A THEORY OF WAGE DETERMINATION
UNDER CONDITIONS OF OLIGOPOLY

by

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ABSTRACT

This thesis is an examination of the factors involved in the determination of the wage rate under conditions of oligopoly in the product market. There will be explicit recognition of the roles of trade unions and management in the determination of the wage rate though this does not imply that the theory is contradictory to Neo-classical analysis. Thus in this sense the theory constitutes a partial synthesis of Institutionalist and Neo-classical thought in the theory of wage determination.

The methodology involved will be theoretical and mathematical. A series of mathematical models are formed from which tendencies are drawn rather than marginal solutions. The last model used will constitute a reformulation and possible revival of Professor Hicks' concept of concession curves. The concession curves will utilize a built-in error-learning model. Overall, the models will provide a possible mathematization of the "Hicks-Cambridge-Sociological" theory of inflation due to their explicit recognition of the firm's ability to mark up prices and the trade union's role in causing cost increases.

DEDICATION

TO PESACH

We can not reason ourselves out of our basic
irrationality. All we can do is to learn
the art of being irrational in a reasonable
way.

Aldous Huxley

ACKNOWLEDGMENTS

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CHAPTER 1

INTRODUCTION

The purpose of this thesis is to create a model of collective
wage and fringe-benefit determination under conditions of oligopoly –
both differentiated and undifferentiated. Further, a synthesis of
neo-classical and institutionalist wage and fringe-benefit adjustment
theory will be attempted. The models are marginalist in method, but
are cast within the Pen-Chamberlain[1] bargaining power models and thus
lean heavily toward institutionalism. The models do not attempt to
incorporate behavioralist or psychologistic bargaining models of the
Walton and McKersie[2] variety, though the author is cognizant of the
possible effects of response by economic agents to faulty perceptions
of "real-world economic phenomena".

The intent of this thesis is to make explicit recognition of the
role of the employer's ability to mark-up prices. To the author's
knowledge there does not exist a micro-economic theory of wage
determination that explicitly recognizes this ability. Such a step
would involve a cost-of-production, neo-Ricardian theory of value and
therefore would not be in keeping with the utilitarian paradigm. The
major difference between this model and other neo-Ricardian models is
that explicit economic constraints on the ability to mark-up are
recognized.

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[1]"A General Theory of Bargaining," American Economic Review,
(March, 1952)

Neil W. Chamberlain, Collective Bargaining (New York: McGraw Hill
Book Co., 1951), ch. 10.

[2]R. E. Walton and B. B. McKersie, A Behavioral Theory of Labor
Negotiations (New York: McGraw Hill Book Co., 1966)

The models presented will deal with a cost minimizing oligopolistic firm which attempts to maintain its market share subject to a lower bound profit constraint or target rate of return. It will also be assumed that the firm prefers more profit to less but this does not imply that it is a profit maximizer or is willing to induce price warfare in order to gain a higher profit. A trade union exists that bargains collectively with each individual oligopolist in the industrial group. The first firm in each wage round is both the price and wage leader, and all other firms in the group follow by tradition. Thus the wage negotiations provide a socially acceptable justification for removing "Sweezy's kink"[3] and increasing prices.

The objective function of the trade union is to extract from the employer a satisfactory wage where size of the wage increase is determined by:

1) Permanent income – Friedmanite variety, a moving average of past wage increases – Yp.

2) Equity return – maintenance of relativities in the Dunlopian[4] wage contour – Ye.

3) Strike return – Ys.

In recognition of the inherent difficulties of both the Dunlopian and Rossian[5] views, this objective function is both political and economic. Thus the satisfactory wage increase ($Ya = Yp + Ye + Ys$) is absolutely essential to the union leadership, for failing to obtain such a wage increase would result in the leadership being ousted from power.

This thesis is theoretical, and there will be no empirical work included. This is not to say that the conclusions are not testable. The conclusions may be important in providing microeconomic foundations

[3] "Demand Under Conditions of Oligopoly," Journal of Political Economy, XLV11 (August, 1939)

[4] John Dunlop, Wage Determination under Trade Unions (New York: Macmillan Press, 1944)

[5] Arthur Ross, Trade Union Wage Policy (Berkeley: University of California Press, 1948)

to the work of Weintraub and Davidson[6] and more recently to the work of Hicks[7] and the so-called "Sociological" school of inflation theory. Overall, the thesis leaves the marginalist, neo-classical solutions as a very special case of a more realistic economic model of wage determination. In the final section of this analysis, a theoretical justification for Hicks' concession and resistance curves will be given.

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[6] S. Weintraub. A General Theory of Price Level, Output, Income Distribution and Economic Growth. Philadelphia: Chilton, 1959.

[7] J. R. Hicks, The Theory of Wages, Second Edition (London: Macmillan Press, 1968)

CHAPTER 11

The objective of this chapter is to examine some of the highlights
of the development of wage theory and briefly touch upon one or two of
the important works in strike theory. It is not the intention of this
chapter to review the majority of developments in wage theory, only
those that may be relevant to the subsequent analysis.[1] The works of
Ricardo will be examined primarily because his concept of the wages
fund is particularly relevant to modern wage determination and elements
of Ricardianism seem to lie at the basis of contemporary arguments that
profits constitute the outer limit to the ability to pay wage increases.
There will be a brief discussion of the neo-classical school followed by
an analysis of Sweezy,[2] and then the institutionalists, Pen-Chamberlain
and Walton and McKersie. Finally, Hicks'[3] theory of concession curves
will be examined, followed by Ashenfehlter and Johnson.

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[1]For a fuller treatment of wage theory, both neo-classical and
institutionalist, the following are suggested:

H. M. Levinson, Determining Forces in Collective Wage Bargaining
(New York: John Wiley and Sons, 1966)

H. G. Lewis, Unionism and Relative Wages in the United States
(Chicago: University of Chicago Press, 1963)

A. Cartter, Theory of Wages and Employment (Homewood, Illinois:
Irwin Press, 1964)

[2]Paul M. Sweezy, "Demand Under Conditions of Oligopoly," Journal of
Political Economy, (August, 1939) XLV11.

[3]J. R. Hicks, The Theory of Wages, Second Edition (London:
MacMillan Press, 1968)

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Let us commence with the work of David Ricardo pertaining to wages. It is here that we may perhaps gain insight into the reasons for contemporary authors' uncertainty as to the role of profits in the determination of the wage rate. Ricardo's concept of the wages fund may aid us in comprehending the ambiguous role of the rate of profit.

Ricardo argues that the total amount which is available to be paid out to those who live on wages is the wages fund, or that proportion of the supply of real capital which consists of consumer goods customarily bought with wages. In essence it is profit after the payment of fixed and material costs before the payment of wages. Thus the average real wage is the wages fund minus profit at the margin of production divided by the number of employees. It was Ricardo's belief that as a result of diminishing returns there would be increasing labour costs of producing food at the margin of cultivation, resulting in higher wages and thus a smaller residual in the wages fund for profit.

In the short-run, Ricardo argued that there seemed little hope for the size of this wages fund to increase because all increases depended on savings by the capitalist classes. In the long-run, however, with capitalist accumulation the size of the wages fund will increase. On the other hand as the wages fund increases, there will be greater tendency over time for population to increase and the wages to fall. Thus we have two countervailing forces operating on the wage rate, according to Ricardo, and the tendency will be for the wage rate to oscillate around the "natural wage". The essence of Ricardo's argument is that "the natural price of labour is that price that will enable the labourers one with another to subsist and perpetuate their race without increase or diminution".[4] In the short-run it is indeed possible for the real wage to rise above subsistance, but this in turn will set in motion demographic pressure to increase family size and population, shrinking the denominator of the wage equation and causing

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[4]David Ricardo, <u>Principles of Political Economy and Taxation</u> (The Works and Correspondence of David Ricardo, Pierro Sraffa and Maurice Dobb, Eds., Cambridge, England: The University Press, Vol. 1, 1951), pg. 23.

a long-run tendency back toward subsistence. It is Ricardo's concept of
the wages fund that is implicit in many contemporary writings when the
wage rate is regressed on profit, i.e., that the rate of profit provides
the upper limit on the ability to pay wage increases.

Leaving Ricardo and the classical school it is now necessary to
turn to the present paradigm in wage theory, the neo-classical
marginalist school. The treatment is particularly brief for there seems
little reason to restate what is written in almost every standard text-
book in micro-economics. Further, it is the author's contention that
the neo-classical approach is of little use in explaining wage
determination in contemporary capitalism. This is primarily because
the assumptions inherent in the neo-classical approach are nowhere
observable, thus rendering the model analytically void.

The first problem arises over the definition of neo-classical.
neo-classical describes that marginalist school of thought in political
economy which utilizes the assumptions of perfect competition and some-
times pure monopoly. It is the theory of perfect competition and
monopoly that will be reviewed. Under conditions of perfect competition,
the wage of homogeneous workers is determined by the marginal physical
product of labour times the average revenue.

Figure 1a

Figure 1b

WAGE

S = AW = MW

D_L = MPP x AR = MVP = MRP

EMPLOYMENT
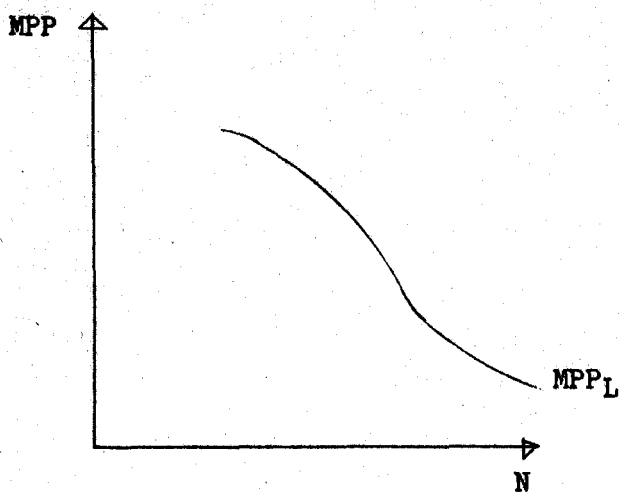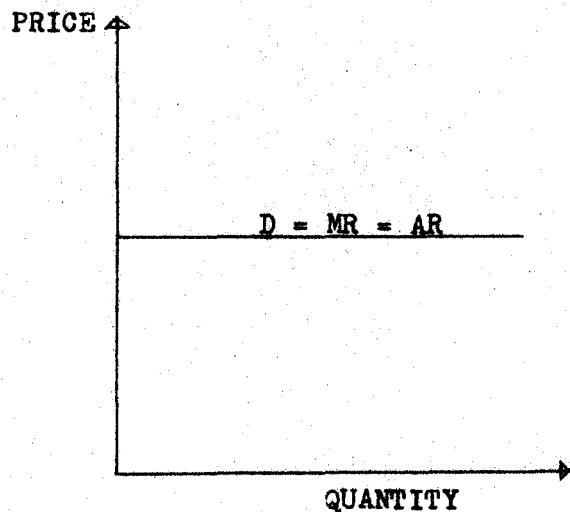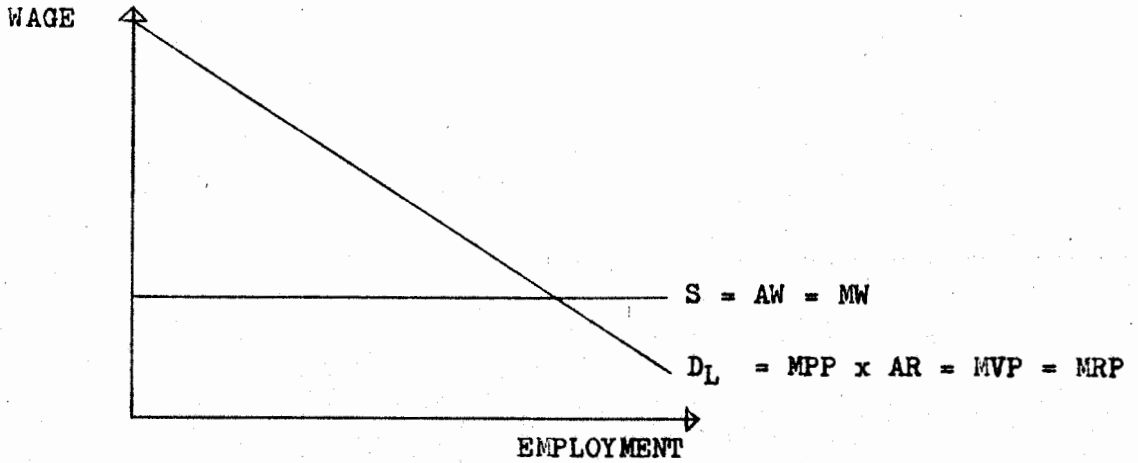
Figure 1c

Apart from the obvious weakness of the assumptions of this theory, there seem to be inherent methodological problems involved in an explanation of wage determination that are unobservable. Rather than continue with a critique of this theory, it may be of heuristic value to examine the exact opposite situation – monopsony, where one employer has total control of the labour market. In this case the AW and MW are not the same.

MONOPSONISTIC EXPLOITATION

WAGE

MW

AW = S

MRP = MVP

EMPLOYMENT
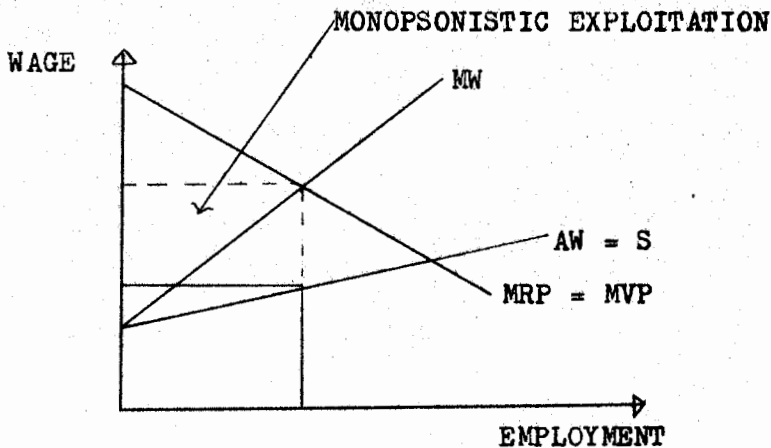
Figure 2

Thus the monopsonist is able, because of his power in the labour market, to set wages below the competitive equilibrium resulting in monopsonistic exploitation.

Let us now turn to the monopoly case which is only a slight analytical variation of the monopsony case. Here the power of the firm lies in the product market rather than in the labour market. In this case the AR curve and the MR curve are not one in the same since the monopolist confronts a downward sloping demand curve.

WAGE

W_m

MVP = MPP x AR

MRP = MR x MPP

N_m N_{pc} EMPLOYMENT
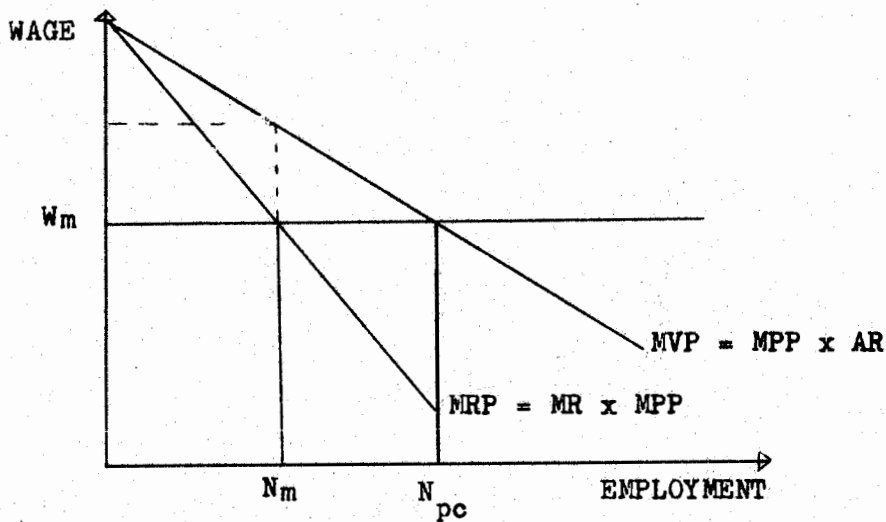
Figure 3

The monopolist, unlike the perfect competitor,[5] will employ labour at N_m restricting employment by the difference between N_{pc} and N_m. In the subsequent chapter it will be argued that the monopolist will generally tend to pay a higher wage rate than the perfect competitor because of the monopolist's greater ability to mark-up prices.

It is now necessary to examine the work of Paul Sweezy, which is utilized in the subsequent analysis. Sweezy's work on the kinked demand function facing an oligopolist is probably one of the most useful

[5] For a fuller explanation of neo-classical factor price determination see Cliff Lloyd, Micro-Economic Analysis (Homewood, Illinois: Irwin Press, 1967), ch. 8.

parts of the neo-classical paradigm. Sweezy's brilliant work has met with much criticism from Stigler,[6] but what Stigler has failed to realize is that Sweezy's theory is not a theory of price determination or price change but one of price inflexibility. Thus by having observed the price to change under conditions of oligopoly Stigler has not at all launched any criticism of "Sweezy's kink", in fact he has missed the point entirely.

Let us examine Sweezy's argument and show how it may be useful in wage theory. It is argued that at the going price for the final product the so-called pessimistic oligopolist is faced with a relatively elastic demand function above the going price and an inelastic function below the going price. This is because the oligopolist realizes that if he increases the price of final output none of the other firms will follow suit and if he decreases price, it will result in price warfare. Thus in effect the oligopolist is faced with a kink in his demand function.
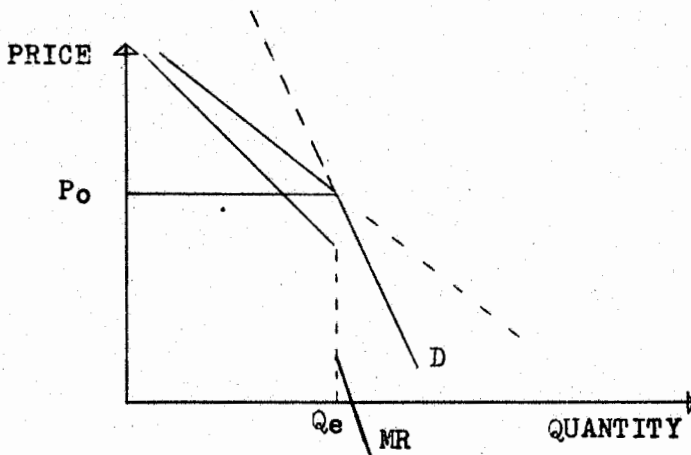
Figure 4

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[6] George Stigler, "The Kinky Oligopoly Demand Curve and Rigid Prices," *Journal of Political Economy*, (October 1947) LV.

As a result of the kink in the demand function at P_0, the oligopolist is confronted with a discontinuity in his marginal revenue function. This concept is important for the subsequent analysis in that it has relevance for price determination in the product market as well as the labour market. If the MR curve is transferred into wage-employment space and assuming the S = AW = MW function passes through the discontinuity we will not derive a market solution for the wage rate.
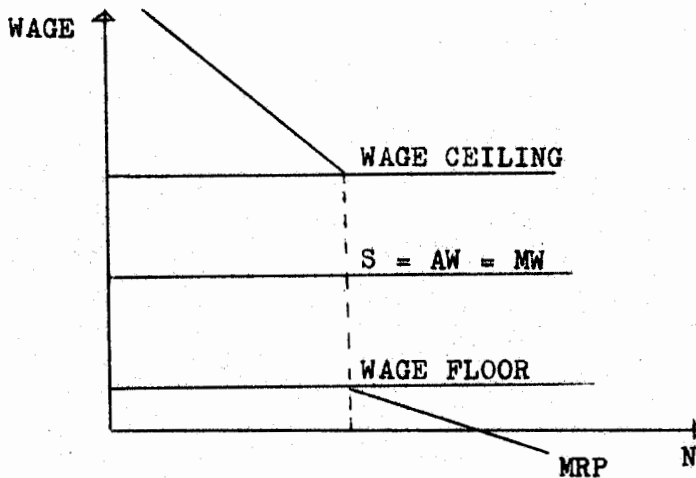
Figure 5

In this case the wage rate can not possibly be determined by the market, and there exists a range between the wage floor and the wage ceiling in which non-market forces (though not necessarily non-economic forces) will determine the wage rate. It is the author's contention that it is Sweezy's failure to accept the sanctity and omnipotence of market forces that have deprived his work of the acceptance it rightly deserves.

Given this kink we have a range in which the wage rate may fall without any employment effects. A question now arises regarding what forces determine wages on the discontinuous portion of the MRP curve. It is here that the nstitutionalists may indeed have relevant realistic

solutions to the question of wage determination. Here the paradigm for the past two decades has been that the wage rate has been determined by bargaining power in collective wage agreements. The institutionalists recognize the role of non-economic forces in wage determination, unlike the neo-classicists who insist that the market is sovereign. Only the works of Jan Pen and Neil Chamberlain will be examined in this field, for it is their models that are explicitly utilized in the body of this thesis.

Pen's model is a highly sophisticated game theoretic model which utilizes concepts stemming from the work of Frederic Zeuthen. The basis of his model is two game theoretic equilibrium conditions for buyer and seller.

$$R_s \left[\frac{S(ps) - S(p)}{S(ps) - Sc} \right] - F_s \left[B(p) - Bc \right] = 0$$

$$R_b \left[\frac{B(pb) - B(p)}{B(pb) - Bc} \right] - F_b \left[S(p) - Sc \right] = 0$$

Where S and B represent satisfaction or ophelimity functions for seller and buyer, R represents a risk evaluation function. F is each party's estimate of the risk of conflict and the use of subscription denotes the level of satisfaction for a party during actual conflict.

These equations indicate that a seller will be willing to settle on some price (p) as long as the cost of agreeing, represented by the difference between the satisfaction at the price striven for, $S(ps)$ and the price under consideration, $S(p)$, divided by the cost of disagreeing represented by the difference between the satisfaction at the desired price and that which would occur in the case of actual conflict; So, multiplied by a risk evaluation function R , less an estimate of the opponents' will to resist $\left[F_s(Bp - Bc) \right]$ is equal to zero. This is similar for buyers.

Pen's model is obviously non-quantifiable and further tells us little more about power relationships than the more functional Chamberlain theory. Chamberlain's theory of bargaining, though definitely lacking in elegance, compensates by providing a relevant and simple perspective on power relationships, and has the added advantage of subsuming all debates within its broad context.

Chamberlain defined bargaining power in terms of costs to each party of agreeing relative to the costs to each of disagreeing. Thus:

$$\text{Bargaining Power of A} = \frac{\text{The cost to B of agreeing with A's terms}}{\text{The cost to B of disagreeing with A's terms}}$$

$$\text{Bargaining Power of B} = \frac{\text{The cost to A of agreeing with B's terms}}{\text{The cost to A of disagreeing with B's terms}}$$

Alternatively, the greater the cost to the employer of sustaining a strike as opposed to the cost of granting the trade union's demands, the weaker will be the bargaining power of the employer. If the bargaining power is less than one, the party will not agree and prefer to hold out. As this approaches unity the cost of disagreemnt will be equal to the cost of agreement. It is this concept that is most broadly accepted as the framework for wage determination in institution-alist thought and it is within that framework that this thesis is developed.

Needless to say this theory does have problems, but it provides the neatest and simplest form of analysis of bargaining relationships.

Levinson argues,

"The most obvious problem was that while his (Chamberlain's) conceptual framework was helpful, it provided no insight into the more difficult task of identifying, and, if possible, quantifying those variables that were dominant in affecting the power position of the parties in actual bargaining situations. In addition, Chamberlain's measure of power was itself variable since it had to undergo constant change during the process of negotiation for a final settlement to be reached...

Nevertheless Chamberlain's approach was a very helpful one for providing an overall framework within which to analyze the concept and attributes of the union-employer power relationship."[7]

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[7] H. M. Levinson, op. cit., pg. 9

It will be one of the objectives of the subsequent analysis to
provide a possible framework for identifying the forces which generate
the bargaining power.

, Let us now briefly examine the work of J.R. Hicks. It was Hicks
in Theory of Wages who outlined the concept of concession and resistance
curves. Unfortunately Hicks gave absolutely no justification for their
slope which will be the basis of section four in chapter three. He
argues that there exists a relationship between wages and the length of
the strike, the union's resistance curve being negatively sloped and the
employer's concession curve being positively sloped.[8]
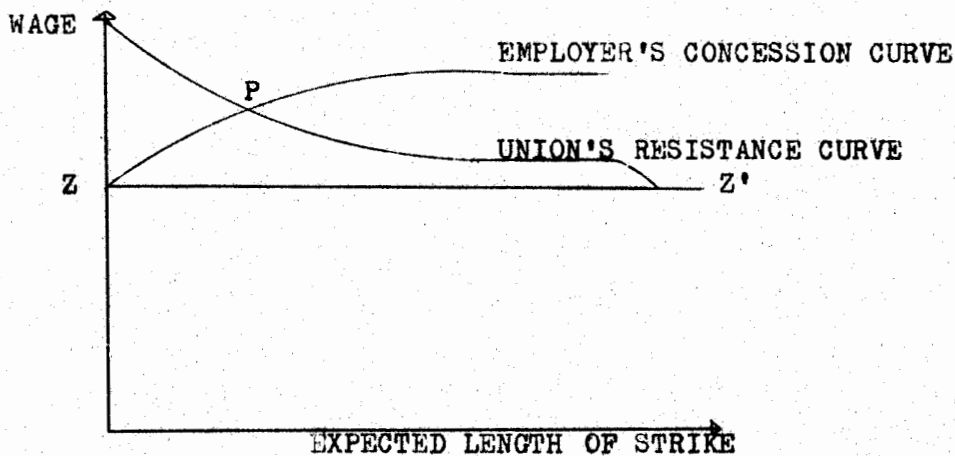
Figure 6

Hicks argues that P is not necessarily an equilibrium point but
rather "the highest wage rate which skilful negotiation can extract
from the employer".[9]

Hicks argues that OZ is the wage rate the employer would pay if
unconstrained by the union. This seems to make little sense. It would
seem that OZ would be the wage offered just prior to the strike.
Further, Hicks argues that the ZZ' line is the point the union would

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[8] J.R. Hicks, The Theory of Wages, op. cit., pg. 142

[9] ibid, pg. 143

settle on after a long strike. Again there seems no reason why this should correspond to the same wage the employer would offer if unconstrained by the union.

The work of Ashenfehlter and Johnson, which prompted the author to write this thesis, will now be briefly examined. Their work on strikes consisted of devising a model of strike incidence with an implicit wage theory. The model is very similar to that used in section three of chapter three. However, the model which was used by Ashenfehlter and Johnson did not allow output, prices or employment to vary as did wages, profits and strike length. This makes little sense within a neo-classical context. Further, the resistance curve for the trade union is a simple exponential decay function and there seems to be little empirical evidence or logic to support such an argument.

The reason this selection of authors was chosen for a literature review is that section three of chapter three is an Ashenfehlter and Johnson type model within the Pen-Chamberlain bargaining power context and a "Sweezy" oligopolistic product market. Price determination is neo-Ricardian and the conclusions utilize Ricardo's concept of a wages fund. Section four reformulates Hicks' concept of concession and resistance curves to give them specific economic justification.

The analysis will go through four stages of purification and elaboration. In the first section, strong and tenuous assumptions are made. In the second section three basic assumptions are removed: the continuity of wage negotiations, the monotonicity of the isoquant, and the static nature of the market. In the third section the most important assumption is removed; that the ability to mark-up is perfect. It is here in this third section that we derive our synthesis of neo-classical and institutionalist thought as well as a formalization of the "Hicks-Cambridge-Sociological" theory of inflation. In the fourth section we remove an assumption pertaining to the knowledge of the employer about the resistence curve of the trade union and derive a theoretical justification for Hicks' concept of concession.

SECTION 1

Assumptions:

1) The employer with whom we are dealing is an oligopolist with a product market that can be either differentiated or undifferentiated, but for our purposes we assume it to be differentiated. He attempts to maintain his market share subject to a lower bound profit constraint. The traditional assumptions of profit or sales maximization may lead to price warfare which in turn can cause loss of market share. The firm will be a profit maximizer only in the sense that it minimizes costs of production. These assumptions will not be relaxed at any stage for they are integral to the analysis and it is felt they correspond to observable reality.

2) Prices in this firm are determined by average cost plus mark-up in the neo-Ricardian manner. Mark-up pricing is not inconsistant with neo-classical analysis[1].

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[1] Paul A. Samuelson and Anthony Scott, Economics, Canadian Edition (Toronto: McGraw-Hill Ryerson Limited, 1975), ch. 26, p. 465.

3) The market size is constant and given exogenously. This implies that we can equate the objective of constant market share to that of constant output. This assumption will be relaxed later.

4) The firm can technically substitute at least some labour for capital in response to repeated wage increases while maintaining the same level of production. Technical substitution will be along a smooth monotonic isoquant. This assumption will also be relaxed.
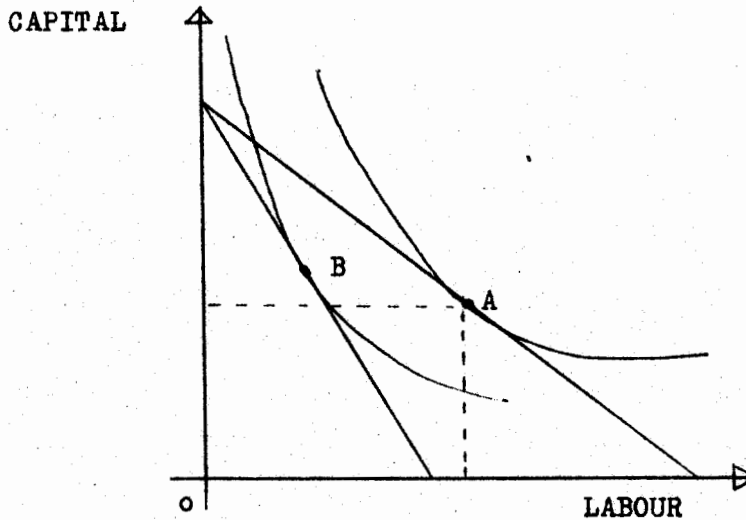

Figure 7

Figure 7 illustrates the response of "corporatus economicus" of the Neo-classical variety to an increase in the wage rate. The firm will decrease output and increase its capital intensity by moving from point A to B.
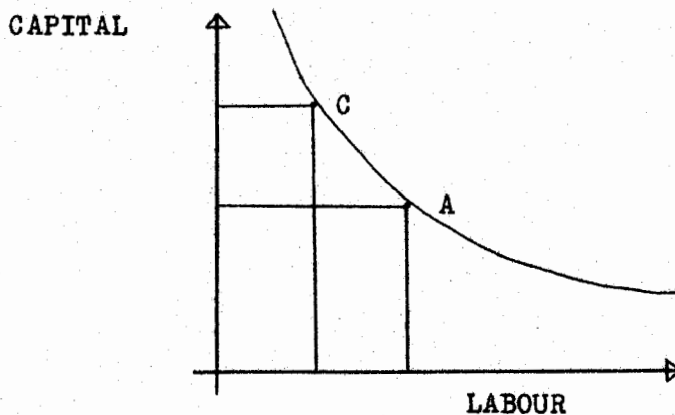

Figure 8

Figure 8 illustrates how the oligopolistic firm will respond to a change in the wage rate. Rather than decreasing output as in Figure 7. the firm will try to stay on the same isoquant I_0 but will move from A to C substituting labour for capital. (All questions of Robinsonian re-switching aside.)

5) The residual cost that can not be technically substituted as in assumption four will be passed on in the form of higher costs to the consumer. This immediately begs three very important questions.

    a) If he can pass on cost increases without losing output why does he not set higher prices earlier?

    b) If he can pass on cost increases and increases price why does he not charge an infinitely high price?

    c) If the above holds true what reason would he have to cost minimize?

First, wage determination often acts as a socially acceptable reason for removing "Sweezy's kink" and allowing price to rise – this is especially so in the steel and automative industries. Thus because of this kink the pessimistic oligopolist may be reluctant to increase prices unilaterally. Furthermore, unilateral price increases without obvious cost increases may result in some form of government intervention via anti-combines legislation.

In response to the second question it is known that even an oligopolist who does not face "Sweezy's kink" will face some form of downward sloping demand curve. Setting an infinitely high price would result in zero output.

Third, if he is facing a kink and can not increase price unilaterally then increases in profit can only come from decreases in production costs.

The last question to be asked is how can it be possible to increase prices without allowing output to fall or alternatively how can the marginal propensity to pass on cost increases be unity (MPPCI = 1)? This can not easily be explained. There exist two plausible situations in which an increase in price will not cause a decrease in output. Either of these situations or a combination of both could result in an MPPCI = 1. The

author does not suggest that these situations are prevalent phenomena
in the real world but rather that they may be offered as a possible
explanation. First, if the industry demand function is inelastio over
a range, step-wise, then the producer's MPPCI = 1. Second, if a
commensurate and compensating shift occurs in the demand function with
every shift upwards of the cost curves then the MPPCI = 1.

The first of these cases, i.e. the step-wise demand function, occurs
when consumers as a whole are unresponsive to price changes. Consumers
tend to have a threshold of awareness with regard to price changes, i.e.
due to imperfect imformation, consumers will be unaware of marginal
price changes over a range. Only when they become cognizant of the
price change will they alter the quantity consumed. Further, if their
consumption patterns are sticky, the range over which the consumer will be
unresponsive to price changes will be greater. The sticky APC and thus
the inelastic demand function are very much an outgrowth of developed
Western economies and subsequently may offer a partial explanation for
the ability of oligopolistic firms to mark-up prices.

INDUSTRY DEMAND CURVE

PRICE

QUANTITY
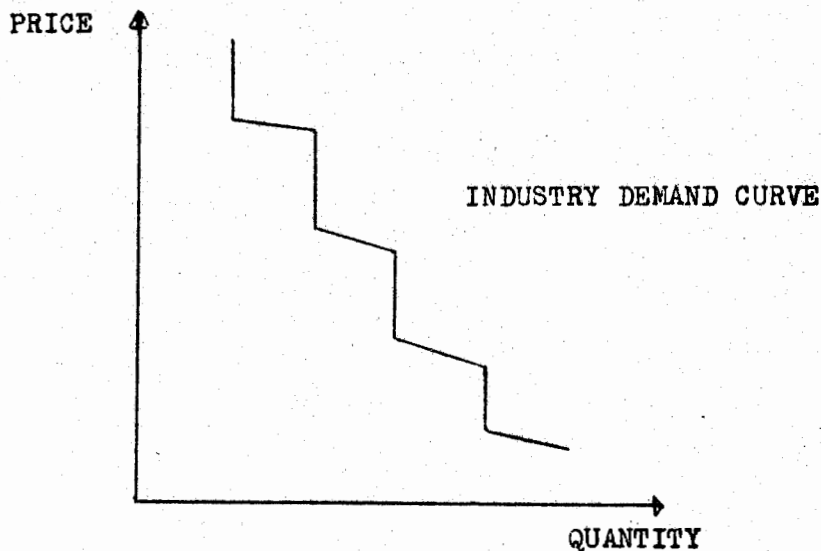
Figure 9

In order to deal with the second possible case we must examine the
demand function of the firm rather than the industry as a whole. If we
now assume that the money supply is endogenous rather than exogenous and
that the monetary authorities expand the money supply in response to
political and sociological pressures as the Cambridge monetarists have
been arguing, then there exists further justification for an MPPCI = 1.
Real economic growth would also shift the demand function upwards allowing
the producer to pass on cost increases without suffering any adverse
output effects. There is reason to conclude that compensating shifts in
the demand function are not purely fortuitous or coincidental phenomena.
It may well be a natural by-product of the market system. Whether the
money supply is exogenous as the Chicago School argue or whether it is
endogenous as Cambridge argues, there is no doubt that a shift in the
money supply will have significant ramifications.

Figure 10
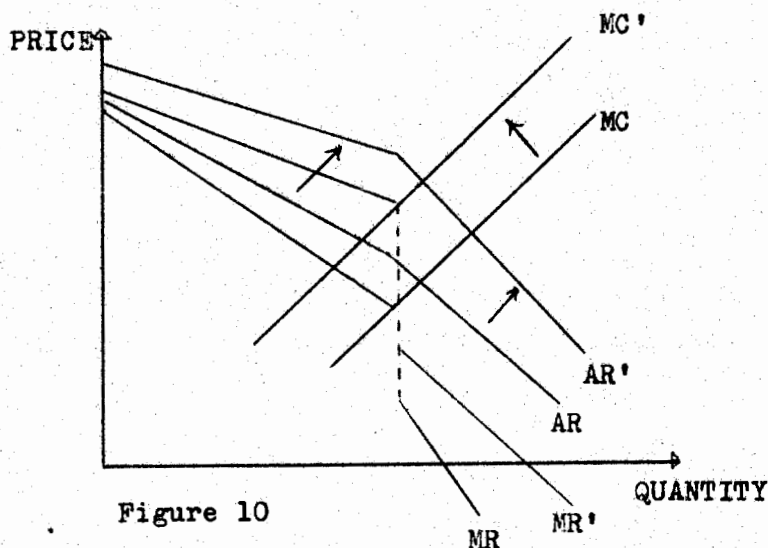
A concurrent shift upwards in Sweezy's AR function with a shift
upward in the AC and MC curves can neutralize the output effect of a
price change. This strong assumption will be relaxed in the third
section of the analysis.

6) There exists a type of competition that the oligopolist finds costly - competition from a new entrant. This also explains why even if "Sweezy's kink" were removed, the industrial group avoids charging too high a price. Thus the oligopolist will attempt to minimize the price increase to avoid jumping the threshold of the barriers to entry. Further, it is the general rule that uncertainty enshrouds the exact locality of the threshold, thus causing even greater reluctance to increase prices.

7) A trade union exists with lexicographic ordering in its preferences between wages and employment. In other words the trade union will seek wage increases with little or no consideration of employment effects. This is subject to a politically feasible minimum level of employment. This assumption is justifiable on the grounds that most union leaders look to employed members for votes - unemployed workers do not pay dues and thus do not vote. The trade union leadership will attempt to avoid this minimum because of uncertainty as to its exact locale since this uncertain minimum the membership will oust the leadership.

8) The trade union will attempt to maximize wage increases in the long-run. This assumption will be relaxed to one of short-run "wage-increase satisficing" in subsequent sections.

The Model:

It is now necessary to introduce the concept of a long-run wage employment trade-off curve, which is simply an isoquant in wage-employment space. It traces the level of employment at any given level of output as the entrepeneur technically substitutes capital for labour.

EMPLOYMENT

← LEXICOGRAPHICALLY ORDERED
PREFERENCES

POLITICALLY FEASIBLE MINIMUM
OF
EMPLOYMENT

N_{min}

LRWN

W_{entry} W_{max}

WAGES
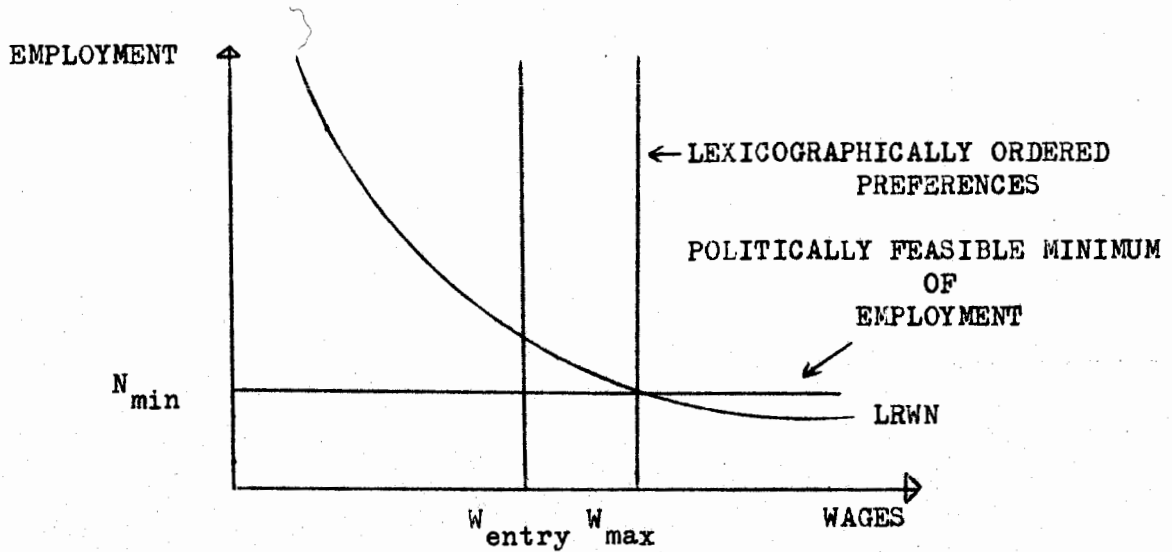
Figure 11

The trade union leadership with its lexicographically ordered
preferences will continually seek wage increases to which employers
with MPPCI = 1 will agree with only token resistance. These wage
increases will be passed on to the consumer in the form of higher
prices but the employer will technically substitute the now higher
priced labour for capital along the LRNW curve. Thus we will observe
unemployment, cost-push inflation and higher capital/labour ratios
over time. For a constant level of output, this process will continue
until either the entry wage (i.e. that wage that will force prices to
the threshold of barriers to entry[2]) or the maximum wage (i.e. that
wage that will generate a level of employment below the minimum
acceptable level) depending on which is lower. If, however, the
maximum wage is greater than the entry wage conflict will occur.

Thus far the analysis has been one of non-conflicting objectives
which is not to say that the objectives of labour and capital are
harmonious but over a range there seems to be no pecuniary reason for

[2]In this case "entry" means entry from a foreign competitor.
Domestic entrants usually face higher costs along with higher prices.

any disturbance of industrial peace. However as the actual wage
approaches the entry wage the cost of agreement will rise for the
employer. This will generate a conflict of interests and possibly
a strike. As long as the oligopolistic producer can pass on cost
increases without any significant effect on competition, output or
profits then there is no reason for conflict to occur.

CONFLICT
ZONE

As the trade union increases wages, the
employer substitutes labour for capital
along the LRNW.

W,N equilibrium if $W_e > W_m$

N_{min}

LRNW
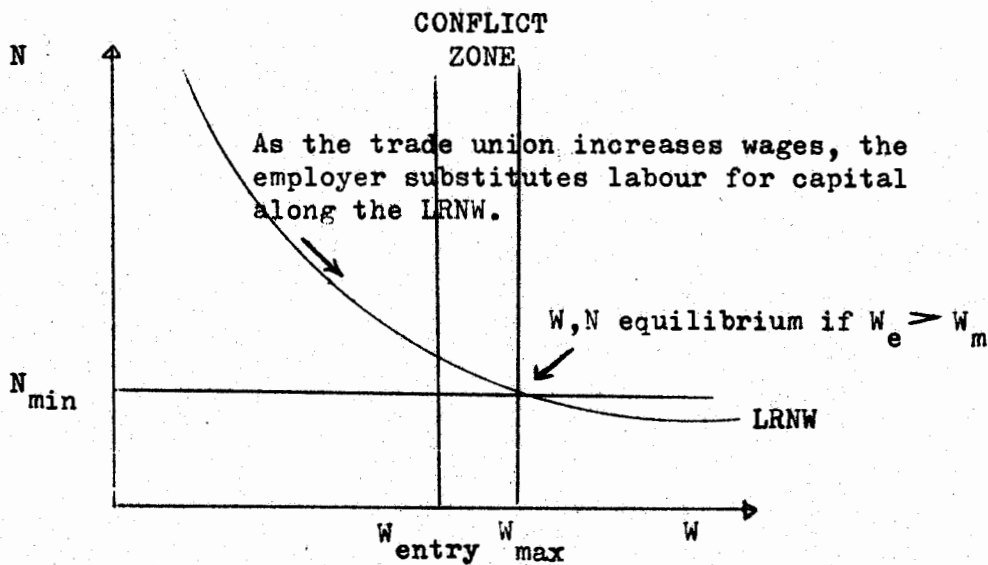
W_{entry} W_{max} W

Figure 12

If $W_{max} > W_{entry}$ then $\lim\limits_{W \to W_{entry}} S > 0$

where S = Strike length

In conclusion we have a theory which offers a possible explanation
for some of the observed behavior in wage determination under conditons
of oligopoly. Over time, firms which have an MPPCI = 1 will have no
reason to resist union wage demands. Their response will be to techni-
cally substitute labour for capital generating unemployment. Conflict
will only occur when the oligopolist is confronted with potential

competition from a new entrant which would cause his MPPCI to drop below
one. Thus far the theory has explained little about wage determination
per se, for in the real world the MPPCI is generally less than one and
therefore wage determination becomes a problem of limited conflict
rather than perfect harmony. What is now necessary is to make the model
more dynamic by allowing output to vary and relaxing the assumption of a
monotonic, continuous isoquant. The relaxation of this last assumption
will have interesting ramifications on the theory.

SECTION 11

The conclusions from section one are intuitive but at best can
only be taken as tendencies. It is now necessary to begin the second
stage of the analysis and remove some of the more contentious assumptions.
Obviously in the real world output and market size do change. Wage
negotiations are discrete rather than continuous and the neo-classical
monotonic isoquant is unrealistic where technology is often lumpy. The
relaxation of the last assumption will give significant insights into
changes in the nature and substance of collective bargaining. It will be
shown that the location of the firm on the isoquant is important in
determining whether collective agreements are wage oriented or security
oriented. The relaxation of all these assumptions will in no way alter
the conclusions of the previous section.

Let us begin with the relaxation of two assumptions concurrently.
First, that of constant market size, and second, continuous wage
negotiation. Let us assume that in the middle of a two-year contract
there is an exogenous and permanent shift in demand for the product.
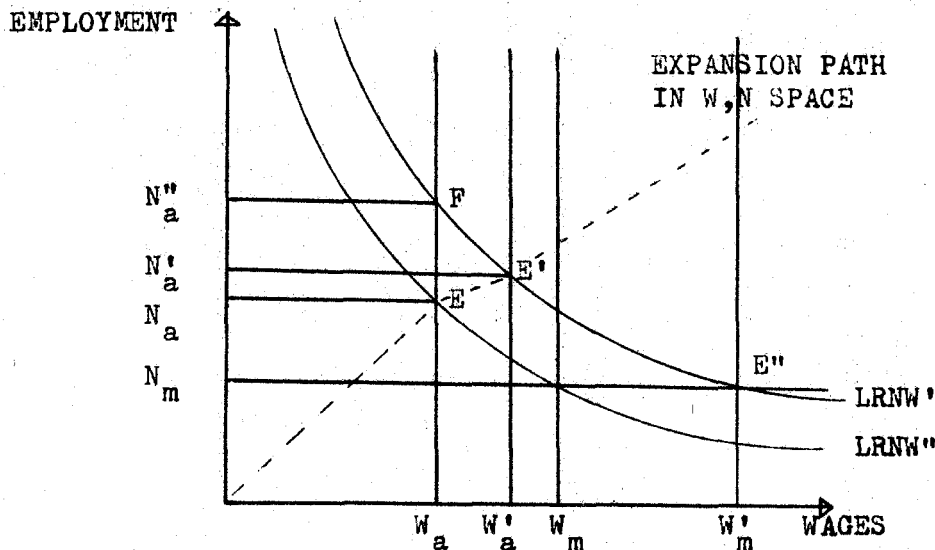The firm will then move along the expansion path from E to some point E'.

Figure 13

If there is no need to increase wages to attract labour, the firm may locate at point F. This can only occur if technical substitution is along a smooth neo-classical isoquant. There is no reason to suppose that this is the case in the real world and technical substitution under these circumstances would be unlikely to occur. In the interim period of a wage negotiation it would seem unlikely that reswitching of techniques would occur. Given the shift of the LRNW to LRNW' we will have a resultant shift in the W_m to W_m'. Thus increases in the demand for the product would have the important effect of making the eventual conflict that may occur more likely. In the next round of wage negotiations the union will force wage increases and the process will continue but now along LRNW'.

This immediately begs another question. If $W_m \rightarrow W_e$, why does the union not immediately push towards that point in each negotiation and thus generate conflict? The answer has three parts. First, wage negotiations are temporally discrete phenomena rather than continuous and thus a trade union leader may wish to avoid increasing wages to the maximum because he wishes to avoid conflict in the next wage round. Second, given that the union leadership may wish to avoid conflict, uncertainty may force him to move cautiously. Third, the union membership may be wage satisficing rather than maximizing which may slow the movement along the LRNW.

Let us now relax the assumption of a monotonic isoquant and have only four possible production points rather than an infinity. Further, it shall be assumed that there exists some cost associated with scrapping one production technique and introducing another.

CAPITAL

.A

FOUR POSSIBLE
PRODUCTION TECHNIQUES
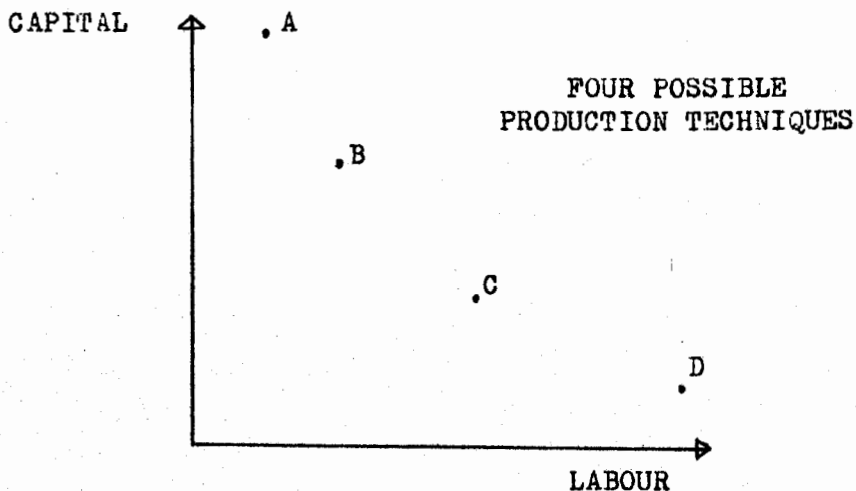
.B

.C

D
.

LABOUR

Figure 14

If we transfer these four production points into wage-employment space
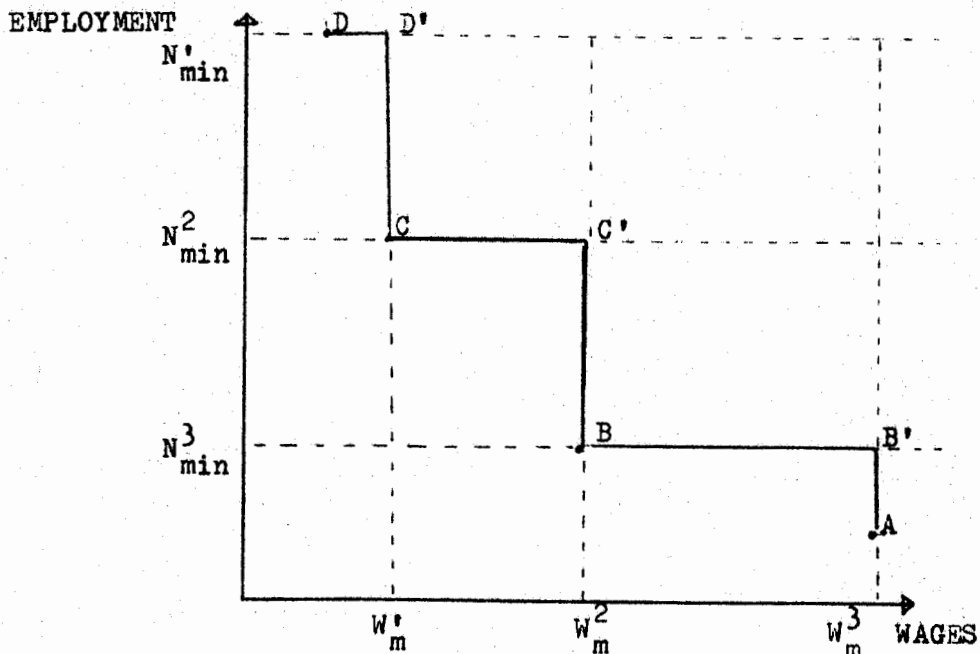we obtain the following LRNW.

Figure 15

Assuming we are at point D in figure 15 -the most labour-intensive method of production, and unions push for a wage increase the employer will absorb the wage increase until point D' where the cost of absorbing an extra dollar of wage increases will force the firm to substitute production technique D for C. Now, however, the trade union will attempt to avoid pushing wages beyond W'_m because in the present case displacement and retrenchment of employees would be massive and the political ramifications may lead to an ousting of the incumbent leadership. It is predictable from this model that as we approach the "substitution points" the bargaining issues will change from a wage orientation to an employment orientation. Further, at each and every production technique there will be a wage maximum and an employment minimum.

The diagramatic analysis is now complete. The relaxation of the minor assumptions of the first section has facilitated a number of important conclusions, especially conclusions regarding the substance of collective agreements, i.e. whether they are to be wage oriented or security oriented. The tendencies of the first section are still intact but little more can be said about wage theory until the assumption of the MPPCI = 1 is relaxed. It is the relaxation of this assumption that will constitute the bulk of the analysis in the following section.

SECTION III

In this section two of the most important assumptions are relaxed: MPPCI = 1, and that the trade union maximizes wage increases. Recapping the assumptions:

1) We have an oligopolistic producer who bargains collectively with a trade union that represents all his employees.

   The oligopolist is also the wage and price leader for the industrial group.

2) The oligopolist attempts to maintain his market share, i.e., $MS = \dfrac{\alpha_i}{\sum_{i=1} \alpha_i}$ is constant.[3] Within this constraint he attempts to minimize production costs. Profits are also constrained so that he operates only where actual profits are greater than or equal to some subjectively determined minimum, i.e., $\pi > \pi$ min.

3) The oligopolist can pass on some proportion of a given cost increase to the consumer in the form of higher prices but not all, i.e., MPPCI < 1. What can not be passed on is absorbed in the form of lower profits. The oligopolist may also choose to incur a strike if the profit stream is greater by having a strike than by absorbing the wage increase.

4) At the end of the wage bargain the producer is confronted with an output, prices, wages and employment decision, the levels of which are invariant into the indefinite future. This assumption is for mathematical simplicity.

5) The oligopolist recognizes the trade union and is aware of its demands and its resistance curve. The firm selects that level of profit and thus output prices and employment that will maximize the discounted present value of its future profit stream subject to the above constraints. The firm bears no malevolence toward the union.

---

[3] MS = market share – constant and exogenously given.

$\sum_{i=1} \alpha_i$ = market size – variable and exogenously given.

6) The trade union desires a satisfactory wage-fringe adjustment. It does not maximize and has little interest in employment effects.

7) The union has a resistance curve which is directly related to membership preferences.

The Model

The profit level in each time period is:[4]

$$\pi = \alpha P - \beta W - H \qquad (1)$$

where π = total profit

α = level of output

P = price

β = manhours of labour

W = wage rate

H = fixed costs

The present value of a future profit stream is:

$$V = \int_0^\infty \pi e^{-rt} dt \qquad (2)$$

where V = discounted net present value of an infinite profit stream

r = rate of time discount

t = time

Substituting 1 into 2 we obtain:

$$V = \int_0^\infty \{\alpha P - \beta W - H\} e^{-rt} dt \qquad (3)$$

which may be written as follows:

$$V = \int_S^\infty \{\alpha P - \beta W\} e^{-rt} dt - \int_0^\infty H e^{-rt} dt \qquad (4)$$

Fixed costs run from zero to infinity where variable costs only begin when the strike ends. (It is possible that S = 0)

$$V = \{\alpha P - \beta W\} \frac{e^{-rs}}{r} - \frac{H}{r} \qquad (5)$$

Thus far we have dealt with a tautology. In order to give this theory operational significance we must introduce some behavioral relationships

---

[4]The analysis could be developed using vectors, however, this would add little or nothing to the analysis.

into the tautology. Let us examine the union's behavior. We know by assumption that the union seeks three types of return in it's final pre-strike demand.

1) Permanent income - Friedmanite variety (Yp)
2) Equity income - maintenance of relativities with those in Dunlopian wage contour (Ye)
3) Strike return (Ys)

Wages can be represented as follows:

$$W = W_{t-1} + \{Y_\infty + (A-Y_\infty)e^{-\xi^2 S^2}\} \qquad (6)$$

where,

W_{t-1} = wage earned prior to negotiation

S = strike length

A = Yp + Ye = final demand prior to strike

Y_∞ = the acceptable wage increase after an infinitely long strike

$$Yp = \overset{M}{\underset{i=1}{\Sigma}} X_i \, \Delta Y_{t-1} \qquad {}^{5}$$

$$Ye = \overset{K}{\underset{k=1}{\Sigma}} X_k \, \Delta(Y_{t-1} - Y_k)$$

Y_k = wage rate of those groups in the Dunlopian wage contour with whom the union membership traditionally compare themselves.

Thus if no strike occurs the union will settle for A, but if a strike does occur the union will be forced down its resistance curve to a wage the employer finds more agreeable.

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[5] The weightings X_i and X_k will be so adjusted as to avoid double counting between Yp and Ye. The weightings are specified so as to add to one. The precise calculation of these is left to the econometrician.
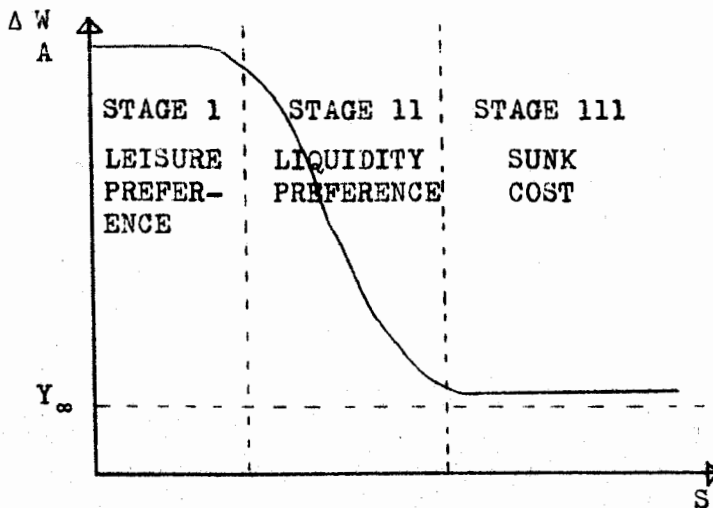
Figure 16

The above resistance curve has been posited in response to the resistance curve used by Ashenfehlter and Johnson[6] which is a simple exponential decay function. Not only have Ashenfehlter and Johnson offered no justification for positing such a resistance curve, but there does not seem to be any intuitive reason for having a resistance curve exhibiting exponential decay in the early stage of the strike. The proposed alternative is:

$$R = Y_\infty + (A-Y_\infty)e^{-\xi^2 S^2} \qquad (7)$$

where $\xi^2 S^2 = \phi - \mu$

ϕ = a measure of leisure preference of the rank-and-file

μ = a measure of liquidity preference of the rank-and-file

R = change in wage demand

---

[6]"Bargaining Theory, Trade Unions, and Industrial Strike Activity," American Economic Review, (March 1969)

Equation 7 shows that union resistance is an exponential decay function which operates directly on A, the final pre-strike wage demand. The slope of this decay function is determined by the leisure and liquidity preferences of the rank and file. The size of the wage demand decays exponentially until it asymtotically approaches Y_∞. From this resistance curve we can separate three stages of concession. First, where the leisure preference predominates in its influence over the final pre-strike demand and concession is minimal. Second, where the liquidity preference begins to operate and concession becomes evident and third, where concession levels off due to the "sunk cost" nature of the strike. If the Y_∞ is negative then we can have a wage decrease resulting.

Continuing the analysis let us examine the pricing behavior of our oligopolist.

$$P \equiv P_{t-1} + \eta \left[\frac{\Delta W \beta + \Delta \beta W}{\alpha} \right]$$

where: P_{t-1} = pre-negotiation price of output

η = MPPCI. The MPPCI is subject to a constant market share and is a function of the following variables:

1) elasticity of demand for the final product

2) the size of the average cost increase

3) degree of concentration

4) barriers to entry

5) growth of demand both in a nominal and real sense

6) the response of competitors to the price change

If market conditions plus the wage demand are such that the oligopolist has an MPPCI $\approx$ 1 and the discounted net present value of profit is greater with a strike than without, a strike will occur. The firm that maximizes V has a choice of agreeing to A and avoiding a strike, or incurring a strike and thus settling at a lower wage rate. Since output is constrained by the assumption of constant market share and price is constrained by the MPPCI, then by maximizing V the oligopolist is in effect minimizing costs. The following are two possible V profiles for varying strike length.
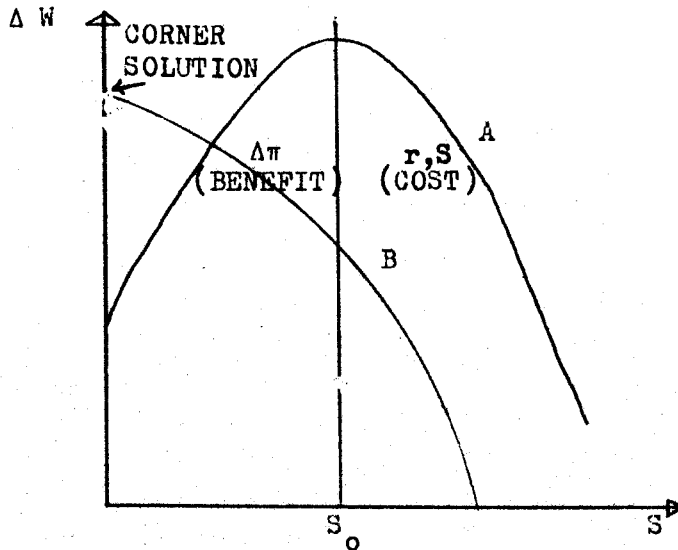
Figure 17

Profile A of figure 17 indicates that it would be profitable to
incur a strike as there would be significant concession from the trade
union resulting in increased profits. It would not be profitable to
continue the strike at S_0, as the cost due to the rate of time discount
would decrease the value of V relative to any possible concession by
the trade union that may increase π. In profile B we have a corner
solution. The employer will choose not to incur a strike because either the
size of r or the nature of the trade union resistance curve would
force V to fall.

Returning to equation 5:

$$V = \{\alpha P - \beta W\} \frac{e^{-rs}}{r} - \frac{H}{r}$$

The oligopolist will set dV/dS=0 :

$$0 = \frac{d\{\alpha P - \beta W\}}{dS} \frac{e^{-rS}}{r} - e^{-rS}\{\alpha P - \beta W\} \qquad (8)$$

Divding both sides by e^{-rS} we obtain:

$\rightarrow \quad 0 = \dfrac{d(\alpha P - \beta W)}{dS} \cdot \dfrac{1}{r} - (\alpha P - \beta W)$

$\rightarrow \quad \dfrac{d(\alpha P - \beta W)}{dS} = r(\alpha P - \beta W)$ $\hspace{3cm}$ (9)

but: $\quad \alpha P - \beta W = \pi + H$

$\rightarrow \quad \dfrac{d(\alpha P - \beta W)}{dS} \cdot \dfrac{1}{r} = \pi + H$

Solving equation 9 for W we obtain:

$W = \dfrac{\alpha P}{\beta} - \dfrac{d(\alpha P - \beta W)}{dS} \cdot \dfrac{1}{\beta r}$ $\hspace{2.5cm}$ (10)

but: $\quad \dfrac{d(\alpha P - \beta W)}{dS} = \alpha \dfrac{dP}{dS} + P \dfrac{d\alpha}{dS} - \beta \dfrac{dW}{dS} - W \dfrac{d\beta}{dS}$ $\hspace{1cm}$ (11)

$\hspace{3cm} (+)(-) \; + \; (+)(+) \; - \; (+)(-) \; - \; (+)(+)^6$

Further: $\quad \alpha = MS \cdot \sum\limits_{i=1}^{\;} \alpha_i$ $\hspace{3cm}$ (12)

Substituting equations 11 and 12 and the price equation into 10, we obtain:

$$W = \dfrac{MS \cdot \sum\limits_{i=1}^{\;} \alpha_i \left\{ P_{t-1} + \eta \left[\dfrac{\Delta W \beta + \Delta \beta W}{\alpha} \right] \right\}}{\beta}$$

$$- \left\{ \alpha \dfrac{dP}{dS} + P \dfrac{d}{dS} - \beta \dfrac{dW}{dS} - W \dfrac{d\beta}{dS} \right\} \cdot \dfrac{1}{\beta r}$$

---

[6]In order to explain the signs of these partial derivatives, it is necessary to recognize the downward slope of the resistance curve and that a change in wages will cause a change in price. The slope of the other two partials then comes from the downward sloping demand curve for labour and the final product.

Thus we can conclude that wages will be greater, ceteris paribus:

1) The greater is output, market share, and market size. Due to employment being on the denominator of the equation, it is difficult, if not impossible, to differentiate between a scale effect and a productivity effect of any given change in output.

2) The smaller is employment.

3) Combining 1 and 2, the greater is average product and thus the smaller the labour cost/total cost.

4) The larger is the price of final output and thus the MPPCI which is related to the change in average cost, the barriers to entry, the degree of concentration, the elasticity of the demand function, and the growth of demand for the final product.

5) The greater is r, the rate of time discount.

6) The less responsive is output to a change in S.

7) The smaller is the responsiveness of wage rate changes to S along the union resistance curve, i.e. the greater is the leisure preference and the smaller the liquidity preference. The greater is Y_∞ and the larger is $A = Yp + Ye$.

8) The greater is the responsiveness of employment to the length of the strike.

9) The smaller is the optimum profit required to set $\frac{dV}{dS} = 0$ if a strike occurs. This is because a strike acts as a method of income distribution. However, this is not to say that the wage bill will be higher in firms with lower wage rates, but rather that a lower profit rate is implied once all costs have been passed on and the only other source of absorbing cost increases would be a fall in profit.

10) The higher is total revenue, ceteris paribus et mutatis mutandis, the higher is profit. This seems contradictory to

conclusion 9, but 9 is a behavioral relationship not related to the state of the industry. In effect 9 is equivalent to a Ricardian wages fund where successive increments in wages must come from profit. Naturally the larger the wages fund, the greater the wage rate and this necessarily implies that higher wages mean a smaller residual for profit.

Let us now return to equation 9 and see if there is something more to be derived from the analysis.

$$\frac{d(\alpha P - \beta W)}{dS} = r(\alpha P - \beta W) \tag{9}$$

but: $\alpha P - \beta W = \pi + H$

$$\rightarrow \quad \frac{d(\pi + H)}{dS} = r(\alpha P - \beta W)$$

$$\rightarrow \quad \frac{d\pi}{dS} + \frac{dH}{dS} = r(\alpha P - \beta W)$$

but: $\frac{dH}{dS} = 0$ by assumption

$$\frac{d\pi}{dS} = r(\alpha P - \beta W) \tag{12}$$

Thus we have an equilibrium conditon; $\frac{d\pi}{dS}$, the marginal benefit of the strike, is equal to $r(\alpha P - \beta W)$, the marginal cost of the strike. At this equilibrium point, the V function reaches a maximum. The oligopolist has thus selected an optimum strike length. From the resistance curve, the oligopolist can determine the wage rate he must pay and thus price of the final product, output and employment as indicated in figure 18.
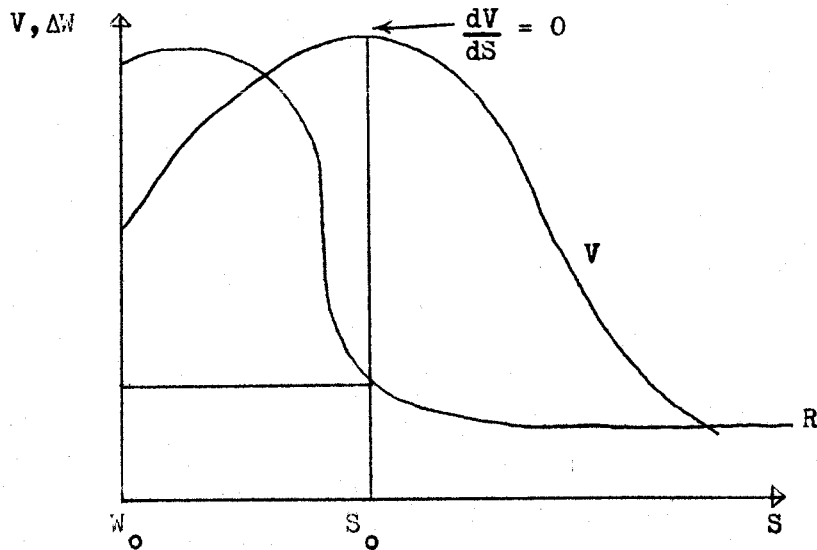
Figure 18.

Let us relax several of the assumptions in order to determine how the foregoing analysis departs from neo-classicism. Solving for W in equation 12 we obtain:

$$W = \frac{\alpha P}{\beta} - \frac{d\pi}{dS} \cdot \frac{1}{r\beta} \qquad\qquad (13)$$

but if no strike occurs then $\frac{d\pi}{dS} = 0$ and if $\eta = 0$ then $P = P_{t-1}$ and we are in a long-run situation where profits are equal to zero. Then:

$$W = \frac{\alpha P}{\beta}$$

$$\rightarrow \quad W = APP_L \cdot AR$$

but in the long-run APP = MPP,

$$W = MPP_L \cdot AR$$

which is a neo-classical solution. This implies that as the MPPCI approaches zero, AR approaches MR, and thus perfect competition is only a very special case of the oligopoly with which we are dealing.

What assumptions were relaxed in our analysis in order to derive the neo-classical solutions? The answer to this question may prove a fitting conclusion to this section, for surely it is the departure from a paradigm that constitutes the sole contribution of any theory. Basically, all that was required to derive the neo-classical case was to set the MPPCI = 0 and by omitting the strike. The relaxation of this last assumption rids the analysis of the wage equation and thus all vestiges of behavioralism. This suggests that much of neo-classical distribution theory stems from a basic accounting identity, i.e. profits are equal to total revenue minus total cost.[8] The relaxation of the former assumption, i.e. MPPCI > 0 removes all market power from the hands of the firm and sets the MR = AR. This will give us perfectly competitive demand conditions. It is in these two assumptions that we have a neo-classical and institutionalist synthesis. The role of the trade union and its rank and file is embodied in the wage equation. It is via the wage demand that we will get sociological pressure on the wage level and inflation. It is via the MPPCI and the multiplicity of economic and institutionalist variables that determine it, that the firm has the discretionary market power to acquiesce to such wage demands. In this sense the analysis may prove to be a formalization of what Professor Hicks has been arguing as a major cause of inflation. What remains in the final section is the removal of two extra assumptions pertaining to the omniscience of the firm. This will constitute the basis for a revision of Hicks' concept of concession and resistance curves.

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[8] Pierro Sraffa, Production of Commodities by Means of Commodities Prelude to a Critique of Economic Theory. Cambridge, University Press.

    The basic tennet of Sraffa's work is that neo-classical solutions are derivable from accounting equations.

SECTION lV

Let us return to equation 9 before entering into the bulk of the analysis:

$$\frac{d(\alpha P - \beta W)}{dS} = r(\alpha P - \beta W) \qquad (9)$$

Solving for W;

$$W = \frac{\alpha P}{\beta} - \frac{d(\alpha P - \beta W)/dS}{\beta \cdot r} \qquad (14)$$

but; $\dfrac{d(\alpha P - \beta W)}{dS \cdot \beta r} = \dfrac{d(\alpha P)}{dS} \cdot \dfrac{1}{\beta r} - \dfrac{d(\beta W)}{dS} \cdot \dfrac{1}{\beta r}$

Substituting the above equation into 14 we obtain:

$$W = \frac{\alpha P}{\beta} - \underbrace{\frac{d(\alpha P)}{dS} \cdot \frac{1}{\beta r}}_{\substack{\text{Total Revenue}\\\text{Effect}}} + \underbrace{\frac{d(\beta W)}{dS} \cdot \frac{1}{\beta r}}_{\text{Total Wage Effect}}$$

These two effects are:

1) Total Wage Effect – Wages will be higher by the change in the total wage bill with respect to the length of the strike, divided by the number of hours of post–strike employment times the rate of time discount.

2) Total Revenue Effect – Wages will be lower by the change in the total revenue with respect to the length of the strike, divided by the number of hours of post–strike employment times the rate of time discount.

In order for a strike to occur the following must be true:

$$\frac{d(\alpha P)}{dS} \cdot \frac{1}{\beta r} > \frac{d(\beta W)}{dS} \cdot \frac{1}{\beta r}$$

If this were not the case then the increment to total cost of a strike
would be greater than the increment to total revenue and no rational
employer would undertake a strike. Even though this may be the case,
the signs of the partial derivatives in 11 may not be so clear.

Total Revenue Effect

$$\frac{d(\alpha P)}{dS} = \alpha \frac{dP}{dS} + P \frac{d\alpha}{dS}$$

We know that $dP/dS < 0$, but this does not necessarily mean that $d\alpha/dS > 0$.
If we remove the assumption that output effects are always positive, we
can separate two possible effects on total output.

    1) Wage Effect: $dP/dS < 0, \rightarrow d\alpha/dS > 0$. By holding out longer the employer
forces wages and prices down thus increasing potential market, i.e.,

$$(d\alpha/dS)_w > 0$$

    2) Market Effect: $d\alpha/dS < 0$. Under conditions of product
differentiation, a strike may cause consumers to lose their brand
allegiance and try substitute products, which may have adverse effects on
output, i.e.,

$$(d\alpha/dS)_m < 0$$

but in order for a strike to occur the following must hold true;

$$(d\alpha/dS)_w + (d\alpha/dS)_m > 0$$

    The basis of this section will be the removal of the above inequality
so that it is possible for;

$$(d\alpha/dS)_w + (d\alpha/dS)_m < 0$$

Section three did not allow for the market effect, only the wage effect.

Total Wage Effect

$$\frac{d(\beta W)}{dS} = \beta \frac{dW}{dS} + W\frac{d\beta}{dS}$$

There is little question as to the sign of dW/dS, but $d\beta/dS$ depends entirely upon $d\alpha/dS$

It is now necessary to relax one more assumption before the above makes analytical sense. We must relax the assumption of omniscience. By doing so we can have an employer who responds to costs under conditions of imperfect information.

Let us set up our assumptions.

1) We have the same oligopolist as in section three however he now no longer has perfect knowledge of the union's resistance curve. He does have an estimate of the trade union's resistance curve on which he bases his behavior. His perception of the curve are adjusted via an error learning model. He does not know what his optimum V will be. It is obvious from this assumption that it is necessary to change the nature of section three in order to accommodate such an assumption.

2) He responds to wage demands by the trade union by calculating the total cost of not agreeing to the estimate of the latest demand and dividing this by the number of hours he requires.

i.e.:- $C = \dfrac{\text{Total Cost per day}}{\beta}$

where C = concession or change in offer.

In other words the daily cost is calculated and divided by employment. Assume the first day of a strike costs the firm $1,000 and the firm requires 100,000 hours into the planning period, then it will offer $.01 to its employees. If on the second day it costs $2,000, then the addition to the previous day's offer will be $.02, et hoc genus omne.

The actual extent of concession, i.e., the cost of disagreement, is determined by current profit lost by not agreeing to the union's

terms plus the market lost by removing one's product from the market and exposing consumers to alternative brands minus the positive profit associated with lowered wages. Over time the cost of disagreement will continue to rise as the market effect increases and the wage effect becomes less significant. Further, even if the net cost were constant each day there would be cumulative concession, i.e., if the cost per day were $1,000 the cumulative wage offer would be $.01 per day if employment were 100,000.

The cost of agreement (CA) will continually fall as the cost of disagreement (CDA) rises. The CA is determined by the difference in the discounted present value of profits at the union's present wage demand and expected profit at the employer's offer. The strike will terminate when the cost of disagreement is equal to the cost of agreement, i.e., $CA - CDA = 0$ or $CA/CDA = 1$.

Stage 1

In this stage the cost of disagreement is zero because inventories exist and thus concession is minimal.

→ Inventory Effect $= \int_{S-1}^{S} (\alpha'\bar{P})\pi'dS - \int_{S-1}^{S}(I_E \cdot \bar{P})\pi'dS$

where α', $\bar{P}$, and π' = pre-strike levels of output, price and profit rate.
If $I_E = \alpha$ then Inventory Effect = 0 where I_E = Effectual supply of inventories to consumers.

We know that C = Total Cost per day$/\beta$.

Thus the size of concession when inventories exist is as follows:

$$C = \frac{\int_{S-1}^{S} (\alpha'\bar{P})\pi'dS - \int_{S-1}^{S} (I_E \cdot \bar{P})\pi'dS}{\beta}$$

If $\alpha = I_E$ then there will be no concession.

Stage 11

In this stage inventories are depleted and thus new effects begin to operate. These can be termed the total cost of the strike.

| Total Cost of Strike | = | Current Profit Effect | + | Fixed Cost Effect | + | Market Effect | − | Wage Effect |

Net Current Effect   Long-Run Effect

Current Profit Effect $= \int_{S-1}^{S} E(\alpha P)\pi_E dS$

Fixed Cost Effect $= \int_{S-1}^{S} (H \cdot 1/\pi_E)\pi_E dS$

Net Current Effect $= \int_{S-1}^{S} E(\alpha P)\pi_E dS + \int_{S-1}^{S} (H \cdot 1/\pi_E)\pi_E dS$

Market Effect $= \int_{S}^{\infty} E(\Delta S \cdot P \cdot s_{ca})\pi_E e^{-rt} dt$

Wage Effect $= \int_{S}^{\infty} E(\Delta W \cdot Q/\varepsilon_D)\pi_E e^{-rt} dt$

where π_E = Expected profit rate if employer accepted union's demand.

H = Fixed costs. Q = Quantity demanded.

s_{ca} = Slope of the consumer allegiance function.
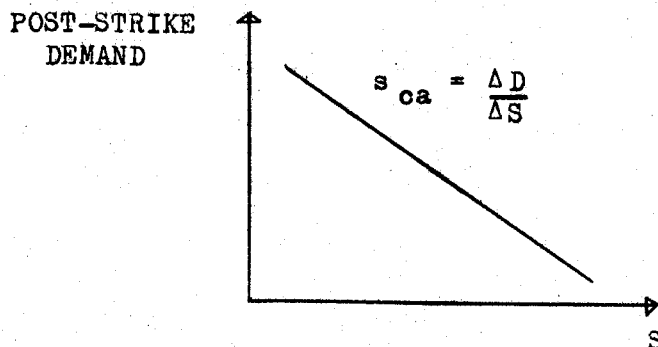
ε_D = Price elasticity of demand.

POST-STRIKE DEMAND

$s_{ca} = \dfrac{\Delta D}{\Delta S}$

Figure 19

Thus in stage two:

$$C = \int_{S-1}^{S} E(\alpha P)\pi_E dS + \int_{S-1}^{S}(H.1/\pi_E)\pi_E dS \quad \underline{+ \int_S^\infty \{E(\Delta S.P.s_{ca})\pi_E - E(\Delta W.Q/\epsilon_D)\pi_E\} e^{-rt}dt}$$
$$\beta$$

Stage III

In stage three the strike becomes progressively longer and the changes in the wage and market effects become negligible, i.e.

$$\underset{S\to\infty}{\text{Lim}} \quad \frac{\int_S^\infty E(\Delta S.P.s_{ca})\pi_E e^{-rt}dt - \int_S^\infty E(\Delta W.Q/\epsilon_D)\pi_E e^{-rt}dt}{\beta} \quad \to \quad 0$$

As this occurs the total cost of the strike (TCS) becomes:

$$\int_{S-1}^{S} E(\alpha P + H/\pi_E)\pi_E dS$$

Furthermore, it is conceivable that as $S \to \infty$, $\alpha P \to 0$ and thus TCS = H

The Concession Curve

The following logic is essentially marginalist. We have assumed that the employer will concede to the union according to;

$$\frac{\text{total cost per day}}{\beta}$$

in every time period of the strike. In other words the oligopolist is indifferent between allocating the cost of the strike to his employees and losing it on lost production. The concession curve which is utilized is of an exponential form and is only one of an infinite number of mathematical equations exhibiting this type of general slope. The partition of the concession curve into three separate stages is purely arbitary and is only meant as an approximation of the foregoing analysis.
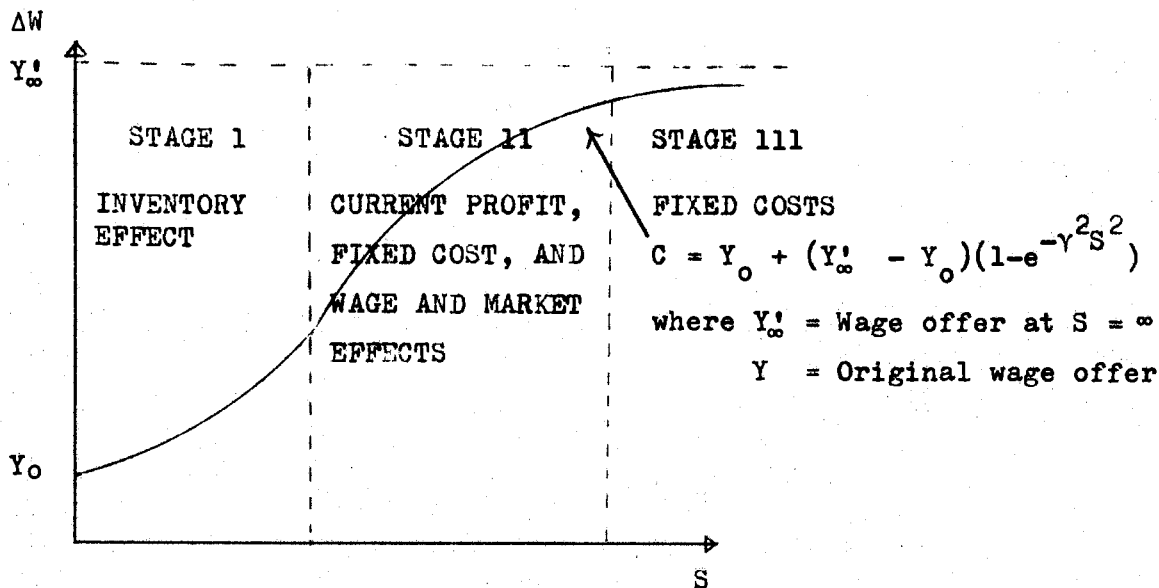
We can now define our concession curve:

Figure 20

$$C = Y_0 + (Y_\infty' - Y_0)(1-e^{-\gamma^2 s^2})$$

$$= \frac{\int_{S-1}^{S} E(\alpha P + H/\pi_E)\pi_E dS + \int_{S}^{\infty}\left\{E(\Delta S.P.s_{ca})\pi_E - E(\Delta W.Q/\epsilon_D)\pi_E\right\}e^{-rt}dt}{\beta}$$

We can now build in an error-learning model into our concession curve. Keeping in mind that we are working under the assumption that the oligopolist makes estimates of the union's resistance curve in order to trace out his own concession curve, it is necessary to make his estimate of the union's resistance curve a parameter of the concession curve. Let us assume that from an original wage demand of

an extra $1 by the union, the employer estimates that at time point S_0 in the strike the union will be demanding $.90, instead the union actually demands $.80. What ensues? The employer now shifts his estimate of the union's resistance curve downwards so that it passes through the $.80 point. However, the oligopolist's estimate of the union's resistance curve is a parameter of his own concession curve. Thus the shift of the resistance curve means a decrease in the cost of disagreement and thus a shift of his concession curve downwards as follows:
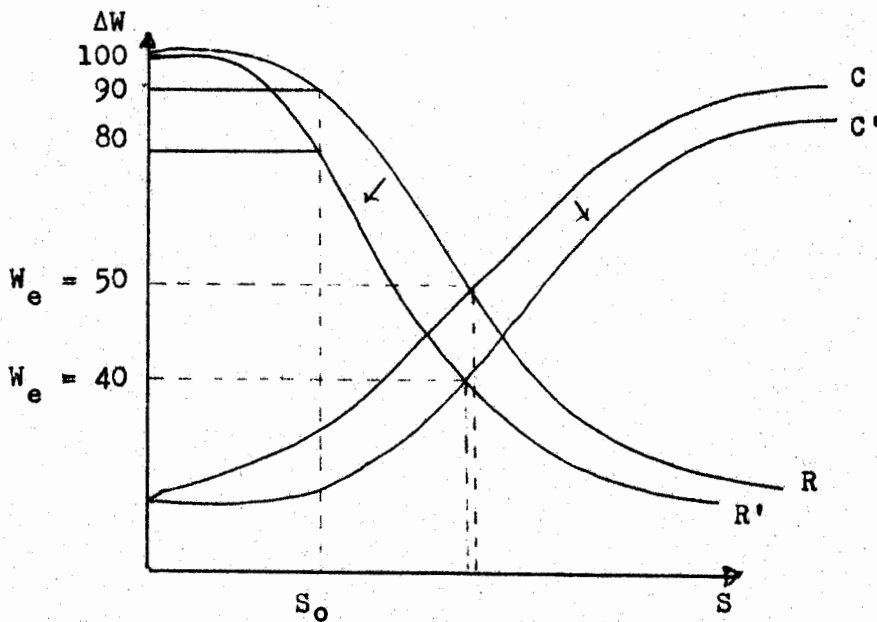

Figure 21

Thus this will necessarily mean a lower wage rate but the conclusion regarding strike length is left ambiguous.

Equilibrium Conditions

We can now attempt to derive equilibrium solutions for the concession and resistance curves.
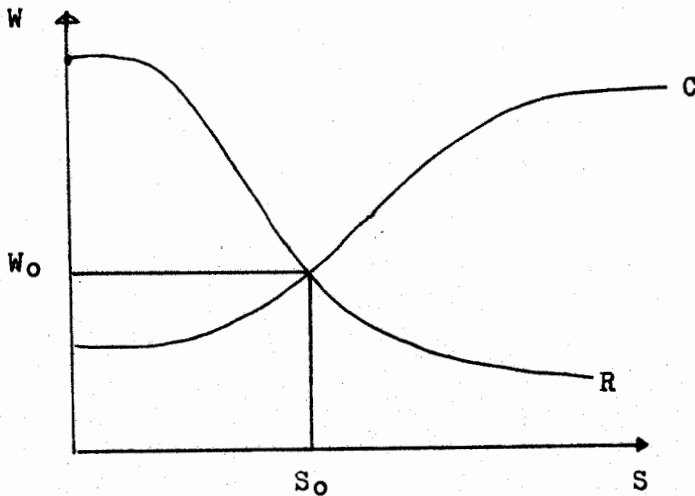

Figure 22

Due to the exponential nature of the simultaneous equations, it is extremely difficult to solve for the two equilibrium points W_o and S_o.

Equilibrium solutions are only derivable by means of computer simulation which is of little use in formulating conclusions. Further, medium sized numbers are not amenable to expansion by Taylor series or any other type of approximation. As a result it is not feasible and perhaps not even worthwhile to attempt to derive conclusions pertaining to the equilibrium strike length. However, from the assumptions embodied in the concession and resistance curves we can derive the following tendencies:

The strike will be longer, ceteris paribus,

1) The larger is A.
2) The greater is the leisure preference of the rank-and-file.
3) The larger is the stock of inventories.
4) The more inelastic is the consumer allegiance function.
5) The more elastic is the demand function for the final product.

6) The smaller is the liquidity preference of the rank and file.

7) The smaller is the total profit.

8) The smaller is price.

9) The lower is the level of output.

10) The smaller is the rate of time preference, r.

11) The greater is the responsiveness of P to changes in W, i.e. the greater is the labour cost/total cost.

12) The larger is Y_∞ and the smaller is Y_∞'.

13) The smaller are fixed costs.

CONCLUSION

The analysis is now complete. We have a theory of wages and of strike length determination which incorporates both institutionalist and neo-classical assumptions and conclusions. Section three utilizes a neo-Ricardian theory of price determination for an oligopolist in a "Sweezy-type" product market. Many of the constraining and unrealistic assumptions of the Ashenfehlter and Johnson work are removed without rendering the theory inconsistent with the Pen-Chamberlain theory. The most significant contribution of section three to wage theory lies in the introduction of the ability of the firm to mark-up prices and the role of the trade union in the determination of the wage rate. It is via the trade union demand and the employer's ability to acquiesce to that demand that we have at least a partial explanation for "bargaining table" inflation. This is not to say that this approach to inflation is inconsistant with the Monetarist approach for surely one of the most important factors in determining the employer's ability to mark-up prices is the shift upwards in nominal demand function for the final product. Other factors will also be important; the inelasticity of the demand function for the final product, the height of the barriers to entry , the degree of concentration and the size of the average wage increase. Within this ability to mark-up prices may lie the micro-economic foundations of inflation theory and a possible source for the eventual disentanglement of the debate between the Monetarists and the Cambridge School.

In section four Hicks' much criticized concession and resistance curves are reformulated giving the slopes specific economic justification. Conclusions regarding strike length are derived from this section , many of which are empirically testable. Conceivably it may be possible to derive certain hypotheses pertaining to particular industries, e.g., industry X will generally have longer strikes than industry Y because the wage effect is larger than the market effect in X.

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