because the processes in that group are so slow. A static model can always be regarded as describing the stationary state of a dynamic model which describes explicitly some of the processes that are ignored in the static model because in that model they are regarded as being rapid enough to be ignorable.

What is pointed out here means that saying that stationary states of dynamic models are uninteresting, is equivalent to saying that statical models are uninteresting. There seems to be sufficient evidence for rejecting this evaluation of static models.

The stationary states of Model A are slightly modified versions of static models which have been much used and still are much used. That seems to be a sufficient reason for being interested in these stationary states.

COMPARISON OF MODEL A WITH OTHER MODELS

Introduction

The points of departure for the discussions in this chapter are the following questions: Why is Model A capable of producing stationary states where there is unemployment? What are the similarities and the differences between the theory embodied in Model A and certain other theories about unemployment?

The chapter is organized in the following way:

First Model A is compared with a dynamic model which cannot generate stationary states with unemployment.

Next there is a sketch of Keynesian theory[1] and a comparison between this theory and neo-Keynesian theory[2].

Finally there is a comparison between (i) Model A and (ii) Keynesian and neo-Keynesian theory.

Comparison of Model A with a model which cannot generate stationary states with unemployment

If Model A is valid, then we can get stationary states with unemployment. In order to throw some light on this property of Model A, we shall compare that model with a model which only can generate stationary states where there is unemployment.

Let us replace equation (7) in Model A with the equation

$$(7a) \qquad X^D = a_7 X + b_7 w + X^{PD} + d_7 m + e_7 \qquad 0<a_7<1,\ b_7<0,\ d_1>0$$

Here m is the real amount of money. m is defined by

$$(11) \qquad m = \frac{M}{P}$$

where M is the nominal amount of money, and P is an index for the product prices.

Let us also assume that the development of P and W is determined by

$$(12) \qquad \frac{\dot{P}}{P} = a_{12}(X^D - X^S) \qquad a_{12}>0$$

---

[1] With "Keynesian theory" I shall here mean that theory which is called "Keynesian Theory" on p. 70-76 in Leviacic and Rebmann (1).

[2] On p.70 there is a sketch of what I here call "neo-Keynesian theory".

$$(13) \qquad \frac{\dot{W}}{W} = a_{13}(N^D - N^S) \qquad a_{13}>0$$

With Model D we shall mean a model which is defined as follows: The endogenous variables of the model are m, W, P and the endogenous variables of Model A. There are two exogenous variables, X^{PD} and M. The relations of the model are (1) - (6), (7a) and (8) - (13).

It can be shown that if the exogenous variables, the functional form f and the coefficients of Model D remain constant for a sufficiently long time, then Model D will approach a stationary state where there is balance in both the labour market and the product market. This conclusion is independent of the values taken by X^{PD} and M.

If we decide to use Model D as a point of reference, then we can give the following explanation of why Model A can generate both stationary states with Keynesian unemployment, stationary states with Keynesian/classical unemployment, and stationary states with classical unemployment:

(i) Model A differs from Model D (a) in the description of the generation of values on w, and (b) by not including the real balance effect. (In Model D the real balance effect is included through the combination of (a) the price behaviour described by equation (12), and (b) the appearance of m in equation (7b.)

(ii) When Model D's theory about w is valid, then there will be balance in the labour market in all stationary states. Such balance means that the supply limit for the employment is equal to the smallest of (a) the neoclassical limit and (b) the Keynesian limit.

(iii) In a model which has the real balance effect, there will be balance in the product market in all stationary states. Such balance means that the Keynesian limit is equal to the smallest of (a) the neoclassical limit and (b) the supply limit.

(iv) It is the fact that w is exogenous in Model A, that makes Model A capable of generating stationary states with unemployment. A model which (a) contains Model D's theory about w, but (b) does not include the real balance effect, can not generate stationary states with unemployment.

(v) Let us for a moment assume that we have a model where w is exogenous (as w is in Model A), but where the real balance effect is included in the way this is done in Model D. Such a model can generate stationary states with unemployment, but the unemployment will always be of the Keynesian/classical type.

(vi) It is the combination of (a) assuming that w is exogenous, and (b) not including the real balance effect, that makes Model A capable of generating stationary states with Keynesian unemployment. It is the same combination that makes Model A capable of generating stationary states with classical unemployment.

Keynesian theory

The Keynesian theory of unemployment deals mainly with situations satisfying the following description: There is excess supply in the labour market. All conditionally profitable production possibilities are utilized. The supply of products is equal to the quantity produced, and also equal to the demand for products. The nominal wage rate is inflexible downwards, and therefore the economy is in equilibrium in spite of the fact that there is excess supply in the labour market.

An increase in the demand for products will according to Keynesian theory have the following consequences: For a short time there will be excess demand for products. This excess demand will raise the product prices, and therefore reduce the real wage rate. The reduction of the real wage rate will make conditionally profitable some of the production possibilities that were not conditionally profitable in the initial situation; and the producers will start utilizing these possibilities. The production and the supply of prodcts will therefore increase. Both the price increase and the increase in production will reduce that excess demand for products which occured immediately after the demand for products had increased. - After a short period during which the above-mentioned adjustments in prices and production take place, the economic system will reach a new equilibrium. In this new equilibrium the use of labour is larger than in the old one. This implies that the increase in the demand for products has reduced the unemployment. - We may also note that in the new situation the real wage rate is lower than it was in the old situation.

Keynesian theory and neo-Keynesian theory

1. Both (i) Keynesian theory, and (ii) neo-Keynesian theory about what the neo-Keynesians call "Keynesian unemployment", deal with unemployment which is such that an increase in the demand for products

will reduce the unemployment. But there are important differences between the types of unemployment described in the two theories.

2. Keynesian theory deals mainly with equilibrium situations. In these equilibrium situations all conditionally production possibilities are utilized. Neo-Keynesian theory about what the neo-Keynesians call "Keynesian unemployment", deals only with equilibrium situations. But in these equilibrium situations some of the conditionally profitable production possibilities are unutilized.

3. The equilibrium situations dealt with in Keynesian theory are situations where demand for products and supply of products are equal.

It is part of the definition of what the neo-Keynesians call "Keynesian unemployment" that there is excess supply of products.

4. According to Keynesian theory the product prices increase if there is excess demand for products. According to neo-Keynesian theory the product prices remain constant in the period considered by the theory.

This difference between the two theories will probably be explained by the neo-Keynesians as a consequence of the fact that the perspective on time is different in the two theories.

5. If we want a broad definition of what we shall call "Keynesian unemployment", then one alternative is to use the following one: Keynesian unemployment is unemployment which is such that it will be reduced if the demand for products increases.

If we use this definition, then we will say that both (i) Keynesian theory, and (ii) the neo-Keynesian theory about what the neo-Keynesians call "Keynesian unemployment", deal with Keynesian unemployment.

However, such a terminology will conceal the fact that the two theories deal with types of unemployment which in several ways are different.

Keynesian theory, neo-Keynesian theory and Model A

In several ways those economic situations which in this paper are called "Keynesian stationary states", resemble the economic situations the neo-Keynesians call "cases where there is Keynesian unemployment". In both these types of economic situations there is excess supply both in the labour market and the product market, and in both types there are unutilized production possibilities which are conditionally profitable. Finally, in both of these types of economic

situations an increase in the demand for products will increase the employment.

In several ways the economic situations we have called "Keynesian/classical stationary states of Model A" resemble the equilibrium situations described in Keynesian theory. In both of these types of economic situations there is excess supply in the labour market, balance in the product market, and utilization of all conditionally profitable production possibilities.

However, the above-mentioned resemblances are by no means complete.

The resemblance between the situations we call "Keynesian stationary states" and the situations called "Keynesian" by the neo-Keynesians, is less than what a superficial comparison may suggest. It is true that there is excess supply of products in both types of situations. But when evaluating what this means, we should be aware of the fact that that version of the concept "supply of products" which we use in Model A, is different from the version which is used in neo-Keynesian theory. (Cf. p 81.)

There are also differences between (i) the equilibrium situations discussed in Keynesian theory, and (ii) the Keynesian/classical stationary states of Model A. Here is one of them: According to Keynesian theory an increase in demand for products will increase the employment. On the other hand, according to Model A an increase in demand for products will have no consequences for the employment if the economy is in what we call "a Keynesian/classical stationary state".

A PHILLIPS CURVE

Price theory

Let P denote an index for product prices. We shall assume that the growth rate $\frac{\dot{P}}{P}$ for P is determined by

$$\frac{\dot{P}}{P} = a_{12}(X^D - X^S) + b_{12} \qquad a_{12}>0,\ b_{12}>0 \tag{12b}$$

From the assumption that b_{12} is positive follows that P will increase when $X^D = X^S$.

The coefficient b_{12} is included in (12b) in order to represent in a simple way the following theory: Some products are sold under imperfect competition. In connection with these products there is a certain amount of "price administration", which means that some producers or groups of producers from time to time mark up their prices.

On p. 80-81 it is pointed out that the term "the supply of products" can be given different meanings. It may be asked: How should we define X^S in order to get the best possible correspondence between equation (12b) and "reality"? However, that is a question I shall not discuss here. We shall assume that when we deal with equation (12b), then X^S shall be interpreted in the same way as it is when we deal with Model A.

A menue of stationary states

We shall assume that we deal with an economy which behaves as described by Model A and by the simple price theory presented in the preceding section. We shall also assume that initially this economy is in a state which is stationary with respect to the variables of Model A, and where conditions (I) and (II) on p. 83, are satisfied. This implies that the stationary state is of the Keynesian type, with

unemployment and with excess supply of products. (Cf. p. 87.) Finally we shall assume that b_{12} is so influential that P increases in the initial situation in spite of the excess supply of products.

Let us suppose that X^{PD} is gradually increased while w remain constant. This has the following consequences for the stationary state of Model A:

(i) At first the state remain Keynesian. The increase in X^{PD} leads to less unemployment, and to less excess of products. (Cf. the conclusions on p. 88.) The reduction of the excess supply of products makes P grow faster. (Cf. equation (12b) on p. 99.)

(ii) When X^{PD} reaches a certain value, then the stationary state becomes Keynesian/classical; and when X^{PD} gets larger than that particular value the state becomes classical. When this has happened, there is excess demand in the stationary state.

(iii) When the stationary state has become classical, then an increase in X^{PD} leave the unemployment in the stationary state unchanged and increases the excess demand for products in the stationary state. (Cf. the conclusions on p. 92.) The increase in the excess demand for products makes P grow faster.(Cf. equation (12b) on p. 99.)

What is pointed here, is illustrated in fig. 9. The curve in fig. 9 may be described as a Phillips curve. It is of some interest to note that such a curve can be derived from the economic theory incorporated in Model A and the simple price theory described above. But what is analysed in this chapter is of course only one of several economic mechanisms which can create a covariation between unemployment and the rate of exchange in the prices.

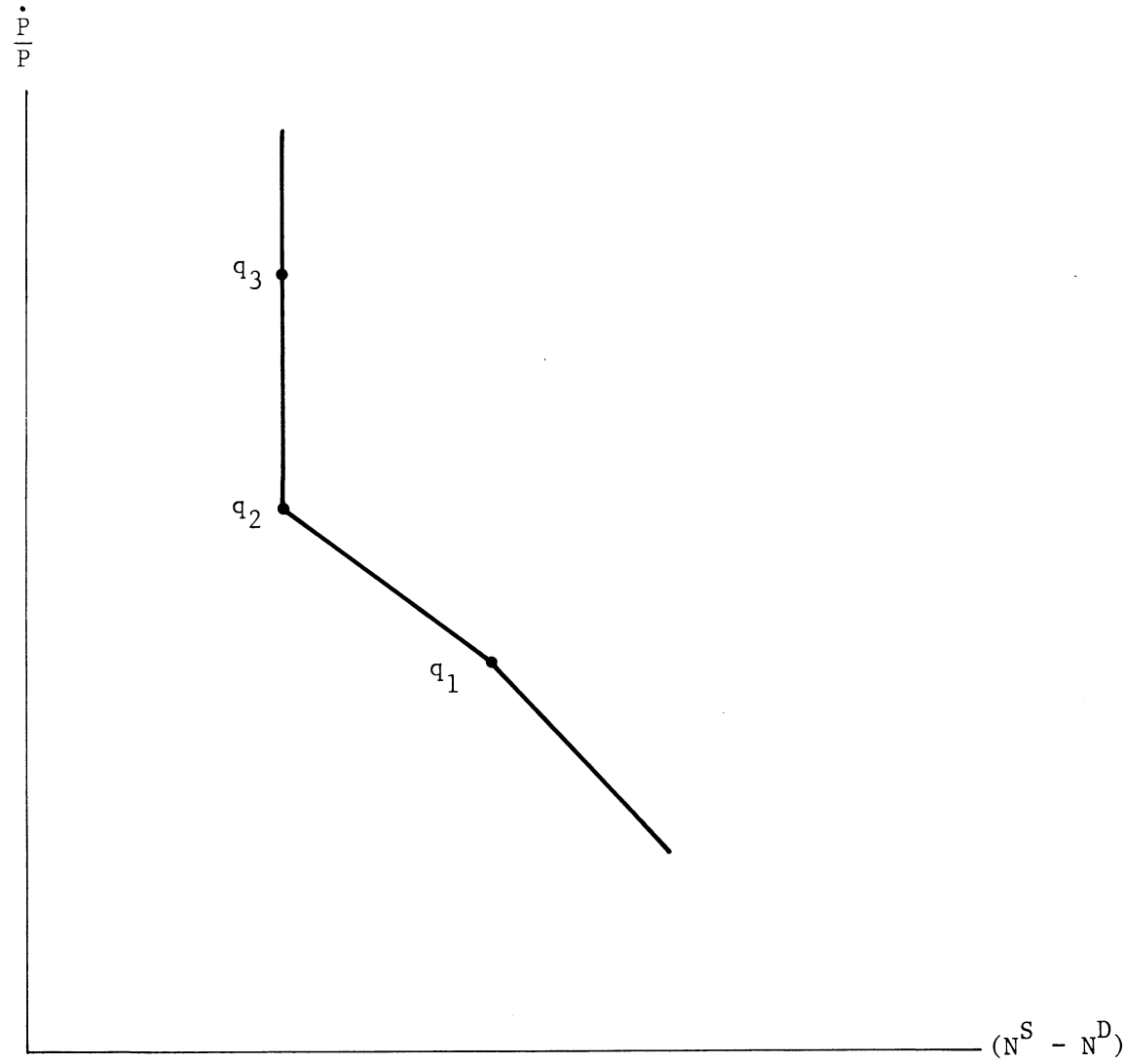

Figure 9. A Phillips curve

q_1, q_2 and q_3 express unemployment and price increase in three different stationary states. q_1 represents an arbitrarily chosen Keynesian stationary state, q_2 represents the Keynesian/classical stationary state, while q_3 represents an arbitrarily chosen classical state.

Appendix 1

THE REAL BALANCE EFFECT

Let M denote the nominal amount of money, and let P be a relevant price index. The real amount of money, which we shall denote m, is by definiton equal to $\frac{M}{P}$. According to the theories about the Pigon effect and the Keynes' effect, the demand for products, X^D, depends on m.

On the basis of these theories we may consider letting the equation

$$(7a) \qquad X^D = a_7X + b_7w + X^{PD} + d_7m + e_7 \qquad 0<a_7<1,\ b_7>0,\ d_7>0$$

replace equation (7) in Model A.

If we want to use the theory embodied in (7a), then there are at least two types of cases where we perhaps will express it in a somewhat different form.

The first of these types are the cases where d_7 is close to zero and/or there usually is little variation in m. In such cases we may first substitute (7a) with

$$(7a^*) \qquad X^D = a_7X + b_7w + X^{PD} + (e_7 + d_7m)$$

If we define c_7 by

$$(14) \qquad c_7 = e_7 + d_7m$$

then we are back to equation (7). The consequences on X^D of changes in m will then be taken care of through changes in the intercept c_7.

Suppose next that the following is true: (i) The supply of money is determined by the government. (ii) The government sets a target for m and uses its control over the supply of money to reach that target.

In such cases we may first substitute (7a) with

$$(7a^{**}) \qquad X^D = a_7X + b_7w + (X^{PD} + d_7m) + e_7$$

If we define Y^{PD} by

$$(15) \qquad Y^{PD} = X^{PD} + d_7m$$

and substitute from (13) in (7a**), then we get

$$(7a^{***}) \qquad X^D = a_7X + b_7w + Y^{PD} + e_7$$

We are now back to an equation of the same type as (7). Y^{PD} may be described as "the contribution from financial and monetary policy to the demand for products". (Cf. the description of X^{PD} on p. 79-80.)

Appendix 2

SOME CONSEQUENCES OF A MODIFICATION OF THE WAGE THEORY

1. In the main part of this paper we have assumed that w is affected only by ideas about how the income created by the production ought to be distributed. In this appendix we shall assume that w is affected both by (i) such ideas and (ii) by the difference between the demand for labour and the supply of labour.

Let w^{ID} be that value which w would have taken if w had been completely determined by the existing ideas about how the income ought to be distributed.

We shall assume that the development of w is determined by

$$(16) \qquad \dot{w} = a_{16}(N^D - N^S) + b_{16}(w^{ID} - w) \qquad a_{16}>0,\ b_{16}>0$$

With Model B we shall mean a model which is derived by modifying Model A in the following way:

(i) w is regarded as endogenous instead of exogenous.
(ii) Equation (16) is incorporated in the model.
(iii) w^{ID} is regarded as exogenous.

We may note that Model B has two exogenous variables, W^{ID} and X^{PD}.

In a stationary solution of Model B w must be equal to zero. It follows from (16) that this implies:

$$(16') \qquad 0 = a_{16}(N^D - N^S) + b_{16}(w^{ID} - w)$$

Earlier in this paper we have discussed what happens to the values taken by $(N^S - N^D)$ and $(X^D - X^S)$ in the stationary state if Model A is valid and X^{PD} increases. What follows is a first attempt to discuss if the conclusions reached in those discussions must be revised if we replace Model A with Model B. We shall mainly deal with the type of cases which can be analysed most easily.

2. Until otherwise stated we shall assume that the coefficient b_7 appearing in equation (7) is equal to zero. This means that until otherwise stated we shall discuss cases where the demand for products is unaffected by how income is distributed between wage income and non-wage income.

3. Let w^{CE} denote that value on w which makes N^{CD} and N^{S} equal. We shall call this value "the neoclassical equilibrium real wage rate". It follows from equations (1) and (4) that w^{CE} is

$$\frac{b_1 - b_4}{a_4 - a_1} .$$

Until otherwise stated we shall assume that the following conditions are satisfied:

(IIIb) $$w^{ID} > w^{CE}$$

(IVb) $$a_1 w + b_1 < g\left(\frac{X^{PD} + c_7}{1 - a_7}\right)$$

Condition (IIIb) is not identical with the condition (III) which was introduced on p. 89. But there is a close connection between these two conditions. - Condition (IIIb) says w^{ID} is higher than the neoclassical equilibrium real wage rate. Because we assume that $a_4 > a_1$, condition (IIIb) is equivalent to saying that w^{ID} has such a value that <u>if</u> $w = w^{ID}$, then the neoclassical limit is lower than the supply limit. - Condition (III), which is used in a analysis where where we <u>assume</u> that $w = w^{ID}$, says unconditionally that the neoclassical limit is lower than the supply limit.

Condition (IVb) is a simplified version of condition (IV), which was introduced on p. 89. The simplification is caused by the fact that we now deal with cases where $b_7 = 0$.

What is pointed out above, implies that the type of cases where Model B is valid and conditions (IIIb) and (IVb) are satisfied, is closely connected to the type of cases where Model A is valid and conditions (III) and (IV) on p. 89 are satisfied.

Let s' be an alternative for the functional form f and the values of the coefficients and the exogenous variables of Model B. And let S' denote the set of all such alternatives where $b_7 = 0$ and where conditions (IIIb) and (IVb) are satisfied. It can be shown that to each element of S' there corresponds one and only one stationary state of Model B, and that this stationary state is stable. It can also be shown that the value taken by w in the stationary state satisfies the following equation:

$$(17) \qquad w = w^{ID} - \frac{a_{16}(a_4 - a_1)}{a_{16}(a_4 - a_1) + b_{16}} (w^{ID} - w^{CE})$$

It can be shown that our assumptions about the coefficients of Model B imply that the fraction appearing on the right hand side of equation (17) has a value between 0 and 1. From this and equation (17) we can draw the following conclusion: When Model B is valid and conditions (IIIb) and (IV) are satisfied, then in the stationary state w has a value which lies between w^{CE} and w^{ID}.

Let n_1 and n_2 be two numbers such that when $w^{ID} = n_1$ and $X^{PD} = n_2$, then conditions (IIIb) and (IVb) are satisfied. We may compare

(i) the values taken by "the endogenous variables of Model A" in a stationary solution of Model B where $w^{ID} = n_1$, and where $X^{PD} = n_2$,

with

(ii) the values taken by the same variables in a stationary solution of Model A where

$$w = n_1 - \frac{a_{16}(a_4 - a_1)}{a_{16}(a_4 - a_1) + b_{16}} (n_1 - w^{CE}),$$

and where $X^{PD} = n_2$.

It can be shown that the two sets of values on the endogenous variables of Model A are identical. By combining (i) this result and (ii) the analysis on p. 92 of some consequences of increasing X^{PD}, we can reach the following conclusion:

When Model B is valid, and conditions (IIIb) and (IVb) are satisfied, then an increase in X^{PD} will have the following consequences for the stationary state: The value of $(N^S - N^D)$ remains unchanged, and the value of $(X^D - X^S)$ increases.

This conclusion is in accordance with the conclusions reached in the analysis of the neoclassical stationary states of Model A. (Cf. p. 92.)

4. Let w^{KE} denote that value on w which makes the Keynesian limit and the supply limit equal. This means that w^{KE}, which is a function of X^{PD}, can be found from the following equation:

$$(18) \qquad g\left(\frac{X^{PD} + c_7}{1 - a_7}\right) = a_4 w + b_4$$

We shall call w^{KE} "the Keynesian equilibrium real wage rate".

Let us turn to the cases where the following conditions are satisfied:

$$(Ib) \qquad w^{ID} > w^{KE}$$

$$(IIb) \qquad g\left(\frac{X^{PD} + c_7}{1 - a_7}\right) < a_1 w + b_1$$

The type of cases where Model B is valid and conditions (Ib) and (IIb) are satisfied, is closely related to the type of cases where Model A is valid and conditions (I) and (II) on p. 83 are satisfied.

A brief and preliminary analysis indicates that when conditions (Ib) and (IIb) are satisfied and $a_4 > 0$, then the following holds true: (i) To each alternative for the functional form f and the values on the coefficients and the exogenous variables of Model B there corresponds one and only one stationary state of that model. This stationary state is stable. - (ii) In this stationary state there is excess supply both in the labour market and the product market.
- (iii) An increase in X^{PD} will have the following consequences for the stationary state: Both $(N^S - N^D)$ and $(X^S - X^D)$ will be reduced.

We may note that the consequences mentioned in (iii) are the same as those caused by an increase in X^{PD} in a case where we have a Keynesian stationary state of Model A.

5. Let us now replace the assumption that $b_7 = 0$, with the assumption that $b_7 > 0$, and let us also assume that a_4 is not necessarily positive. The analysis then becomes more complicated. A brief and very superficial analysis seems to indicate the following:
(i) If, roughly speaking, a_4 is "large" and b_7 is "small", then the conclusions regarding how an increase in X^{PD} affects $(N^S - N^D)$ and $(X^S - X^D)$, will be the same as those reached in the analysis of the stationary states Model A. - (ii) The conclusions will be different and more complicated if a_4 is "small" and b_7 is "large".
- (iii) The conclusions will depend not only on the values on a_4 and b_7, but also on other aspects of the economic structure.

Appendix 3

A MODEL FOR A SERVICE-PRODUCING SOCIETY

1. Let us for a moment imagine a society where all products are services. Services cannot be stored; therefore the producers have no stocks of their own products. For this and other reasons Model A is not appropriate if we want to analyse such a society.

What follows is a sketch of a macromodel which perhaps can be useful if we want to discuss how production and employment are determined in societies where only services are produced. We shall call this model "Model S".

2. The variables used in Model S are the same as those used in Model A, except for the following modifications:

(i) We do not use Z in Model S, because there are no stocks of products in the society described by Model S.

(ii) In Model S we define N in the following way: N is the flow of labour services bought by the producers, per unit of time. $(N^S - N)$ is therefore an expression of the amount of unemployment.

(iii) We introduce a new endogenous variable which we call N^U. This variable denotes the amount of labour services which is actively used in the production, per unit of time.

N^U is never larger than N. If N^U is smaller than N at a certain point of time called t, then this can be explained as follows:

The value taken by $(N - N^U)$ tells how many units of active work are "lost", per unit of time, at t, for the following reason: Some of the wage earners who have jobs and are on the job at t, are idle because at that time they have no customers demanding their services. $(N - N^U)$ will for instance include the active work lost by a hair dresser who at t is in the shop where she has her job, but who is idle because she has no customers.

3. The changes we have made in the set of endogenous variables, imply that we still have nine variables of this type.

4. We use relations (1), (2), (4), (5), (7) and (9) of Model A. But equations (3), (6), (8) and (10) of Model A are replaced by

$$(3^*) \qquad \dot{N}^D = a_3(N^{CD} - N^D) + b_3(X^D - X^S) \qquad a_3>0,\ b_3>0$$

$$(6^*) \qquad X = f(N^U) \qquad f>0$$

(8*) $X^S = f(N)$

(10*) $X = X^T$

It is to be understood that "the economic mechanism" described by (3*), functions under the restriction given by (2).

5. Equation (3*) says that the change in N^D depends on (i) the amount of conditionally profitable production possibilities which are not utilized, and (ii) the difference between the demand for products and the supply of products. We could have included $(N - N^U)$ in equation (3*). But because of the close connection between $(N - N^U)$ and $(X^D - X^S)$ in the society described by Model S, there is not much sense in doing this.[1]

It can be shown that if $\dot{N}^D = 0$ in a situation where $N^{CD} > N$, then this must be a situation where some of the wage earners who are on the job, are idle because they lack customers. In such a case $\dot{N}^D$ is zero because the following two tendences cancel out: (i) A tendency to an increase in $\dot{N}^D$ because there exist conditionally profitable production possibilities which are not utilized. (ii) A tendency to a reduction in $\dot{N}^D$ because at least some of those who are employed, are idle part of that time they are on the job.[2]

6. Equation (6*) says that the production at a certain point of time is a function of how much work is being done at that point of time.

Equation (8*) says that the supply of products at a certain point of time is equal to that amount which will be produced if all wage earners who are "on the job" at that point of time, are busy with customers.

Equation (10*) says that the amount which is produced, is equal to the amount which is traded.

7. On p. 83 we have introduced two conditions we have called "condition I" and "condition II". When both these conditions are satisfied, then the Keynesian limit is the lowest of the three limits for the employment.

[1] If $X^D < X^S$, then $(N - N^U)$ is positive and a monotonously decreasing function of $(X^D - X^S)$. If $X^D \geq X^S$ then $(N - N^U) = 0$. (Cf. equations (6*), (8*), (9) and (10*.)

[2] Cf. the discussion on p. 79 about the type of situations where $\dot{N}^D$ is zero in a goods producing society.

We have shown that when conditions (I) and (II) are satisfied, then Model A generate that type of stationary states which we have called "Keynesian". In these states $N^S > N^D$, $X^S > X^D$, and $N^{CD} < N$. It can also be shown that if conditions (I) and (II) are satisfied, then Model S generate stationary states where the same relations are satisfied.

It is also of interest to note this:

(i) When conditions (I) and (II) are satisfied, then $Z > Z_0$ in the stationary states which are generated by Model A.

(ii) When conditions (I) and (II) are satisfied, then $N^U < N$ in the stationary states which are generated by Model S.

What is pointed out above can, somewhat imprecisely, be expressed and interpreted in this way:

When conditions (I) and (II) are satisfied, then both Model A and Model S generate stationary states where there is excess supply both in the labour market and in the product market, and where some of the conditionally profitable production possibilities are unutilized.

In Model A it is the existence of overoptimal stocks of products which is the "brake" that blocks the utilization of some of the conditionally profitable production possibilities. This brake works partly directly, and partly by creating an excess supply of goods which makes it less attractive to utilize production possiblilities.

In Model S the brake is the occurence of "idle time" for some of those who are employed.

8. On p. 89 we have introduced two conditions we called "condition (III)" and "condition (IV)". When both these conditions are satisfied, then the neoclassical limit is the lowest of the three limits for the employment.

We have shown that if conditions (III) and (IV) are satisfied, then Model A generate that type of stationary states which we have called "classical". In these stationary states $N^S > N^D$, $X^D > X^S$, and $N = N^{CD}$. It can also be shown that if conditions (III) and (IV) are satisfied, then Model S generate stationary states where the same relations are satisfied.

It is also of interest to note that when conditions (III) and (IV) are satisfied, then there are no overoptimal stocks in the society described by Model A. Nor are there in the society described by Model S any occurence of "idle time on the job" because of lack of customers.

A STUDY IN UNEMPLOYMENT CAUSED BY A COMBINATION OF (I) MISMATCH IN THE LABOUR MARKET, (II) PRICE-FIXING BEHAVIOUR, AND (III) A DEMAND POLICY WHICH PREVENTS ACCELERATING INFLATION

INTRODUCTION

Genuine macromodels and disaggregated models

In every industrialized society there exist different types of products and different types of labour. But when describing such a society we sometimes, in order to simplify, find it useful to disregard this fact.

Let X represent the (aggregate) production in a certain industrialized society, let N represent the (aggregate) amount of labour used in the same society, and let us assume that we want to explain how the values of X and N are determined. One possible approach is to construct a model which disregards both that X consists of different types of products and that N consists of different types of labour.

Models of the type sketched above we shall here call genuine macromodels. - Model A, the model discussed in the preceding paper, is an example of a genuine macromodel.

When trying to explain how the values on X and N are generated, we can, instead of using a genuine macromodel, use a model of a type which can be sketched as follows: The model is in an essential way based on the fact that aggregate production consists of different types of products and/or the fact that aggregate employment consists of different types of labour.

Models of this type we shall call disaggregated models. The model described in the next chapter is an example of a disaggregated model.

Survey of this paper

The main intention of this paper is to present a simplified version of an economic mechanism which I believe is one of the most important causes of the present high unemployment in the OECD-countries. There are, as indicated in the title of the paper, three main components of that mechanism.

Suppose that the distribution of the aggregate demand for labour on different types of labour, is different from the distribution of the aggregate supply of labour on different types of labour. In such a case we say that there is a mismatch in the labour market. - Mismatch in the labour market is one of the

components of the economic mechanism described and discussed in this paper.

The second component is the price fixing behaviour. I use in this paper a theory of price fixing which is a mixture of some very well known elements of price fixing theory and some elements which, as far as I know, have been suggested rather recently.

The third component is a demand policy which is dominated by the view that accelerating inflation can not be tolerated.

The article is organized in the following way:

In the next two chapters I present and discuss an economic model which describes the above-mentioned mechanism for generating unemployment.

Then follows a chapter where I conjecture that the model gives a strongly simplified picture of the economic structure of the OECD-countries. I also sketch various ways in which the model can be modified in order to improve that picture.

In the final chapter I use the model as a basis for discussing what conceivably the governments in the OECD-countries can do in order to reduce the unemployment.

The paper contains three appendices. The first presents some conjectures regarding what has been and what is the main causes of unemployment in those countries which today are members of OECD. The second contains a few notes on price fixing behaviour, and the third discusses the concept "the aggregate demand for products".

MODEL G

Introductory remarks

In this chapter I describe a model called "Model G". With the exception of the inflation theory it contains, this model is very simple. But there is a price to be paid for that simplicity. When I discuss the questions I shall raise in this paper, it is sometimes necessary to use modified versions of Model G.

Model G describes a society where there exist two groups of products, A-products and B-products. A-products are produced in a group of industries called A-industries, and B-products are produced in a group called B-industries.

There exist two types of labour. One type, which is called A-labour, is used in A-industries. The other type, B-labour, is used in B-industries. - People who have the skills needed for doing A-labour, will be called A-workers; and people who have the skills needed for doing B-work, will be called B-workers. No one is qualified for doing both A-work and B-work.

In a modern society a producer can face these problems: (a) He does not find buyers for his products. - (b) The costs of producing and selling the last units he produces, are larger than the gross income received from selling these units. (Cf. p. 13.) - The first of these problems can cause a type of unemployment which we call "Keynesian", while the second problem can cause unemployment of a type we call "neoclassical".

In this paper we shall assume that we shall only have to deal with cases where - to use a terminology introduced in the first paper - the Keynesian limits to the employment are lower than the neoclassical limits. This implies that when constructing Model G we can disregard those elements of the economic structure which create what I in previous papers have called "the neoclassical mechanism for creating unemployment".

Endogenous variables

X_i^D = Demand for i-products, measured in fixed prices.
$i = A, B$

N_i^D = Demand for i-labour. i = A, B

N_i = Employment in i-industries. i = A, B

p_B = Relative price of B-products. p_B is by definition $\frac{P_B}{P_A}$,

where P_i (i = A, B) is the price of i-products.

P = Index for product prices. - $\ddot{P}$ denotes the second derivative of P with respect to time

Exogenous variables

X^D = Volume of aggregate demand for products. X^D is by definition "the money value of aggregate demand for products, deflated with P". (More about the definition of aggregate demand for products on p. 146.)

N_i^S = Supply of i-labour. i = A, B

w_B = Relative wage rate for B-labour. w_B is by definition $\frac{W_B}{W_A}$,

where W_i (i = A, B) is the wage rate for i-labour

Equations

(1) $X_i^D = a_{1i}X^D + b_{1i}p_B + c_{1i}$ $\quad i=A,B,\ 0<a_{1i}<1,\ b_{1A}>0,\ b_{1B}<0$

(2) $N_i^D = a_{2i}X_i^D + b_{2i}$ $\quad i=A,B,\ a_{2i}>0$

(3) $N_i = \text{Min}(N_i^D, N_i^S)$ $\quad i=A,B$

(4) $p_B = a_4w_B + b_4$ $\quad a_4>0,\ b_4>0$

(5) $\ddot{P} = a_5b_5(N_A^D - N_A^S) + c_5d_5(N_B^D - N_B^S) + e_5$ $\quad b_5>0,\ d_5>0,\ e_5\geq 0$

The coefficient a_5 is equal to 1 if $N_A^D>N_A^S$. If $N_A^D<N_A^S$, then $a_5 = a_5^0$, where a_5^0 is a number between 0 and 1. The coefficient c_5 is equal to 1 if $N_B^D>N_B^S$. If $N_B^D<N_B^S$, then $c_5 = c_5^0$, where c_5^0 is a number between 0 and 1.

The determination of the values of the i-quantities

Demand for i-products. We shall assume that demand for i-products, where i = A, B, is an increasing function of aggregate demand for products.

We shall also assume that the more expensive the B-products are, compared to the A-products, the larger is that share of aggregate demand which is demand for A-products.

In Model G these assumptions about the demand for products are expressed by equation (1).

Amount of production of i-products and supply of i-products.

In Model G we do not find variables representing production and supply of products. The model shall be used in a presentation and discussion of certain theory of unemployment. It turns out that when doing this, it is not necessary to include production and supply of products in the model.

Demand for i-labour. Model G describes a society where there always are unutilized conditionally profitable production possiblilities. (Cf. p. 69.) We shall therefore assume that the i-producers, i.e. the producers in the i-industries, want to produce as much as they can sell, i.e. X_i^D units of their products.

We shall further assume that there exist a production function for i-products which establishes a one-to-one correspondence between the amount of these products and the amount of labour needed to produce them. (That function does not appear explicitly in the model). This implies that there is also a one-to-one correspondence between the amount the i-producers want to produce, and their demand for i-labour.

From the assumptions presented above follows that demand for i-labour is a function of the demand for i-products. This is expressed by equation (2).

Supply of i-labour. We shall assume that, within that perspective of time which is used in the model, the changes in the size and the composition of the labour force are so small that they can be disregarded. We shall also assume that how much each member of the labour force wants to work, is exogenously given. We therefore regard N_i^S as an exogenously given quantity.

Employment of i-labour. We assume that employment of i-labour is equal to the smallest of the two quantities N_i^D and N_i^S. This is expressed by equation (3).

The relative wage rate

For presentational reasons the discussions in this paper will be restricted to cases where it is easier to sell labour in the market for A-labour than in the market for B-labour. This means that within the set of cases we shall discuss, the following is true: If there is balance in the market for A-labour, then there is excess supply of B-labour. And if there is balance in the market for B-labour, then there is excess demand for A-labour.

We shall assume that in the set of cases where the labour markets differ in the way indicated above, the wage rate is lower in the B-market than in the A-market. But we shall also assume that ideas about what are "reasonable" relationships between wage rates, put a limit to how low the wage rate for B-labour can get, compared to the wage rate for A-labour. (Cf. p. 26.) And we shall assume that these ideas are exogenous, and that they determine the size of w_B, the relative wage rate for B-work. All this means that we shall regard w_B as an exogenous variable.

The relative price

The variable p_B tells how expensive the B-products are, compared to the A-products.

It seems reasonable to assume that p_B depends both on the marginal costs of production in each of the two groups of industries, and on the conditions in the product markets. According to this assumption p_B will be influenced by (a) wage rates, (b) other prices of production factors, (c) production functions, (d) relative importance of perfect competition, monopolistic competition and monopoly in each of the product markets, and (e) differences between demand and supply in the product markets.

In order to make Model G simple, the generation of values on p_B is described by equation (4). This equation makes explicit only the effects on p_B of wage rates, and let the effects of all other factors of influence be represented by the quantity b_7. When in later chapters I discuss the implications of given changes in exogenous variables and coefficients of the model. I disregard the fact that such changes may change b_7. In other words, I regard b_7 as a coefficient, even though it would have been more realistic to regard it as a complicated endogenous variable. Doing this, simplifies the analysis considerably.

My conjecture is that, in spite of this simplifications, an analysis based on a model which contains equation (4), will throw some light on how unemployment can be generated. I base this conjecture partly on a belief that the price theory of equation (4) can be modified in a way which is analogous to the way the wage theory of Model A is modified on p. 105-108.

The theory of inflation

1. The inflation theory we shall use, is expressed by equation (5). This equation says that the development of the price level is a function of the differences between demand and supply in certain markets.

2. Let X_A^S denote the supply of A-products, and let X_B^S denote the supply of B-products. It may be asked: Would it not be reasonable to assume that the development of P is influenced not only by $(N_A^D - N_A^S)$ and $(N_B^D - N_B^S)$, but also, and probably to higher degree, by $(X_A^D - X_A^S)$ and $(X_B^D - X_B^S)$? I believe the answer to this question is yes. However, it can be argued that there is a covariation between $(X_A^D - X_A^S)$ and $(N_A^D - N_A^S)$, and that there is a covariation between $(X_B^D - X_B^S)$ and $(N_B^D - N_B^S)$. (Cf. p. 141.) If this is so, then, in order to simplify the equation describing how P changes, we may let $(N_A^D - N_A^S)$ take care of the influence of $(X_A^D - X_A^S)$ on P, and let $(N_B^D - N_B^S)$ take care of the influence of $(X_B^D - X_B^S)$. This is what we do when we use equation (5).

3. According to equation (5) the conditions in the markets determine not the speed of the change in the price level, but the acceleration of that change.

Different explanations can be given for this part of our inflation theory. I shall sketch one of them. For presentational reasons it will be assumed that we only deal with cases where (i) prices and wage rates rise, and (ii) there is excess demand of products and labour in the A-sector, and excess supply of products and labour in the B-sector.

We shall assume that in the society described by Model G, prices and wages are changed in the following way: Mark-ups of prices and wages take place from time to time. The size of each mark-up is the result of a compromise. Each producer and each group of workers want a situation where the price of what they sell, is high compared to the price of what <u>others</u> sell. But on the other hand they do not

want to price themselves out of the market.[1]

We shall further assume that if the society is in a certain state we shall call S_0, then we get mark-ups which make the prices and wages rise at a constant rate.[2]

Another conceivable state will be called S_1. That is a state where (i) the excess demands for for A-products and A-labour are larger than these quantities are in S_0, and where (ii) the excess supplies for B-products and B-labour are smaller than in S_0. We shall assume that these differences between S_1 and S_0 make the price and wage fixers less afraid of pricing themselves out of the market when they are in S_1 than when they are in S_0. On the basis of this and the fact that in S_0 the prices are increasing with a constant rate, we shall assume that in S_1 the inflation is accelerating. And we shall assume that the acceleration is faster the larger the excess demands for A-products and A-labour are, and the smaller the excess supplies of B-products and B-labour are.

Let next S_2 denote a state where the excess demands for A-products and A-labour are smaller than in S_0, and where the excess supplies of B-products and B-labour are larger than in S_0. We can discuss this state in a way similar to the way we discussed S_1. A reasonable conclusion of such a discussion will be that in S_2 the inflation is decelerating.

4. The coefficients b_5 and d_5 in equation (5) describe the influence on P of excess demands. The coefficients are a_5 and c_5 introduced in the equation in order to express the following theory: The influence on the development of the price level of an excess supply in a certain market, is weaker than the influence on that development of an equally large excess demand in the same market.

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[1] Assuming that such mark-up take place, implies that the prices are discontinuous functions of time. That is inconsistent with equation (4) and equation (5). However, this inconsistency is not important, because equations (4) and (5) can be regarded as approximative descriptions of what happens.

[2] Cf. the theory presented in the section "Inertial inflation" on p. 242-243 in Samuelson & Nordhaus (1).

UNEMPLOYMENT WHEN MODEL G IS VALID

Mismatch and unemployment

In connection with Model G mismatch in the labour market means that

$\frac{N_A^D}{N_A^S}$ is different from $\frac{N_B^D}{N_B^S}$.

When Model G is valid and there is mismatch in the labour market, then we can get excess demand in one labour market and excess supply in the other also in cases where aggregate demand of labour is at least as large as aggregate supply of labour. In such cases there will be unemployment. (Cf. equation (3).) The size of that unemployment depends on the size of the mismatch, i.e. on the difference between

$\frac{N_A^D}{N_A^S}$ and $\frac{N_B^D}{N_B^S}$. It will be reduced if the mismatch is reduced.

Demand policy as a means to avoid unemployment when there is mismatch in the labour market

Let us assume that there is excess demand for A-labour and excess supply of B-labour. The excess supply of B-labour of course imply that there is unemployment among B-workers.

The demand for B-labour is a function of aggregate demand, X^D and of relative price, p_B. (Cf. equation (1).) Until otherwise stated we shall assume that w_B, and therefore also p_B, remain constant. (Cf. equation (4).)

An increase in X^D has several effects. Here are some of them: (i) Demand for B-products increase. - (ii) The increase in demand for B-products increase demand for B-labour. - (iii) The increase in demand for B-labour reduce unemployment among B-workers.

According to Model B the value of X^B is determined by the government. It follows from what is pointed out above that the government by increasing X^D can reduce unemployment. It also follows that by making the increase in X^D large enough, the government can eliminate unemployment.

A modification of Model G

Let us for a moment consider the following modification of the equation (1) in Model G: It is only up to a certain level for X^D that an increase in X^D increase X_B^D. When X^D is above that level, then an increase in X^D result in an equally large increase in X_A^D, while X_B^D remains constant.

We may note that in a society where the economic structure is as described by this modified version of Model G, it is not necessarily true that unemployment among B-workers can be eliminated by increasing X^D. It is possible that even the maximum value of X_B^D - a value which is reached when X^D is above a certain level - is too small to result in full employment among B-workers.

Demand policy and the problem of avoiding accelerating inflation

We shall now return to the original version of Model G.

Above we have concluded that when this version is valid, then the government can avoid unemployment by making X^D large enough. However, doing this can have consequences which the government is not willing to accept. We shall assume that if X^D is large enough to give balance in the market for B-labour, then there will be excess demand for A-labour. (Cf, p. 118.) It can be seen from equation (5) that under such conditions in the labour markets there will be accelerating inflation. This means that if the goal of avoiding accelerating inflation is given top priority by the government - as it probably is - then the government cannot let X^D reach that level which is neccessary to avoid unemployment among B-workers.

How large must unemployment be if accelerating inflation shall be avoided? An inspection of equation (5) shows that the answer to that question depends partly on the coefficients a_8 and c_8. These coefficients express the theory that an excess supply in a certain market has an effect on the rate of the price increase which is smaller than the effect of an equally large excess demand in the same market. We may note that this is a characteristic of the price fixing behaviour which contributes to unemployment.

Changing the relative wage rate as a means to avoid unemployment when there is mismatch in the labour market

1. In this section we shall assume that initially we have excess demand for A-labour and unemployment among the B-workers. We shall also assume that the value on X^D remains constant within the set of situations considered in the section.

2. According to Model B the value of w_B is determined by ideas about what is reasonable. Let us suppose that these ideas are changed in such a way that it becomes acceptable to use a value on w_B which is lower than the present value.

A reduction in w_B will have several effects. Here are some of them: (i) The relative price of B-products, p_B, will be reduced. (Cf. equation (4).) - (ii) The reduction of p will increase demand for B-products. (Cf. equation (1.) - (iii) The increase in demand for B-products will increase demand for B-labour. (Cf. equation (2.) - (iv) The increase in demand for B-labour will reduce unemployment among B-workers. 3. The wage rate paid for B-labour, and therefore also w_B, must be positive. And if w_B must be positive, then there will according to equation (4) also exist a positive lower limit for the relative price p_B.

4. From equation (1) and what is pointed out in the preceding paragraph follows that there exists an upper limit for how much demand for labour can be increased through a reduction of w_B. This implies that it may be impossible to eliminate the unemployment among B-workers only by reducing w_B.

MODEL G AND THE UNEMPLOYMENT IN THE OECD-COUNTRIES

Using Model G to explain unemployment in the OECD-countries

For some purposes the OECD-countries can be regarded as one society. We shall call this society "the OECD society". (Cf. p. 49.) It is my conjecture that Model G expresses the essence of some important traits of the economic structure of the OECD society. I also conjecture that a study of the model can reveal important causes of the present unemployment in that society. Simplified versions of those causes are described in the preceding chapter. By modifying Model G we can improve the model's strongly simplified picture of the economic structure of the OECD society. There are many possibilities for modifications. I shall sketch four of them.

Behaviour which modifies the composition of the supply of labour

In Model G it is assumed that the supply of each type of labour is exogenous. Part of the basis for this assumption is the assumption that within that perspective of time which is used in the model, the changes in the size and the composition of the labour force are so small that they can be disregarded. (Cf. p. 117.)

Let us now suppose that we in an analysis use a perspective of time which is somewhat longer than the one which was used when the original version of Model G was constructed. Then it can be reasonable to assume that mismatches in the labour market result in adjustments which change the composition of the supply of labour. Suppose for instance that at a certain point of time there is excess demand for A-labour and excess supply of B-labour. It seems reasonable to assume that, given sufficient time, this will have the following consequences:

(i) We will get an increase in the proportion of new entrants to labour market who are trained for doing A-work.

(ii) Some of the B-workers will be retrained in such a way that they become qualified for working in the A-industries.

These consequences will tend to reduce the mismatch in the labour market.

The economic behaviour which is sketched above, can be incorporated in a modified version of Model G through including in that version equations describing how mismatches in the labour market result in changes in the composition of the supply of labour.

Technical change

In the original version of Model G it is assumed that the techniques of production remain constant[1]. But in the OECD society those techniques are changing rapidly, and these changes have consequences for the composition of the aggregate demand for labour.

What is pointed out here, means that, unless we are concerned only with what happens in the short run, we can improve Model G by incorporating in the model equations describing how production techniques change over time.

2. Suppose that we have modified Model G by incorporating in the model both (i) equations decribing changes in production techniques, and (ii) equations describing how mismatches in the labour market result in adjustments of the composition of the supply of labour.

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[1] This assumption is part of the basis for equation (2). Cf. the discussion on p. 117 of the demand for i-labour.

labour. One of the conclusions which can be drawn from such a modified version of Model G will be the following one: It seems reasonable to assume that an increase in the speed of technical change will tend to increase the average mismatch in the labour market, and therefore also increase the average unemployment in the society.

Change the assumptions regarding the connections between types of labour and groups of industries

In Model G we assume that each group of industries uses one and only one type of labour, and that each member of the labour force is qualified for working in one and only one group of industries. When such assumptions are valid, then each member of the labour force in a very strict way "belongs to" one of the groups of industries.

We can replace these assumptions with the following ones: There are several different types of labour. Some of these types are used only in one of the groups of industries, and some of them are used in both groups. Among the types which are used in both groups, is a type we shall call "unskilled labour". With an acceptable degree of simplification we can say that everyone can do unskilled labour without getting any training for doing that type of labour.

The modifications which are sketched above, probably mean much for how well the model can describe the consequences for the unemployment of changes in production techniques. A change in these techniques does not only change the amount of labour needed for producing a given amount of products. Usually it also changes the way in which that amount of labour is distributed on various types of labour. Changes in such distributions can mean much for the creation of mismatches in the labour market, and consequently also mean much for the creation of unemployment.

Regional disaggregation

In a modified version of Model G we can divide the OECD society into a set of regions and for each of these regions have variables and equations describing what happens there. In such a version can be generated mismatches between the regional distribution of the demand for labour and the regional distribution of the supply of labour. These regional mismatches will in many ways be analogous to the groups-of-products mismatches which can be generated by the original version of Model G.

EMPLOYMENT POLICY IN THE OECD SOCIETY

A list of what the governments conceivably can try to do in order to reduce unemployment

Let us assume that the original version of Model G gives an acceptable picture of the economic structure of the OECD society. Let us also assume that the present employment situation in this society can be described as follows: There is mismatch in the labour market, and there is large unemployment in a group of industries we may call "the B-industries of the OECD society". The unemployment is mainly the result of the combination of (i) the mismatch in the labour market, (ii) the price fixing behaviour described by equation (5) in Model G, and (iii) the top priority given to the goal of avoiding accelerating inflation.

In what follows I shall give a list of what, according to Model G, the governments of the OECD-countries conceivably can try to do in order to reduce or eliminate the present unemployment. Most items on the list are based on the theory that a reduction of the mismatch in the labour market will make it possible to reduce the unemployment without getting accelerating inflation. One item in the list focus on the price fixing behaviour described by equation (5), and one item is based on the idea that accelerating inflation perhaps can be made more acceptable. Here is the list:

(i) Change the demand structure.

With "change the demand structure" I shall here mean "do something which implies that one or more of the coefficients appearing in equations (1) of Model G change".

A change of these coefficients can, via changes in the composition of the demand for labour, reduce the mismatch in the labour market.

(ii) Change the techniques used in the production.

More efficient techniques in the B-industries will, via a reduction in the coefficients of equation (4), reduce p_B. That will, via an increase in the demand for B-products, increase the demand for B-labour.

It is probably more important that more efficient techniques in the B-industries also will reduce the amount of B-labour needed to produce a given amount of B-products. That will reduce the demand for B-labour. (In Model B this effect will come in the form of a change in the coefficents of the B-version of equation (2).)

A change to less efficient techniques in the B-industries, and changes in the efficiency of the techniques used in the A-industries, will have analogous effects.

Since the efficiency of techniques used in production has consequences for demand for labour, a government can conceivably try to accomplish a change in techniques which imply that the mismatch in the labour market becomes smaller.

(iii) Subsidize B-products and/or levy excise taxes on A-products.

Doing this will according to Model G have the following effects: - (a) Such subsidies and taxes will reduce the coefficients of equation (4). - (b) The reduction in the coefficients of equation (4) will reduce p_B. - (c) The reduction in p_B will reduce the demand for A-products and increase the demand for B-products.(Cf. equation (1). - (d) This change in the demand for products will reduce demand for A-products and increase demand for B-products. (Cf. eqation (2).) That will reduce the mismatch in the labour market.

(iv) Reduce the relative wage rate w_B.

A reduction in w_B will reduce p_B, and that will, for reasons stated above, reduce the mismatch in the labour market.

(v) Change the price fixing behaviour in such a way that the relation between w_B and p_B is changed.

The coefficients of equation (4) depend among other things on price fixing behaviour. A change in price fixing behaviour which reduces one or both of these coefficients, will reduce p_B. For reasons sketched in point (iii), that will reduce the mismatch in the labour market.

(vi) Provide vocational training and retraining which change the composition of the aggregate supply of labour.

Vocational training and retraining can increase the number of A-workers and reduce the number of B-workers. That will reduce the mismatch in the labour market.

(vii) Change the price fixing behaviour in such a way that, with a given mismatch in the labour market, there is an increase in "the highest aggregate demand for products one can have without getting accelerating inflation".

In Model G such a change will be expressed as a change in the coefficients of equation (5).

If we assume that aggregate demand for products always is kept as high as it is possible without making the inflation accelerating, then such a change in price fixing behaviour will have the following consequences: (a) Aggregate demand for products increases. - (b) Demand for B-products increases because aggregate demand for products increases. - (c) Demand for B-labour increases because demand for B-products increases. - (d) Unemployment among the B-workers will be reduced because demand for B-labour increases.

(viii) Change the economic structure in such a way that it becomes easier to live with accelerating inflation.

Such a change - whatever it could be - can conceivably make it acceptable to increase the aggregate demand for products even if this results in accelerating inflating. An increase in the aggregate demand for products will have the consequences sketched in point (vii).

However, it seems unlikely that the economic structure can be changed in such a way that it becomes acceptable to live with accelerating inflation for more than a limited period.

Restrictions on the employment policy

In the OECD society the governments have today a comparatively weak influence on many important types of economic decisions, including (i) decisions about which production techniques shall be used by private firms, and (ii) which prices shall be charged for products produced by private firms. This implies that many of those "means" which are included in the above list, cannot be used to any large degree without transfering to public agencies considerable parts of that decision power which today belongs to private firms.

Both for principal and practical reasons many people are against such a transfer of decision power. Therefore it does not seem likely that it will made be in the foreseeable future. Consequently we must conclude that many of the items on the list presented above, will either be used only in very moderate doses or not be used at all.

There are also other restrictions on the choice of means in the employment policy. Here are two examples: (i) Ideas about how income ought to be distributed, put a limit to how low a value can be accepted on the relative wage rate w_B. - (ii) It is a widely accepted idea that the composition of the production ought to be determined by the strength of the needs felt for various types of products. According to theories based on this idea, subsidies and excise taxes will, except for some cases where they have a corrective influence, "distort" the composition of the production. Partly for this reason there exist political limits to how much a mismatch in the labour market can be reduced by subsidizing some products and taxing other products.

Vocational training

1. A mismatch in the labour market can be reduced by changing (a) the composition of the demand for labour, or (b) the composition of the supply of labour, or (c) both these compositions. For several reasons, some of them sketched in the preceding section, there are practical and political limits to the possibilities of changing the composition of the demand for labour. That increases the relevance of the possibilities of changing the composition of the supply of labour.

2. Changes in vocational training can conceivably be used as a means to adjust the composition of the supply of labour in such a way that mismatches in the labour market are avoided. In this section we shall discuss briefly (a) to what extent that is done today in the OECD society, and (b) the possibilities for doing it in the future. The discussions will be based on a version of Model G which, compared to the original version, is modified in these ways:

(i) We assume that the production techniques change rapidly. (Cf. p. 124.)

(ii) We make the following assumptions: There are several types of labour. Some of these types are used only in one of the groups of industries, and some of them in both groups. (Cf. p. 125.)

3. With "the amount of vocational training" we shall here mean "the number of people which each year are given vocational training". With "the composition of the vocational training" we shall mean "the distribution of the given training on training for various types of labour". And with "a market mechanism for adjusting the amount and distribution of vocational training" we shall mean an economic

mechanism which works in a way which may be indicated as follows: "The forces of the markets" imply that an excess demand for a certain type of labour contributes to an increase of the number of people who are being trained for doing that type of labour. An excess supply has the opposite effect.

4. The development of the amount and composition of the vocational training in the OECD society is today influenced both by market mechanisms and by attempts of public agencies to adjust the training to existing and future demand for labour. But those influences are far to weak to imply that mismatches in the labour market do not occur.

5. It seems difficult to imagine that the relevant market mechanisms can be improved to such an extent that they alone will be sufficient to avoid mismatches in the labour market. An important reason for this is that the production techniques change so rapidly.

6. A public policy which results in such vocational training that mismatches are avoided, must contain the following elements:

(i) Good predictions of the future composition of demand for labour must be made.

(ii) For each type of training and retraining there must be provided a sufficient number of opportunities to get that type of training. "A sufficient number" here means a number which is at least as large as what is needed according to the predictions mentioned in point (i).

(iii) Potential trainees must be influenced in such a way that for each type of training a sufficient number of people will both (a) want to take this type of training, and (b) have the economic opportunities necessary for doing this.

We may in particular note that there seems to be a decreasing demand for unskilled labour in the OECD society. Part of a policy for avoiding mismatch in the labour market must therefore be to make sure that not too many people remain unskilled.

7. For several reasons we cannot in the near future expect a public policy for vocational training which closely resembles the one sketched above. One of these reasons is that it is difficult to make good enough predictions of the future composition of the demand for labour. Another reason is that a policy of the type sketched above will cost money. For at least most of the OECD governments financial problems are an important obstacle to spending much more money than

they do today on any programme, including a programme for giving that vocational training which is needed if mismatches in the labour market shall be avoided.

A FINAL REMARK

Model G generate only cases with Keynesian unemployment, but can be modified in such a way that it also can generate cases with classical unemployment and cases with Keynesian/classical unemployment. The analysis of this paper can be extended by using modified version of Model G to discuss how unemployment can be reduced in the following two types of cases:

(i) Cases where there is classical unemployment among B-workers and excess demand for A-workers.

(ii) Cases where there is Keynesian/classical unemployment among B-workers and excess demand for A-workers.

Appendix 1

WHAT HAS BEEN AND WHAT IS THE MOST IMPORTANT CAUSES FOR UNEMPLOYMENT IN THE OECD-COUNTRIES?

Introduction

The main topics of this paper are (i) a theory about a certain mechanism for creating employment, and (ii) whether that theory can contribute to an understanding of the present unemployment in the OECD-countries.

In this appendix I digress from those topics. In the last section of the appendix I argue for the view that we can distinguish between three periods in the history of unemployment in the OECD-countries. The other sections sketch theories and conjectures which will be used in the last section.

Limited natural resources as a cause of unemployment in a primitive economy

We shall assume that figure 10 describes the production possibilities for an agricultural society which produces only one type of products. In this society there is used a production technique which establishes a firm connection between the size of the area which is cultivated and the number of people employed in the production.

Figur 10 shows that the marginal productivity of labour falls when employment, N, exceeds a level called N_1, and is zero when N exceeds another level called N_2. This can be explained in the following way: When N is N_1, then all land of which is well suited for cultivation, is utilized. When N exceeds N_2, then also all other land which can be cultivated, is utilized.

It is not necessary to discuss here how large employment in this society will be. What is important, is that there certainly will be unemployment if the labour force exceeds N_2. We shall also note that this unemployment is "long-run" in the following sense: It will not disappear even if both (i) prices and wages are given sufficient time to adjust, and (ii) the members of the society have sufficient time and resources to make all investments they find it reasonable to make.

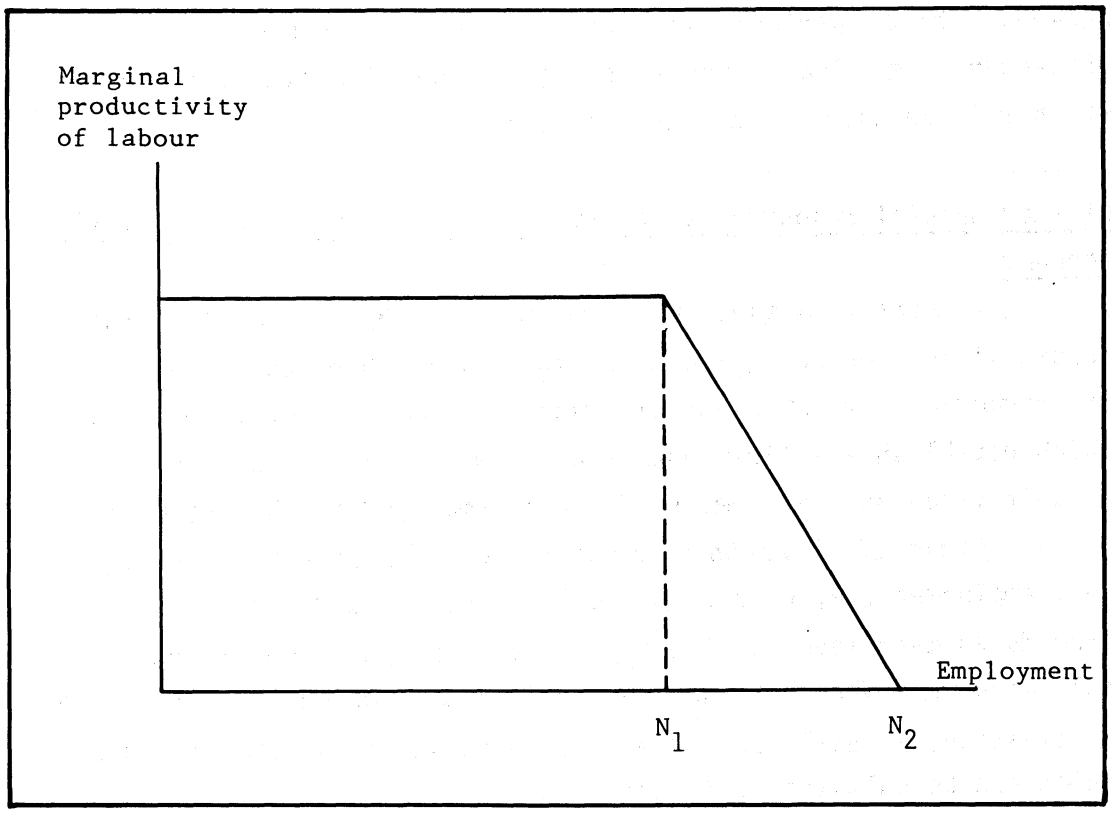

Figure 10. Production possibilities in a primitive agricultural society

What is illustrated by figure 10 can be expressed by saying that in a primitive economy the combination of (i) the available amount of natural resources and (ii) the available production technique, sets a limit for the employment.

Figure 10 can be regarded as a strongly simplified description of (a) the present situation in many of the developing countries, and (b) a situation which some generations ago existed in many of those countries which today are industrialized.

The present long run production possibilities in the OECD-countries

1. Let us look at an example: When we talk about labour needed to produce cheese, then we can mean not only (i) that amount of labour which is used in cheese-producing dairies, but also (ii) labour done by farmers who have produced the milk used for producing the cheese, and (iii) labour used in producing the production factors which those farmers have used.

2. Can the production in the OECD-countries be increased without getting a reduction in the marginal productivity of labour? Let us discuss this question, but let us first make it more precise through the following statements:

(i) That version of the concept "the marginal productivity of labour" which we shall be concerned with, is derived from that broad version of the concept "labour used in the production" which is sketched above.

(ii) We shall be interested in what will have happened after there has been sufficient time for making all desired adjustments.

3. Natural resources of course set limits for the agricultural production in the OECD society. But these limits are by far not reached. It is possible to increase that production considerably without any reduction in the marginal productivity of labour. It is even possible to increase production and at the same time reduce input of labour, but we need not go into that here.

Products from manufacturing industries are, directly or indirectly, based on natural resources. This can imply that we get effects of the type which is described in the preceding section, i.e. effects which imply that the long run marginal productivity of labour will become smaller if production is increased. However, my impression is that the number of such cases are few. In most industries we have the following situation: If a new factory is built, then the productivity of labour in that factory will be higher than the productity of labour

which is typical for the existing factories in the industry.[1]

For most of the industries which produce services, the size of the existing amounts of various types of natural resources means little, if anything at all, for the efficiency of the production. In these industries the production usually can be increased without getting any reduction in marginal productivity of labour.

What is pointed out above, can be summed up in this way: The exisisting amounts of natural resources set limits for how high the production in the OECD-countries can become before the long run marginal productivity of labour will start to decrease. But, broadly speaking, these limits are not reached today. The long run production curves in the OECD society are such that production can be increased considerably without reduction in marginal productivity of labour.

4. It should be noticed that the above discussion deals with the long run production functions. If we turn to what we may call "short run production functions" we will find that the marginal productivities of labour decrease when production exceeds a certain level. Here are two reasons for that: (i) The amount of production equipment is given in the short run. (ii) A high production may in the short run be possible only if one uses not only the most efficient parts of the existing production equipment, but also old-fashioned and inefficient equipment which will not be used when production is low.

This property of the short run production functions makes it possible to get classical unemployment also in industries where the long run marginal productivity of labour does not fall when production increases.

Increased segmentation of the labour market

In the OECD society many members of the labour force are educated and/or trained for doing special jobs, and people with different job qualifications usually do not compete with each other for jobs. We may therefore say that the labour market is segmented.

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[1] One may ask: Why are not more new factories built immediately if new factories will be that efficient? Here are two possible causes: (a) When deciding whether or not to produce in an existing factory, there are some sunken costs in the production, and these costs will not be considered. When deciding whether or not to build a new factory, there are no sunken costs, and all costs will therefore be considered. - (b) The income derived from building a new factory will come only after some time. This implies that there is a certain risk involved in raising new industry.

The segmentation of the labour market was less developed some decades ago, for instance in the 1930s, than it is today. Of course the segmentation to some degree existed also at that time. Also then there were many jobs which called for special types of education and/-or training. But jobs where either (i) no particular skills were needed, or (ii) the skills needed for doing the job acceptably could be learned in comparatively short time, represented a larger proportion of the total number of jobs than they do today. A considerable subgroup of the jobs consisted of doing unskilled manual work in agriculture, transport and manufacturing industries. This subgroup of jobs was to a large extent homogeneous from a labour market point of view, in the following sense: With an acceptable degree of simplification we may say that anyone of the jobs in that subgroup could be taken by any person who was fit and willing to do manual work.

In an economy where any member of the labour force can fill any existing job, there will be no mismatch in the labour market. The increased segmentation of the labour market during the last decades have increased the possibilities of getting unemployment which depends on the existence of such a mismatch.

A change in price-fixing behaviour?

Let N^D denote the aggregate demand for labour, and let N^S denote the aggregate supply of labour. In the 1960s many economists assumed that the development of the price level could be explained either by the equation

$$\dot{P} = f(N^D - N^S) \qquad f(0)>0,\ f'>0, \tag{6}$$

or by an equation expressing roughly the same theory as equation (6).

On the basis of that theory it was assumed that a government could "choose from a menue". If the government wanted low unemployment, it could achieve that goal, but then it had to accept a comparatively high rate of inflation. The higher rate of inflation the government was willing to accept, the lower unemployment could become.

Let us assume that in a society where equation (6) has been valid, price behaviour is changed in such a way that equation (5) of Model G becomes valid. This implies that it is no longer the first, but the second, derivative of the price level with respect to time, which is determined by the conditions in the labour market.

Such a change will be important for the possibilities of avoiding unemployment. It is one thing to accept a high but constant rate of inflation as a "price" to be paid for conducting a demand policy which makes unemployment low. It is another and much less acceptable thing to accept accelerating inflation as the consequence of such a policy. Therefore, the change from (6) to (5) reduces the acceptable possibilities for avoiding high unemployment.

In economic theory there seems to have been a move away from equation (6). At least for some economists this move has been a move towards an inflation theory which in some ways is the same as the one used in this paper.[1]

Is this change in economic theory a reflection of a change in the economic structure? Has there in the OECD society been a change which, somewhat simplified, can be described by saying that equation (5) has replaced equation (6)? If the answers to these questions are yes[2], then that change is probably an important part of the answer to the question: Why has unemployment in the OECD society been much higher in the 1980s than it was in the 1950s and the 1960s.

Three periods in the history of unemployment in the OECD-countries

What have been and what are important causes of unemployment in those countries which today are members of OECD? Here is my conjecture about what is an acceptable simplified answer to that question:

For most of the countries we can distinguish between three different historical periods.

The first period. In the first period limits to employment set by a combination of the existing production techniques and the existing amounts of natural resources, played major role in creating

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1) Samuelson & Norhaus' description of inertial inflation corresponds to the description in this paper of what happens when the economy is in a state called S_0. (Cf. p. 120 in this paper and p. 242-243 in Samuelson & Nordhaus.) But according to Samuelson & Nordhaus $\dot{P}$ changes as a result of "shocks", while in this paper we assume that $\dot{P}$ changes when differences between demand and supply are different from what they are in S_0.

2 At least for USA there exist data which support the hypothesis that such a change has taken place. Cf. figures 13.6 and 13.7 in Samuelson & Nordhaus, (1).

unemployment. One got long run unemployment if the population became too large compared to how many people were needed to utilize the existing resources by means of the existing techniques.

In this period there was comparatively little segregation in the labour market. A large part of the labour was manual labour which most people could do, or at any rate which could be learned on the job.

What is pointed out above, implies that in the first period unemployment was mainly of the type described on p. 133-134.

The second period. It is not obvious where we shall draw the boundary between the first period and the second period; nor is it obvious where we shall draw the boundary between the second period and a third period which will be described below. But at any rate the 1920s and the 1930s belong to the second period.

Also in the 1920s and the 1930s much of the demand for labour was demand for unqualified labour or demand for types of labour where the most necessary qualifications could be learned on the job during a comparatively short time. But development of new techniques had relaxed the earlier rather strict connections between natural resources and employment possibilities. The importance of "lack of natural resources" as a cause for unemployment was therefore reduced. On the other hand, changes in the economic system had increased the importance of "too small aggregate demand" as a cause for unemployment.

In the second period a large part of the unemployment was of the type which is called "Keynesian". The theory about that type of unemployment gives a good guidance regarding what could have been done to reduce considerably unemployment which existed in the second period.

The third period. We are now in the third period. From an unemployment point of view the most important differences between this period and the second are the following ones:

(i) There has been a change in price fixing behaviour. For the second period it is an acceptable simplification to assume that the differences between demand and supply determined the first derivative of the price level with respect to time. For the third period it is an acceptable simplification to assume that those differences determine the second derivative of the price level with respect to time.

(ii) The labour market is more segmented in the third period than it was in the second period.

(iii) The production techniques change more rapidly in the third period than they did in the second period.

(iv) The reduction of the importance of "lack of natural resources" as a cause for unemployment has continued. In the third period lack of natural resources therefore causes less unemployment than it did in the second period.

What is mentioned in (ii) and (iii) implies that the mismatches in the labour market are larger in the third period than they were in the second period.

In the third period, i.e. the present period, the largest component of unemployment is a type of unemployment which can be described by a version of Model G which contains those modifications which are sketched on p. 124-125.[1] That is a type which is caused by a combination of (i) mismatch in the labour market, (ii) a certain price fixing behaviour, and (iii) a demand policy which prevents accelerating inflation.

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1) This does not mean that it is the only type. In most industries the short run marginal productivities of labour are decreasing functions of the amount of labour used in production, og that can contribute to classical unemployment. (Cf. p. 27.) But, as indicated above and in contrast to what is the case in primitive agricultural societies, very little of this classical unemployment can be regarded as caused by lack of natural resources.

Appendix 2

MORE ABOUT EQUATION (5) IN MODEL G

Covariation between excess demand for products and excess demand for labour

When we discuss the society described by Model G, then we shall assume that the i-producers in this society, where i = A, B, behave in the same way as the producers of Model A behave. (Model A is a model which is presented and discussed in the preceding paper.) This behaviour creates a Keynesian and a neoclassical limit for the employment in the i-sector. The number of people qualified for doing i-work creates a supply limit for this type of labour. We shall assume that the supply limit is lower than the neoclassical limit in all situations we shall consider in this appendix. (NB. Those elements of the economy which creates a neoclassical limit for the employment for i-labour, do no appear in Model G.)

We shall use the name "the i-sector" for that part of the economy which consists of the market for i-products and the market for i-labour.

Let us consider a case where the demand for i-products is very small. In such a case the Keynesian limit for the employment of i-labour is smaller than the two other limits for the employment of that type of labour. To a given value on demand for i-products it therefore corresponds a certain Keynesian stationary state for the i-sector. In this type of state there is excess supply both in the market for i-products and in the market for i-labour. (Cf. what type of stationary state we get for Model A in a case where X^{PD} is small. See p. 87.)

If, starting from this state, we increase demand for i-products gradually, then we reduce gradually both excess demand for i-products and excess demand for i-labour. (Cf. what happens to the stationary state of Model A if we start with a low value on X^{PD} and gradually increase X^{PD}. See p. 88.)

For a certain value on demand for i-products there will be balance both in the market for i-labour and in the market for i-products. If there is a further increase in demand for i-products, then we will get excess demand in both markets. The larger the demand for i-products becomes, the larger these excess demands will be.

It follows from what is pointed out above that when demand for i-products varies in the way described above, then there will be a covariation between excess demand for i-products and excess demand for i-labour.

What is pointed out here can be the basis for using the following approach: In an equation describing the development of the price level we let excess demands for products be "represented" by excess demands for labour.

The connection between the modern theory of the Phillips curve, the reduction theory and equation (5)

With "the modern theory of the Phillips curve" I shall here mean a theory which says: (i) The Phillips curve of the short run is downward sloping. - (ii) If we increase the time period which is the basis for constructing the Phillips curve, then the Phillips curve becomes steeper. - (iii) The Phillips curve of the long run is vertical. (Cf. for instance Samuelson and Nordhaus p. 247-255.)

With "the reduction theory" I shall mean a theory which says that accelerating inflation will reduce real demand for products. It is not obvious that this theory is correct. But it can conceivably be correct, for instance because of a kind of real balance effect.

On the basis of equation (5) and the reduction theory we can draw conclusions which in important respects are the same as those we find in the modern theory of the Phillips curve. I shall illustrate that with an example.

Let U denote unemployment. Figure 11 shows how, according to the modern theory of the Phillips curve, an increase in public demand affects U and $\dot{P}$. The figure contains the Phillips curves which describe consequences of changes in aggregate demand (a) six months after a change, (b) twelve months after a change, and (c) in the long run.

Using equation (5) and the reduction theory we can explain points A, B, C and D in figure 11 in the following way:

Let S_0 denote an initial situation where P is zero. The values taken by U and $\dot{P}$ in this situation is represented by point A in figure 11.

At a certain point of time the government increase its demand for products. Therefore aggregate real demand for products increases,

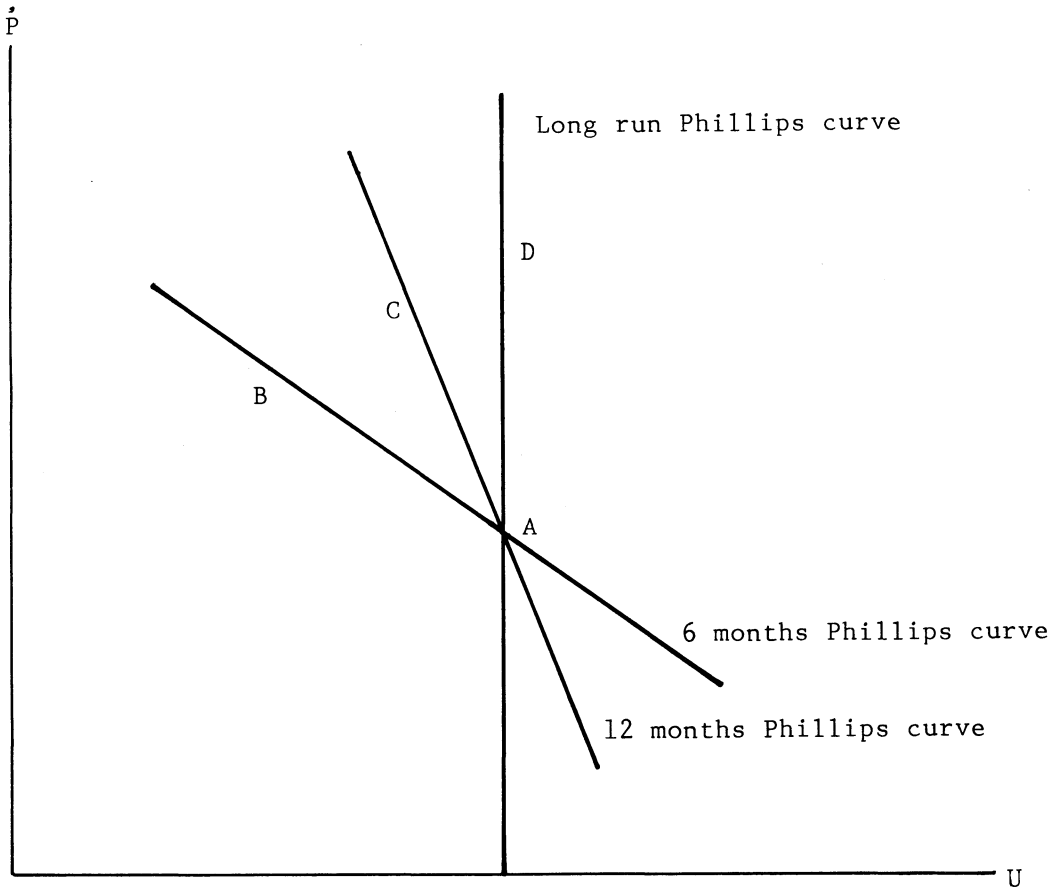

Figure 11. Phillip curves

and that results in less unemployment.

Less unemployment means higher $\ddot{P}$. (Cf. equation (5).) Since $\ddot{P}$ was zero in the initial situation, this means that we get accelerating inflation.

Accelerating inflation reduces real demand for products. (This is the reduction theory.) But because of the initial increase in it, for some time this demand remains larger than it was in S_0. We shall here assume that the period where the real demand for products remains larger than it was in S_0 , is more than twelve months.

Point B describes the situation six months after the increase in public demand. This situation is as follows: U is less than it was in S_0. $\dot{P}$ is larger than in S_0, because in the six months which has passed since public demand increased, $\ddot{P}$ has been positive.

Point C describes the situation twelve months after the increase in public demand. Also in the last six months $\ddot{P}$ has been positive. This has the following effects: (i) U is larger than it was six months ago. (Cf. (i) the reduction theory, and (ii) the connection between aggregate demand for products and U.) But U is less than it was in S_0. (Cf. the assumption that for more than twelve months real demand will be larger than it was in S_0.) - (ii) $\dot{P}$ is also larger than it was six months ago.

In the long run the reduction effect will have reduced the real demand for products so much that it is the same as it was in S_0. When that has happened, then we have arrived at a situation where U is the same as in S_0, while $\dot{P}$ is stabilized at a level which is higher that the one $\dot{P}$ had in S_0. - What is said here about the long run, is illustrated by D in figure 11.

Appendix 3

NOTES ON THE CONCEPT "AGGREGATE DEMAND FOR PRODUCTS"

Introduction

We shall also in this appendix assume that we deal with a society where there are two groups of products, A-products and B-products. We shall further assume that the relative price, p_B, remains constant and equal to 1 in the set of situations considered in this appendix. This assumption implies that it can be sensible to add amounts of A-products and amounts of B-products.

Basic demand and conditional demand

With "the basic demand for a group of products" we shall here mean "the demand we get for that group of products if supply is at least as large as demand for the other group of products".

Let us consider the following case: Basic demand for A-products is 100, and basic demand for B-products is also 100. Supply of A-products is 50, and supply of B-products is 150. We shall assume that in this case trade with A-products is 50, i.e. only half of the basic demand for these products is satisfied. - The term "the conditional demand for B-products" will in what follows be used to denote the demand for B-products we get in this case.

Here are three theories about the size of the conditional demand for B-products:

Theory no. 1: People react to the insufficient supply of A-products by increasing their demand for B-products with an amount which is equal to their unsatisfied demand for A-products. This means that conditional demand for B-products is 150.

Theory no. 2: Demand for B-products will increase with an amount which is somewhat smaller than the unsatisfied demand for A-products. In other words, conditional demand for B-products is between 100 and 150, for instance 130.

Theory no. 3: Conditional demand for B-products is equal to basic demand for B-products, i.e. equal to 100.

I believe that usually theory no. 2 is most realistic. But using this theory can raise certain aggregation problems. (More about that in the next section.) In order to "assume away" those problems I have assumed, when constructing Model G, that this model describes a society where theory no. 3 is correct.

My conjecture is that replacing theory no. 3 with theory no. 2 will make the analysis of mismatches in the labour marked more

complicated, but will not in any essential way change the main conclusions I draw in this paper.

How shall we define "aggregate demand for products"?

Let us first assume that demand for each group of products is independent of whether or not there is sufficient supply of the other group of products. (Cf. theory no. 3.) In this case it seems reasonable to decide that by definition "the aggregate demand for products" shall be "the sum of basic demand for A-products and basic demand for B-products".

Let us next assume that conditional demand for B-products depends on the balance between demand for A-products and supply of A-products. (Cf. theories no. 1 and 2.) We shall look at the case, mentioned above, where basic demand for A-products is 100, supply of A-products is 50, basic demand for B-products is 100, conditional demand for B-products is 130, and supply of B-products is 150.

In spite of the fact that low supply in the market for A-products have resulted in high demand for B-products, the demand for A-products is nevertheless 100. And there is no doubt about the fact that realized demand for B-products, a quantity which in this connection is called "conditional demand for B-products", is 125. Should we from this decide that what we shall call "aggregate demand for products" by definition shall be equal to the sum of basic demand for A-products and conditional demand for B-products, i.e equal to (100 + 130)?

Or should we reason in this way: It seems unlikely that it will be possible to sell an amount of products which is larger than the sum of the basic demands. It is therefore unreasonable to define "aggregate demand for products" in such a way that it can become larger than that sum, i.e larger than 100 + 100. Probably the most sensible we can do is to say that, also in the case we are discussing now, "aggregate demand for products" by definition shall be the sum of the basic demands.

A third alternative is to accept this view: In the case we are discussing now, we should not use the concept "aggregate demand for products". That concept should be used only in the following two types of cases: (i) Cases where there is sufficient supply of both groups of products. - (ii) Cases where the possibilities of substituting one group of products with the other are so large that we can, as an acceptable simplification, regard both groups of products as one product.

A comment on an assumption which often is used in macroeconomic analyses

In macroeconomic analyses it is often assumed that aggregate trade with products is equal to the smallest of (a) aggregate demand for products, and (b) aggregate supply of products. In what follows will be shown that this assumption can raise certain problems.

Let us return to the case discussed in the last part of the preceding section.

It seems reasonable to define "aggregate supply of products" as the sum of supply of A-products and supply of B-products, i.e. in this case (50 + 150).

It also seems reasonable to define "aggregate trade with products" as the sum of trade with A-products and trade with B-products. From what is assumed, we can conlude that in the case we are discussing now, this sum is (50 + 130).

Let us first suppose that we define "aggregate demand for products" as the sum of the basic demands. In the case we are discussing now, aggregate demand for products will then be (100 + 100). This means that we deal with a case where aggregate demand for products is (100 + 100), aggregate supply of products is (50 + 150), and aggregate trade with products is (50 + 130), i.e. with a case where aggregate trade is smaller than both aggregate demand and aggregate supply.

Let us next assume that aggregate demand for products is defined as the sum of basic demand for A-products and conditional demand for B-products, i.e. in this case (100 + 130). It is easy to see that, also if we do this, trade with products is smaller than both the quantity we call "aggregate demand for products" and the quantity we call "aggregate supply of products".

Conclusion

In my opinion we should not conclude from what is pointed out above, that the concept "aggregate demand for products" should be banned from economic analyses. In models based on certain simplifying assumptions, that concept is useful. But when the concept is used in an anlysis, then it is of course recommendable that we should be aware of what simplifying assumptions are necessary to make that analysis satisfactory from a logical point of view.

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