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RECORDING OF

The General Theory of Employment, Interest, and Money

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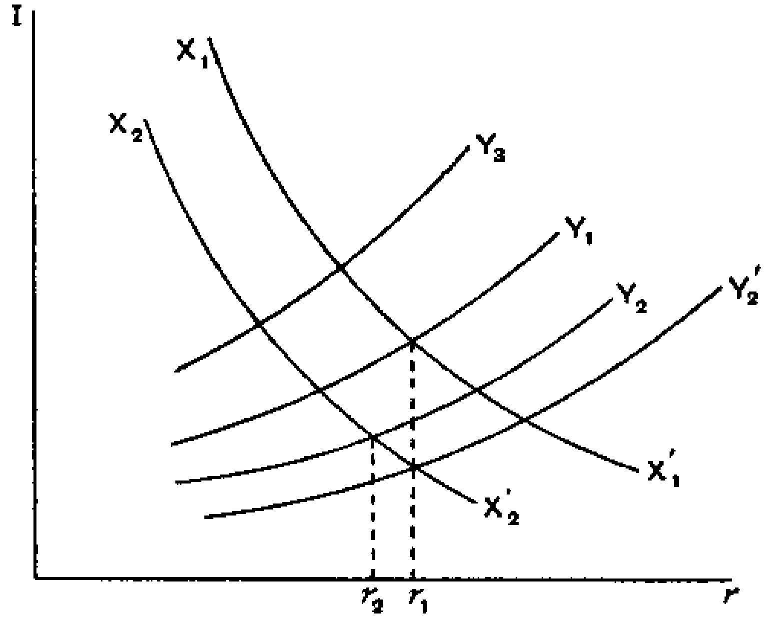
PDF 1

EXTRACT FROM CHAPTER 14



In this diagram the amount of investment (or saving) I is measured vertically, and the rate of interest r horizontally. X_1X_1' is the first position of the investment demand-schedule, and X_2X_2' is a second position of this curve. The curve Y_1 relates the amounts saved out of an income Y_1 to various levels of the rate of interest, the curves Y_2, Y_3, etc., being the corresponding curves for levels of income Y_2, Y_3, etc. Let us suppose that the curve Y_1 is the Y-curve consistent with an investment demand-schedule X_1X_1' and a rate of interest r_1. Now if the investment demand-schedule shifts from X_1X_1' to X_2X_2', income will, in general, shift also. But the above diagram does not contain enough data to tell us what its new value will be; and, therefore, not knowing which is the appropriate Y-curve, we do not know at what point the new investment demand-schedule will cut it. If, however, we introduce the state of liquidity-preference and the quantity of money and these between them tell us that the rate of interest is r_2, then the whole position becomes determinate. For the Y-curve which intersects X_2X_2' at the point vertically above r_2, namely, the curve Y_2, will be the appropriate curve. Thus the X-curve and the Y-curves tell us nothing about the rate of interest. They only tell us what income will be, if from some other source we can say what the rate of interest is. If nothing has happened to the state of liquidity-preference and the quantity of money, so that the rate of interest is unchanged, then the curve Y_2' which intersects the new investment demand-schedule vertically below the point where the curve Y_1 intersected the old investment demand-schedule will be the appropriate Y-curve, and Y_2' will be the new level of income.

Thus the functions used by the classical theory, namely, the response of investment and the response of the amount saved out of a given income to change in the rate of interest, do not furnish material for a theory of the rate of interest; but they could be used to tell us what the level of income will be, given (from some other source) the rate of interest; and, alternatively, what the rate of interest will have to be, if the level of income is to be maintained at a given figure (e.g. the level corresponding to full employment).

The mistake originates from regarding interest as the reward for waiting as such, instead of as the reward for not-hoarding; just as the rates of return on loans or investments involving different degrees of risk, are quite properly regarded as the reward, not of waiting as such, but of running the risk. There is, in truth, no sharp line between these and the so-called 'pure' rate of interest, all of them being the reward for running the risk of uncertainty of one kind or another. Only in the event of money being used solely for transactions and never as a store of value, would a different theory become appropriate[6].

There are, however, two familiar points which might, perhaps, have warned the classical school that something was wrong. In the first place, it has been agreed, at any rate since the publication of Professor Cassel's *Nature and Necessity of Interest*, that it is not certain that the sum saved out of a given income necessarily increases when the rate of interest is increased; whereas no one doubts that the investment demand-schedule falls with a rising rate of interest. But if the *Y*-curves and the *X*-curves both fall as the rate of interest rises, there is no guarantee that a given *Y*-curve will intersect a given *X*-curve anywhere at all. This suggests that it cannot be the *Y*-curve and the *X*-curve alone which determine the rate of interest.

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EXTRACT FROM CHAPTER 19

APPENDIX TO CHAPTER 19: PROFESSOR PIGOU'S 'THEORY OF UNEMPLOYMENT'

Professor Pigou in his *Theory of Unemployment* makes the volume of employment to depend on two fundamental factors, namely (i) the real rates of wages for which workpeople stipulate, and (2) the shape of the Real Demand Function for Labour. The central sections of his book are concerned with determining the shape of the latter function. The fact that workpeople in fact stipulate, not for a real rate of wages, but for a money-rate, is not ignored; but, in effect, it is assumed that the actual money-rate of wages divided by the price of wage-goods can be taken to measure the real rate demanded.

The equations which, as he says, 'form the starting point of the enquiry' into the Real Demand Function for Labour are given in his *Theory of Unemployment*, p. 90. Since the tacit assumptions, which govern the application of his analysis, slip in near the outset of his argument, I will summarise his treatment up to the crucial point.

Professor Pigou divides industries into those 'engaged in making wage-goods at home and in making exports the sale of which creates claims to wage-goods abroad' and the 'other' industries: which it is convenient to call the wage-goods industries and the non-wage-goods industries respectively. He supposes x men to be employed in the former and y men in the latter. The output in value of wage-goods of the x men he calls $F(x)$; and the general rate of wages $F'(x)$. This, though he does not stop to mention it, is tantamount to assuming that marginal wage-cost is equal to marginal prime cost[1]. Further, he assumes that $x + y = \varphi(x)$, i.e. that the number of men employed in the wage-goods industries is a function of total employment. He then shows that the elasticity of the real demand for labour in the aggregate (which gives us the shape of our quaesitum, namely the Real Demand Function for Labour) can be written

$$E_r = \frac{\varphi'(x)}{\varphi(x)} \times \frac{F'(x)}{F''(x)}$$

So far as notation goes, there is no significant difference between this and my own modes of expression. In so far as we can identify Professor Pigou's wage-goods with my consumption-goods, and his 'other goods' with my investment-goods, it follows that his $F(x) / F'(x)$, being the value of the output of the wage-goods industries in terms of the wage-unit, is the same as my C_w. Furthermore, his function is (subject to the identification of wage-goods with consumption-goods) a function of what I have called above the employment multiplier k'. For

$$\Delta x = k'\Delta y,$$

so that

$$\varphi'(x) = 1 + \frac{1}{k}$$

Thus Professor Pigou's 'elasticity of the real demand for labour in the aggregate' is a concoction similar to some of my own, depending partly on the physical and technical conditions in industry (as given by his function F) and partly on the propensity to consume wage-goods (as given by his function φ); provided always that we are limiting ourselves to the special case where marginal labour-cost is equal to marginal prime cost.

To determine the quantity of employment, Professor Pigou then combines with his 'real demand for labour', a supply function for labour. He assumes that this is a function of the real wage and of nothing else. But, as he has also assumed that the real wage is a function of the number of men x who are employed in the wage-goods industries, this amounts to assuming that the total supply of labour at the existing real wage is a function of x and of nothing else. That is to say, $n = \chi(x)$, where n is the supply of labour available at a real wage $F'(x)$.

Thus, cleared of all complication, Professor Pigou's analysis amounts to an attempt to discover the volume of actual employment from the equations

$$x + y = \varphi(x)$$

$$\text{and} \quad n = \chi(x).$$

But there are here three unknowns and only two equations. It seems clear that he gets round this difficulty by taking $n = x + y$. This amounts, of course, to assuming that there is no involuntary unemployment in the strict sense, i.e. that all labour available at the existing real wage is in fact employed. In this case x has the value which satisfies the equation

$$\varphi(x) = \chi(x)$$

and when we have thus found that the value of x is equal to (say) n_1, y must be equal to $\chi(n_1) - n_1$, and total employment n is equal to (n_1).

It is worth pausing for a moment to consider what this involves. It means that, if the supply function of labour changes, more labour being available at a given real wage (so that $n_1 + dn_1$ is now the value of x which satisfies the equation $\varphi(x) = \chi(x)$), the demand for the output of the non-wage-goods industries is such that employment in these industries is bound to increase by just the amount which will preserve equality between $\varphi(n_1 + dn_1)$ and $\chi(n_1 + dn_1)$. The only other way in which it is possible for aggregate employment to change is through a modification of the propensity to purchase wage-goods and non-wage-goods respectively such that there is an increase of y accompanied by a greater decrease of x.

The assumption that $n = x + y$ means, of course, that labour is always in a position to determine its own real wage. Thus, the assumption that labour is in a position to determine its own real wage, means that the demand for the output of the non-wage-goods industries obeys the above laws. In other words, it is assumed that the rate of interest always adjusts itself to the schedule of the marginal efficiency of capital in such a way as to preserve full employment. Without this assumption Professor Pigou's analysis breaks down and provides no means of determining what the volume of employment will be. It is, indeed, strange that Professor Pigou should have supposed that he could furnish a theory of unemployment which involves no reference at all to changes in the rate of investment (i.e. to changes in employment in the non-wage-goods industries) due, not to a change in the supply function of labour, but to changes in (e.g.) either the rate of interest or the state of confidence.

His title the 'Theory of Unemployment' is, therefore, something of a misnomer. His book is not really concerned with this subject. It is a discussion of how much employment there will be, given the supply function of labour, when the conditions for full employment are satisfied. The purpose of the concept of the elasticity of the real demand for labour in the aggregate is to show by how much *full* employment will rise or fall corresponding to a given shift in the supply function of labour. Or—alternatively and perhaps better—we may regard his book as a non-causative investigation into the functional relationship which determines what level of real wages will correspond to any given level of employment. But it is not capable of telling us what determines the *actual* level of employment; and on the problem of involuntary unemployment it has no direct bearing.

If Professor Pigou were to deny the possibility of involuntary unemployment in the sense in which I have defined it above, as, perhaps, he would, it is still difficult to see how his analysis could be applied. For his omission to discuss what determines the connection between x and y, i.e. between employment in the wage-goods and non-wage-goods industries respectively, still remains fatal.

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EXTRACT FROM CHAPTER 20

Chapter 20

THE EMPLOYMENT FUNCTION[1]

I

In Chapter 3 we have defined the aggregate supply function $Z = \varphi(N)$, which relates the employment N with the aggregate supply price of the corresponding output. The *employment function* only differs from the aggregate supply function in that it is, in effect, its inverse function and is defined in terms of the wage-unit; the object of the employment function being to relate the amount of the effective demand, measured in terms of the wage-unit, directed to a given firm or industry or to industry as a whole with the amount of employment, the supply price of the output of which will compare to that amount of effective demand. Thus if an amount of effective demand D_{wr}, measured in wage-units, directed to a firm or industry calls forth an amount of employment N_r in that firm or industry, the employment function is given by $N_r = F_r(D_{wr})$. Or, more generally, if we are entitled to assume that D_{wr} is a unique function of the total effective demand D_w, the employment function is given by $N_r = F_r(D_w)$ That is to say, N_r men will be employed in industry r when effective demand is D_w.

We shall develop in this chapter certain properties of the employment function. But apart from any interest which these may have, there are two reasons why the substitution of the employment function for the ordinary supply curve is consonant with the methods and objects of this book. In the first place, it expresses the relevant facts in terms of the units to which we have decided to restrict ourselves, without introducing any of the units which have a dubious quantitative character. In the second place, it lends itself to the problems of industry and output *as a whole*, as distinct from the problems of a single industry or firm in a given environment, more easily than does the ordinary supply curve—for the following reasons.

The ordinary demand curve for a particular commodity is drawn on some assumption as to the incomes of members of the public, and has to be re-drawn if the incomes change. In the same way the ordinary supply curve for a particular commodity is drawn on some assumption as to the output of industry as a whole and is liable to change if the aggregate output of industry is changed. When, therefore, we are examining the response of individual industries to changes in *aggregate* employment, we are necessarily concerned, not with a single demand curve for each industry, in conjunction with a single supply curve, but with two families of such curves corresponding to different assumptions as to the aggregate employment. In the case of the employment function, however, the task of arriving at a function for industry as a whole which will reflect changes in employment as a whole is more practicable.

For let us assume (to begin with) that the propensity to consume is given as well as the other factors which we have taken as given in above, and that we are considering changes in employment in response to changes in the rate of investment. Subject to this assumption, for every level of effective demand in terms of wage-units there will be a corresponding aggregate employment and this effective demand will be divided in determinate proportions between consumption and investment. Moreover, each level of effective demand will correspond to a given distribution of income. It is reasonable, therefore, further to assume that corresponding to a given level of aggregate effective demand there is a unique distribution of it between different industries.

This enables us to determine what amount of employment in each industry will correspond to a given level of aggregate employment. That is to say, it gives us the amount of employment in each particular industry corresponding to each level of aggregate effective demand measured in terms of wage-units, so that the conditions are satisfied for the second form of the employment function for the industry, defined above, namely $N_r = F_r(D_w)$ Thus we have the advantage that, in these conditions, the individual employment functions are additive in the sense that the employment function for industry as a whole, corresponding to a given level of effective demand, is equal to the sum of the employment functions for each separate industry; i.e.

$$F_r(D_w) = N = \Sigma N_r = \Sigma F_r(D_w).$$

Next, let us define the elasticity of employment. The elasticity of employment for a given industry is

$$e_{er} = \frac{dN_r}{dD_{wr}} \times \frac{D_{wr}}{N_r},$$

since it measures the response of the number of labour-units employed in the industry to changes in the number of wage-units which are expected to be spent on purchasing its output. The elasticity of employment for industry as a whole we shall write

$$e_e = \frac{dN}{dD_w} \times \frac{D_w}{N_r},$$

Provided that we can find some sufficiently satisfactory method of measuring output, it is also useful to define what may be called the elasticity of output or production, which measures the rate at which output in any industry increases when more effective demand in terms of wage-units is directed towards it, namely

$$e_{or} = \frac{dO_r}{dD_{wr}} \times \frac{D_{wr}}{O_r},$$

Provided we can assume that the price is equal to the marginal prime cost, we then have

$$\Delta D_{wr} = \frac{1}{1 - e_{or}} \text{D} P_r$$

where P_r is the expected profit[2]. It follows from this that if $e_{or} = 0$, i.e. if the output of the industry is perfectly inelastic, the whole of the increased effective demand (in terms of wage-units) is expected to accrue to the entrepreneur as profit, i.e. $\Delta D_{wr} = \Delta P_r$; whilst if $e_{or} = 1$, i.e. if the elasticity of output is unity, no part of the increased effective demand is expected to accrue as profit, the whole of it being absorbed by the elements entering into marginal prime cost.

Moreover, if the output of an industry is a function $\varphi(N_r)$ of the labour employed in it, we have[3]

$$\frac{1 - e_{or}}{e_{er}} = -\frac{N_r \varphi''(N_r)}{p_{wr}\{\varphi'(N_r)\}^2},$$

where p_{wr} is the expected price of a unit of output in terms of the wage-unit. Thus the condition $e_{or} = 1$ means that $\varphi''(N_r) = 0$, i.e. that there are constant returns in response to increased employment.

Now, in so far as the classical theory assumes that real wages are always equal to the marginal disutility of labour and that the latter increases when employment increases, so that the labour supply will fall off; *cet. par.*, if real wages are reduced, it is assuming that in practice it is impossible to increase expenditure in terms of wage-units. If this were true, the concept of elasticity of employment would have no field of application. Moreover, it would, in this event, be impossible to increase employment by increasing expenditure in terms of money; for money-wages would rise proportionately to the increased money expenditure so that there would be no increase of expenditure in terms of wage-units and consequently no increase in employment. But if the classical assumption does not hold good, it will be possible to increase employment by increasing expenditure in terms of money until real wages have fallen to equality with the marginal disutility of labour, at which point there will, by definition, be full employment.

Ordinarily, of course, e_{or} will have a value intermediate between zero and unity. The extent to which prices (in terms of wage-units) will rise, i.e. the extent to which real wages will fall, when money expenditure is increased, depends, therefore, on the elasticity of output in response to expenditure in terms of wage-units.

Let the elasticity of the expected price p_{wr} in response to changes in effective demand D_{wr}, namely $(dp_{wr}/dD_{wr}) \times (D_{wr}/p_{wr})$, be written e'_{pr}.

Since $O_r \times p_{wr} = D_{wr}$, we have

$$\frac{dO_r}{dD_{wr}} \times \frac{D_{wr}}{O_r} + \frac{dp_{wr}}{dD_{wr}} \times \frac{D_{wr}}{p_{wr}} = 1$$

$$\text{or} \qquad e'_{pr} + e_{or} = 1.$$

That is to say, the sum of the elasticities of price and of output in response to changes in effective demand (measured in terms of wage-units) is equal to unity. Effective demand spends it sell, partly in affecting output and partly in affecting price, according to this law.

If we are dealing with industry as a whole and are prepared to assume that we have a unit in which output as a whole can be measured, the same line of argument applies, so that $e'_p + e_o = 1$, where the elasticities without a suffix r apply to industry as a whole.

Let us now measure values in money instead of wage-units and extend to this case our conclusions in respect of industry as a whole.

If W stands for the money-wages of a unit of labour and p for the expected price of a unit of output as a whole in terms of money, we can write e_p (= $(Ddp) / (pdD)$) for the elasticity of money-prices in response to changes in effective demand measured in terms of money, and e_w (= $(DdW) / (WdD)$) for the elasticity of money-wages in response to changes in effective demand in terms of money. It is then easily shown that

$$e_p = 1 = e_o(1 - e_w)$$[4].

This equation is, as we shall see in the next chapter, first step to a generalised quantity theory of money.

If $e_o = 0$ or if $e_w = 1$, output will be unaltered and prices will rise in the same proportion as effective demand in terms of money. Otherwise they will rise in a smaller proportion.

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CHAPTER 21, SECTION VI

VI

With the aid of the notation introduced in Chapter 20 we can, if we wish, express the substance of the above in symbolic form.

Let us write $MV = D$ where M is the quantity of money, V its income-velocity (this definition differing in the minor respects indicated above from the usual definition) and D the effective demand. If, then, V is constant, prices will change in the same proportion as the quantity of money provided that e_p ($= (Dpd) / (pdD)$) is unity. This condition is satisfied (see Chapter 20 above) if $e_o = 0$ or if $e_w = 1$. The condition $e_w = 1$ means that the wage-unit in terms of money rises in the same proportion as the effective demand, since $e_w = (DdW) / (WdD)$ and the condition $e_o = 0$ means that output no longer shows any response to a further increase in effective demand, since $e_o = (DdO) / (OdD)$. Output in either case will be unaltered. Next, we can deal with the case where income-velocity is not constant, by introducing yet a further elasticity, namely the elasticity of effective demand in response to changes in the quantity of money,

$$e_d = \frac{MdD}{DdM}$$

This gives us

$$\frac{Mdp}{pdM} = e_p \times e_d \text{ where } e_p = 1 - e_e \times e_o(1 - e_w);$$

$$\text{so that } e = e_d - (1 - e_w)e_d \times e_e e_o$$

$$= e_d(1 - e_e\, e_o + e_e\, e_o \times e_w)$$

where e without suffix (= $(Mdp) / (pdM)$) stands for the apex of this pyramid and measures the response of money-prices to changes in the quantity of money.

Since this last expression gives us the proportionate change in prices in response to a change in the quantity of money, it can be regarded as a generalised statement of the quantity theory of money. I do not myself attach much value to manipulations of this kind; and I would repeat the warning, which I have given above, that they involve just as much tacit assumption as to what variables are taken as independent (partial differentials being ignored throughout) as does ordinary discourse, whilst I doubt if they carry us any further than ordinary discourse can. Perhaps the best purpose served by writing them down is to exhibit the extreme complexity of the relationship between prices and the quantity of money, when we attempt to express it in a formal manner. It is, however, worth pointing out that, of the four terms e_d, e_w, e_e and e_o upon which the effect on prices of changes in the quantity of money depends, e_d stands for the liquidity factors which determine the demand for money in each situation, e_w for the labour factors (or, more strictly, the factors entering into prime-cost) which determine the extent to which money-wages are raised as employment increases, and e_e and e_o for the physical factors which determine the rate of decreasing returns as more employment is applied to the existing equipment.

If the public hold a constant proportion of their income in money, $e_d = 1$; if money-wages are fixed, $e_w = 0$; if there are constant returns throughout so that marginal return equals average return, $e_e e_o = 1$; and if there is full employment either of labour or of equipment, $e_e e_o = 0$.

Now $e = 1$, if $e_d = 1$, and $e_w = 1$; or if $e_d = 1$, $e_w = 0$ and $e_e \times e_o = 0$; or if $e_d = 1$ and $e_o = 0$. And obviously there is a variety of other special eases in which $e = 1$. But in general e is not unity; and it is, perhaps, safe to make the generalisation that on plausible assumptions relating to the real world, and excluding the case of a 'flight from the currency' in which e_d and e_w become large, e is, as a rule, less than unity.