

BUSINESS CYCLE THEORY AND STABILIZATION POLICIES IN A WORLD OF  
SHIFTING TRADE-OFF CURVES

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## ABSTRACT

The current problem of simultaneous inflation and unemployment facing North America and other western economies is a phenomenon that baffles most economists. This is not an overstatement given that Nobelist K. Arrow declared in a recent interview that: "the position of the political activist is greatly injured because we are unable to reconcile inflation and unemployment".

In a context, therefore, of simultaneous inflation and unemployment what then becomes of the conventional trade-off relationship between these two objectives and which currently provides a framework for stabilization policies.

There is indeed much controversy on the issue of the stability of this trade-off relationship and no satisfactory answer, as yet, to explain the apparent erratic behaviour of inflation and unemployment.

In this study we endeavour essentially to provide with Canadian data, evidence in support of:

- (a) A shift towards the right of the trade-off relationship;
- (b) A linkage between these shifts and business cycles in real economic activity.

If therefore, our hypotheses are verified, this would imply a reexamination of the current framework used for stabilization policies and the way these policies are implemented.

We present our case in four parts. In the first part we review the context in which present stabilization policies are undertaken and the problems facing them.

In part two, we reexamine the empirical context on which the trade-off relationship is built, and suggest a correlation between shifts in the trade-off and business cycles.

In part three, we review the developments in business cycles theories and in part four we attempt to establish with Canadian data a link between shifts in the trade-off and elements stemming from the framework of business cycle theories.

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## 1.1 ECONOMIC FLUCTUATIONS

### (a) On the Existence of Cycles

Cyclical patterns are found in the subject matter of nearly all the sciences. Toynbee<sup>1</sup> has called attention to the presence of apparent cyclical patterns in the rise and fall of whole civilizations. The Hindus, before him, believed that the whole universe was regulated by cosmic cycles and the early Greeks established analogies between seasonal cyclical patterns and the ages of humanity.

Similarly, in North America, while output has grown from approximately \$7 million per year before the Civil War in 1860 to a current level of over five trillion dollars, the course of growth in these aggregate economies has been anything but smooth. Historical records suggest that alternatively periods of expansion and contraction occurred as part of this growth process. In fact, cyclical alternations have played an important role in the continuous process of redirecting resources and factors of production within the structure of western economies.

There is, however, a need to distinguish between cyclical movements in the individual segments of the economy and cyclical movements in the aggregate economy. In a sense aggregate economic activity represents a cumulation of all the components of an economic system. An early definition of economic cycles is given by the National Bureau of Economic Research as follows:

"Business cycles are a type of fluctuation found in the aggregate economic activity of nations that organize their work mainly in business enterprises. A cycle consists of expansions occurring at about the same time in many economic activities, followed by similarly general recessions, contractions and revivals which merge in the expansion phase of the next cycle; this sequence of changes is recurrent but not periodic ..."<sup>2</sup>

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1. Arnold J. Toynbee: A Study of History (New York; Oxford University Press; 1947).
  2. W.C. Mitchell, Business Cycles: The Problem and its Setting (New York National Bureau of Economic Research, 1927).

Economic fluctuations per se do not necessarily make economic cycles. An observation of the vast array of economic time series suggests that some are rising while others are falling and some attain their peaks while others are following. In view, therefore, of the wide variation in timing of these individual series, the problem is to find out if there is any rhythm at all to their behaviour on which it may be concluded that they produce a discernible cyclical pattern in the aggregate economy. In fact, some economists had expressed doubts as to the existence of a general business cycle<sup>1</sup>. However, the National Bureau of Economic Research in the U.S. (NBER), the most authoritative source in the compilation of economic fluctuations, developed indicators and techniques for the identification and measurement of economic cycles<sup>2</sup>. It appears on the basis of this evidence and taking account of a diffusion index among the considered time series, that their plots show rather strikingly how these series do tend to move in cyclical patterns. The combined effect of the economic forces represented by these different time series shifts is to produce alternating periods of cyclical expansion and contraction in the aggregate economy. Thus, says Maurice W. Lee, "out of these combined effects and their individual movements, the economic cycle of the aggregate economy is born".<sup>3</sup>

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1. Irving Fisher, for example, wrote: "If we draw any smooth curve to represent the general trend of population, the actual population figures must necessarily rise sometimes above and sometimes below this mean trend line ... Must we then speak of the "population cycle" ...? I see no more reason to believe in "the" business cycle. It is simply the fluctuation about its own mean, and yet the cycle idea is supposed to have more content than mere variability. It implies a regular succession of similar fluctuations, constituting some sort of recurrence, so that, as in the case of the phases of the moon, the tides of the sea, nerve motion, or pendulum swing, we can forecast the future on the basis of a pattern worked out from past experience, and which we have reason to think will be copied in the future".

In: "our unstable dollar and so-called Business cycle", Journal of the American Statistical Association, Vol. XX (June, 1925), pp. 191-192.

2. Geoffrey H. Moore, Statistical Indicators of Cyclical Revivals and Recessions, NBER, Paper No. 31 (New York, 1938)
3. Maurice W. Lee, Macroeconomics: Fluctuations, Growth and Stability, Irwin 5th Edition, Illinois, pp. 37. (1972)

These aggregate economic cycles are known in Great Britain as "TRADE CYCLES" and in North America as "BUSINESS CYCLES"<sup>1</sup>.

(b) The Classification of Cycles

Although, as suggested above, there appears to be a certain consistency in patterns of cyclical variations in the aggregate economic activity, in fact however, 'cycles' vary widely in all respects, depending on the historical sets of data used, the techniques of measurement that are applied, the duration considered, and the conceptual framework that are advanced for their identification. It cannot be said, therefore, that there exists a typical 'AVERAGE CYCLE' resulting from all situations. In the U.S., for example, the most common cycle; 'The modal cycle', is one of three-to-four years' duration. In France, on the other hand, the two-to-three year cycles are the most common. In Great Britain the span appears to be of three-to-six years, whereas in Germany no consistent modal pattern would appear.

Furthermore, in the post World War II era, the classical business cycle exhibiting alternate periods of expansion (Boom) and contraction (Bust) seems to have disappeared, a feature which leads some economists to rethink the concept of the BUSINESS CYCLE.

One of the early identifications of the 'BUSINESS CYCLE' was by Clément Juglar, a French medical doctor who gave up the practice of medicine to found the Société de Statistique in Paris in 1860. Juglar<sup>2</sup> reported 'his' cycle as having an average duration of 9 to 10 years.

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1. Maurice W. Lee (op. cit. pp. 37) suggests that: "the term 'TRADE CYCLES' is misleading in that it appears to give too much emphasis to retail transactions". On the other hand, the term: 'BUSINESS CYCLES' reflects the overwhelming importance of private business in the economic life of the various western nations .... in fact, .... the cycle extends beyond the realm of business, narrowly conceived, and includes fluctuations in every variety of economic activity ...".
  2. Clément Juglar: "Des crises commerciales et leur retour périodique en France, en Angleterre, et aux Etats-Unis". (Paris, 1862)

In 1923, Joseph Kitchin developed the thesis that business cycles are really of two varieties; a minor cycle with an average duration of 40 months and a major cycle composed of two or three minor cycles.<sup>1</sup>

In 1925, Nikolai D. Kondratieff<sup>2</sup>, suggested the possibility of a general cycle; "the long wave"<sup>3</sup> approximately fifty years in duration.

Joseph Schumpeter, in his extensive work on business cycles<sup>4</sup> attempted to integrate the Juglar, Kitchin and Kondratieff cycles into a scheme of composite activity showing the constant interaction of these cycles upon one another. This interplay among cycles of different duration offers intriguing possibilities, some of which may be advanced by the current work of Professor Forrester at M.I.T.

Moreover, an examination of historical records of wholesale price indices for the U.S., Great Britain, France and Germany shows evidence of cyclical patterns similar to the Kondratieff cycle. Although this might be a reflection of long-term upward movements in prices followed by long-term movements in an opposite direction, nonetheless Burns and Mitchell<sup>5</sup> underline the following:

"Allowing as best we can for the interrelation of business cycles in our four countries, we judge that the evidence in hand supports the common opinion that there is a real relation between the direction of the trend of wholesale prices and business cycle contractions".

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1. Joseph Kitchin; "Cycles and Trends in Economic Factors", Review of Economic Statistics, January, 1923.
  2. Nikolai D. Kondratieff: "Die langen wellen der konjunktur", Archiv fur Sozialwissenschaft und Sozialpolitik, vol. LVI, No. 3, 1926. Translated in Review of Economic Statistics, November, 1935.
  3. Jan Tinbergen in "Dynamics of Business Cycles" (Chicago: University of Chicago press (1950, p. 61, suggests that two Dutch economists, Van Geldern and De Wolff, might have discovered these long waves in economic activity before Kondratieff.
  4. Joseph Schumpeter: Business Cycles; New York, McGraw-Hill Book Co., 1939.
  5. Burns and Mitchell, Measuring Business Cycles, New York, NBER, 1946.

Other long cycles are reported to be found in building activity by Clarence Long who describes them as "great sweeps of enormous height and depth lasting on the average 20 years".<sup>1</sup> This evidence is reinforced by Burns and Mitchell findings, who write:

"Our studies indicate that building construction is characterized by long cycles of remarkably regular duration. They run usually from about 15 to 20 years; they are clear-cut in outline, attain enormous amplitudes and are parallel by long cycles in other real estate processes".<sup>2</sup>

In his studies, Clarence Long concludes that "building trends precede general business on major downturns".<sup>3</sup> Maurice W. Lee however, points out that although there appears to be a general tendency in Long's correlation between building and general economic cycles, "it does not follow that every downturn in the Long building cycle is an omen of imminent major depression in the aggregate economy".<sup>4</sup> A special feature of building cycles seems to be that their fluctuations are more wide and that their intensity has been increasing since the turn of the century.<sup>5</sup> In his statistical investigations of the building cycles, J.R. Riggleman reports that "while general business cycles usually fluctuate within a range of 20 percent above or below normal, the major building cycles fluctuate from two to three times as far from normal".<sup>6</sup>

The great amplitudes in fluctuations with respect to the building cycle appears to be consistent in the construction activity of various countries over the past two centuries, as shown in the analyses of the NBER made by M. Gottlieb.<sup>7</sup>

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1. Clarence D. Long Jr., *Building Cycles and the Theory of Investment*, Princeton, N.J., Princeton University Press, 1940, p.129.
  2. Burns and Mitchell, *Measuring Business Cycles*, op. cit., pp. 418-20.
  3. C. Long, op. cit., p. 155.
  4. M.W. Lee, op. cit., p. 54.
  5. C. Long, op. cit., p. 168
  6. John R. Riggleman, "Building Cycles in the United States 1875-1932", *Journal of the American Statistical Association*, vol. XXVIII, September 1933, p. 182.
  7. Manuel Gottlieb, "Tested Knowledge of Business Cycles", NBER, 42nd Annual Report, New York, 1962, pp. 48-51.

There is, moreover, since World War II some evidence of a short building cycle, specifically for residential construction, with a counter-cyclical pattern with respect to the general business cycle.<sup>1</sup>

Finally, some<sup>2</sup> have advanced the possibility of sub-cycles existence in many economic series. This shorter cycle would typically average 18 months in duration. R.P. Mack, for example, identified a short-cycle in the activity process of shoe manufacturing, from leather fabrication to the ultimate retailing of shoes.

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1. Jack M. Guttentag, "The Short Cycle in Residential Construction 1946-59", AER, vol. LI, No. 3, June 1961, pp. 278-298.
  2. Ruth P. Mack: "Consumption and Business Fluctuations: A Case Study of the Shoe", leather sequence, NBER, New York 1956; and Thomas M. Stanback Jr., "Short Run Instability in the Cotton Broad Woven Goods Industry, 1946-51 (Durham, N.C., Duke University, Doctoral Dissertation, 1954; and Bert G. Hickman, "Cyclical Fluctuations in the Cotton Textile Industry", Berkeley, University of California, Doctoral Dissertation 1951.

## 1.2 THE STABILIZATION PROBLEM

### (a) Why Stabilize?

Although economic fluctuations were sufficiently documented by the end of the 18th and during the 19th centuries, economic thought was directed to questions of equilibrium and long-range analysis. Nevertheless, alternating periods of inflation and depression were carrying the economy to extremes of disequilibrium. Since these could not be ignored, some economists attempted to find suitable explanations. Karl Marx proposed a theory of cyclical unemployment and Stanley Jevons<sup>1</sup>, and later on Henry Moore<sup>2</sup>, sought a correlation between cycles of nature (i.e. weather, climate and astronomy) and cycles in the economy. Malthus had attempted to discuss the "recurring periods of glut and crises". However, during that time the great names which carried forward the classical development of economic theory were those of Ricardo, Say, J.S. Mill and Marshall. Accordingly, it is fair to say that by and large the comprehensive analyses of cyclical phenomena in the economy were neglected. The core classicists looked at unemployment as a marginal phenomenon. They hoped that if the monetary authorities would move the money supply up or down quickly enough to keep the market rate of interest always at the natural rate; so that price and wage movements would remain flexible, the economy would always come to full employment.

But by 1930, however, unemployment was rising despite the collapse of wage levels. Capital markets and labour markets were on the brink of disaster. Standard economic theory, with its preoccupation on the long run, was proving largely irrelevant. As the Great Depression deepened, explanations were appearing from many quarters and it was in 1936 after starting on two false trails<sup>3</sup> that John Maynard Keynes published "The General Theory of Employment, Interest and Money".<sup>4</sup>

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1. Stanley Jevons, "Investigations in Currency and Finance", London, MacMillan and Co., 1884.
  2. Henry L. Moore, "Economic Cycles: their law and cause; New York, MacMillan and Co., 1914.
  3. In 1930, Keynes produced a massive two-volume Treatise on Money and two years later, he published his Essays in Persuasion. Both works showed little evidence of any major rejection of classical tenets.
  4. J.M. Keynes, "The General Theory of Employment, Interest and Money", New York, Harcourt Beace & Co., 1936.

Although it took sometime to understand the full implications of the "General Theory", it eventually provided a framework within which stabilization policy could emerge. The General Theory was not written as an analysis of the business cycle; however, Keynes himself underlines its application to cycle analysis by saying:

"Since we claim to have shown in the preceding chapters what determines the volume of employment at any time, it follows, if we are right, that our theory must be capable of explaining the phenomena of the Trade Cycle".<sup>1</sup>

With the General Theory, Modern Macroeconomics is, in effect, being launched and macroeconomic theory will attempt to explain the economy in terms of aggregated income and consumption relationships. Thus began the use of national income and product accounts in the analysis of economic fluctuations and on the basis of this information corrective measures will be taken. After World War II, the vivid memories of the Great Depression provided the necessary political clout to 'legitimatize' the practice of stabilization in government planning through the enactment of the Employment Act of 1946 in the U.S.\* This Act constituted in fact the basic statute on economic stabilization. Since then, the federal government in the United States has the responsibility to take the necessary actions and the appropriate measures to promote maximum employment, production and purchasing power. Section 2 of the Act reads as follows:

"The Congress hereby declares that it is the continuing policy and responsibility of the Federal Government to use all practicable means consistent with its needs and obligations, with the assistance and cooperation of industry, agriculture, labour, and state and local governments, to coordinate and utilize all its plans, functions and resources for the purpose of creating and maintaining, in a manner calculated to foster and promote free competitive enterprise and the general welfare, conditions under which there will be afforded useful employment opportunities, including self-employment, for those able, willing, and seeking to work, and to promote maximum employment, production, and purchasing power".<sup>2</sup>

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1. J.M. Keynes, op. cit., p. 313.  
Employment Act of 1946 as amended, with related laws, Joint Economic Committee, 89th Congress 2nd Session, Washington, D.C., Government Printing Office, 1955, p. 1.

\* In the Canadian context these issues were discussed in the 'White Paper' of 1945.  
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Similar goals are now accepted as basic policy objectives by the governments of most western industrial societies. In Canada, the first annual review of the Economic Council reiterated these goals by defining them as follows:

- full employment
- a high rate of economic growth
- reasonable stability of prices
- a viable balance of payments, and
- an equitable distribution of rising incomes<sup>1</sup>

In its broadest sense, economic stabilization has come to mean therefore an intentional process aiming at a situation of full employment, continued growth and price stability. In reality, the stabilization concept is more complex and it encompasses many meanings which may, in turn, be reflected in a vast array of applications.

To begin with, the concept of full employment is an elastic one. In practice, total use of the labour force at any given time is simply not feasible. Machines must be shut down for repair, maintenance, and overhauling. Workers move from job to job. Seasonal fluctuations impose other limitations. Thus, an attempt to stabilize at near literal full-employment levels could lead to conditions of extreme instability.

Moreover, and as paradoxical as it may seem at first glance, conditions of overfull employment may be reached whenever current demand exceeds current supply with the economy operating at full capacity<sup>2</sup>. Overfull employment is accompanied by sharply rising prices although the level of prices is not uniquely a function of overfull employment.

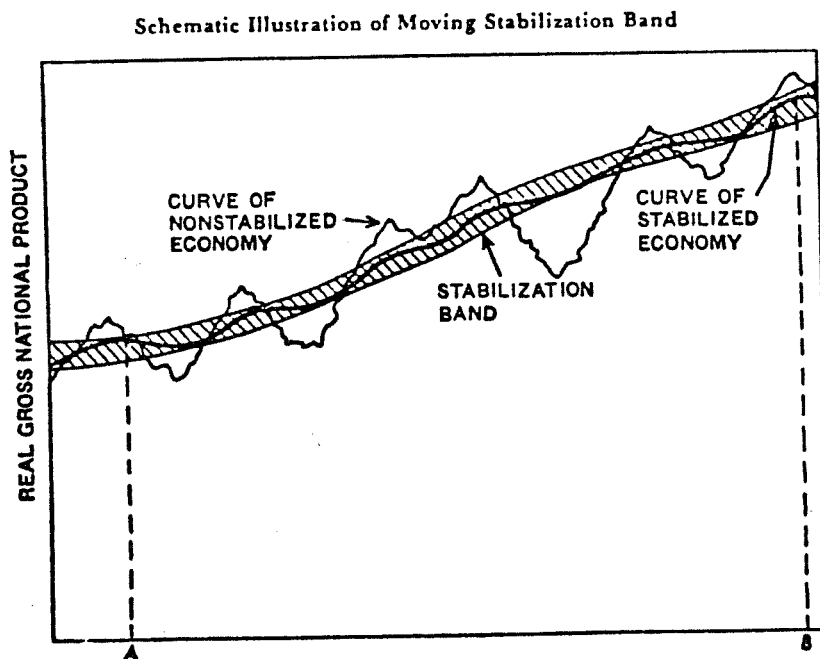
While it is not possible, to set a precise point at which the economy may be considered at full employment or overemployment, it is generally considered that an economy which operates within 95 or 96 percent of its resources is

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1. First Annual Review: Economic Goals for Canada to 1970, Economic Council of Canada, Ottawa, Queen's Printer, 1964, p. 1.
  2. M.W. Lee, op.cit, p. 399, gives the following definition of overfull employment: "a situation in which current aggregate demand exceeds current aggregate supply and the balance may not be restored by an increase in supply within the immediate future".

for practical purposes at full employment. Concern over employment levels refers to stabilization in terms of resource utilization. But the question of stabilization may be considered also in terms of price levels. In fact, some economists believe that full employment could only be achieved through deliberate management of price levels. In any case, galloping inflation can create conditions of extreme instability and lead to severe depressions<sup>1</sup>; hence the responsibility for the government of maintaining purchasing power.

Finally, economic stabilization does not mean a freeze of the economy at given employment and price levels. If the economy, in order to maintain prosperity, is to continue growing for the general welfare of society, it requires constant readjustments in its dynamic process. Furthermore, a certain rate of growth might be necessary in order to accommodate increments in the labour force. Hence, economic stabilization would mean in that context aiming at certain levels of employment and prices without sacrificing growth or, put in other words, within an acceptable rate of economic growth.

The above considerations on full employment, price stability and growth could be illustrated schematically by the following chart<sup>2</sup>:



1. i.e., the German hyper-inflation case of the 1920's.
2. From M.N. Lee, op. cit., p. 404.

(b) The Tools of Economic Stabilization

Generally, the three preferred tools of stabilization policy consist of: fiscal policy, monetary policy, and debt-management policy. Under severe circumstances direct control upon wages and/or prices, known also as income policy, has been used. Before the 1930's, fiscal policy was not really used to influence the economy and responsible fiscal management consisted chiefly at balancing the budget. However, after World War II, it became evident that governments could influence aggregate demand and thus output and employment levels by varying their receipts-expenditure balances. The targets of fiscal policy consisted therefore in the post-war period at achieving desired levels of economic performance through either budget deficits or surpluses, and the size of the government sector.

The levers of fiscal policy are simply the components of governmental receipts and expenditures. Essentially from the receipts side these components consists of: the individual income tax, the corporate income tax, the excise taxes, the estate and gift taxes, the customs duties, the social insurance receipts plus some other miscellaneous items. From the expenditure side, we can principally distinguish outlays for National Defence, for Social programs (i.e., health, education, housing, income security, veterans, etc.), public works, general government, interest payments and, in the case of Canada, provincial equalization programs. Manipulation of the personal income tax will obviously affect individuals' spending and/or saving habits. However, tax policy is more complex than just affecting average variations on tax rates. Problems of rate structure must be dealt with and the incidence of given tax rates upon special groups assessed before tax policy could prove effective.

Corporate income tax is also a major lever in the application of tax policy and plays a vital role in economic stabilization. But here too are complexities with respect to the industrial structure and mix. Problems related to the shifting of the tax incidence towards the consumer in form of higher prices must be taken into account.

Moreover, the impact of the corporate income tax could come directly upon and affect investment. Because of the uncertainties some alternatives to the

corporate income tax were at times proposed. In Canada, the Carter Royal Commission on Taxation<sup>1</sup> recommended in 1966 a uniform personal income tax to replace all other taxes including the corporate income tax. The value-added tax<sup>2</sup> has been advocated also as a substitute to the corporate income tax and Common Market countries began adopting it since the end of the 1960's. Finally, excise tax or sales tax rates could be imposed upon particular commodities in order to discourage their consumption.

In the context of fiscal policy, a distinction needs to be made between 'discretionary stabilizers' and 'automatic stabilizers'. Discretionary stabilizers involve decisions made on the application of specific tax rates. Automatic stabilizers, by contrast, are built in so to speak in the revenue system and concern personal and corporate income taxes and unemployment compensation programs. In times of cyclical expansion, for example, unemployment compensation collections increase because unemployment decreases. Thus, automatically a net flow of funds moves out of the economy and into government during periods of expansion, and back into the economy during periods of contraction, providing therefore a stabilizing effect without calling for any new policy implementation. Similarly, the corporate income tax revenues increase in periods of booms and decrease in periods of slower growth and have thus a dampening effect on the cycle. Personal income tax receipts swing in a related fashion. During an expansion, more taxpayers move into higher income brackets and a more than proportional rise in tax payments from the economy to the government takes place. The opposite occurs in periods when the economy is declining. It is thought that these stabilizers have greater effect in times of decline than in times of cyclical expansion<sup>3</sup>.

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1. Report of the Royal Commission on Taxation, Ottawa, Canada 1966, vol. 4, chap. 19, Queen's Printer.
  2. The value-added tax is essentially a flat rate tax on the value added at each stage of production. Such taxes were popular at the end of World War I; see, for example, National Policy Statement, a Better Balance in Taxes on Business (New York: Committee for Economic Development, 1966).
  3. Peter Eielott, "The Effectiveness of Automatic Stabilizers", American Economic Review, June 1966, pp. 450-465; and, D. Usher, "The Stabilizing Effectiveness of Budget Flexibility" in Policies to Combat Depression, National Bureau of Economic Research (Princeton, N.J., 1956), pp. 205-235; and, M.O. Clement, "The Quantitative Impact of Automatic Stabilization", Review of Economic Statistics; February, 1960, pp. 42-61.

The other side of fiscal policy is government expenditures. In theory at least, a curtailment of government expenditures is prescribed when the economy is moving toward over-full employment and an expansion of government expenditures when the economy falters into unacceptable unemployment. Theoretically, all government spending is inflationary and reductions in government spending deflationary. Government expenditures should then normally be adjusted to compensate for the fluctuations of the private economy rather than aggravate them. However, the notion of counter-cyclical policy is difficult to apply in reality. Government expenditures, for example, must be legislated under a time-consuming process and it could take months or years before the actual implementation of a proposed expenditures program. Furthermore, expenditures through large-scale public works projects require time to be planned carefully and advance planning of these type of projects is not always fruitfully undertaken by government bureaucracies. In addition, a substantial amount of government expenditures is usually difficult to control, such as, for example, programs of national defence, interest on debt, pensions, etc. For all these reasons, a degree of inflexibility is generally found in the use of expenditure policy for stabilization purposes.

Another tool of stabilization policy is constituted by monetary policy which in many ways is seen as the complement of fiscal policy. Monetary policy, furthermore, was an active, if not particularly effective, tool of stabilization at least since the period following World War I. At that time quantity theory<sup>1</sup> provided the basic framework for operation in the context of classical economies and fiscal policy was not really thought of in terms of economic stabilization. Essentially, monetary policy seeks to maintain a balanced aggregate economy through control of the aggregate demand for money. The principal sources of money supply are currency in circulation and demand deposits which constitute the larger source in the flow of money. These are normally regulated by central banks (i.e., the Bank of Canada and the Federal Reserve System in the U.S.A.). The central banks apply monetary policy either by moral suasion and/or variations in reserve ratios, changes in rediscount rates and open-market operations.

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1. We will have an opportunity to come to quantity theory and subsequent developments in Part III.

Eventually, moral suasion encompasses a vast array of 'persuasion' tactics for the purposes of offsetting monetary fluctuations. These, for example, may resort to direct calls of letters from central monetary authorities to private bankers, urging them to restrict their credit activities. National and regional conferences may be used to induce money dealers to caution, etc.

If moral suasion does not prove very effective, central banks can regulate reserve ratios requiring member banks to hold a certain portion of their deposits on reserve with the Central Bank. Central monetary authorities can also change the rate at which they make loans to member banks (the discount rate). The cost of credit to individuals can thus be influenced by this way and effect either a contraction or an expansion of general credit in the economy. Finally, open market operations consist in the purchase or sale principally of government securities in the open market. These securities are sold to withdraw funds from the money flow or in order to put more purchasing power into the hands of the private economy.

In addition to fiscal policy and monetary policy, the government can use debt-management policy for stabilization purposes. Debt-management policy deals with the administration of the federal government debt. It essentially involves taking decisions on the interest rate to be paid on government securities and on the types of maturity distribution of the issues. In general, stabilizing through debt policy involves attempting to lengthen the public debt in times of high-level economic activity. It is thought that debt-management provides a flexible weapon for affecting monetary flows, but for stabilization purposes, there is a need to coordinate its usage with extreme care with the other tools of stabilization policy.

Finally, stabilization can be brought to bear, at least in theory, through direct government controls upon wages and/or prices. Direct control programs involve complexities which may not be apparent on surface and indeed this could be a source of some friction in the very application of those programs or in their assessment. Generally, the appropriate uses of direct controls may be seen when there is a need to contain individual segments of the economy which for special reasons cannot be kept in check by fiscal or

monetary measures. Secondly, direct controls may be used as stop-gap measures to allow time for the passage of legislation or for adequate operations dealing with fiscal or monetary policy to be effective. Thirdly, direct controls may be used to restrain speculative bursts in particular areas of the economy. Fourthly, direct controls could be applied when there is a need to protect the national interest from the effects of specific government programs. (i.e., materials which may be diverted from the economy to special governmental needs). Fifthly, direct controls may be used as devices for checking the "psychology of inflation" seen as triggering the prices-wages spiral.

Numerous problems, however, present themselves whenever controls are applied. The administration of price controls, for example, involves complications with respect to price level definitions, to equity between sellers, and to effective monitoring checks. Wage controls present similar problems and could be inflicting an unfair cost to particular segments of society by affecting different groups differently, inevitably they provoke reactions making stabilization policy a political issue.

Most of all, the implementation of direct controls involves the setting up of extensive bureaucracies at considerable cost, and are thus seen in the long run as a self-defeating device.

In principle, it is thought that direct controls effect a misallocation of economic resources and they are no substitute for sound fiscal and monetary management.

### 1.3 THE FORECASTING PROBLEM

In order to develop an appropriate stabilization program, it is of vital importance to be able to forecast: first, the date of future turning points; second, the duration of expansion or contraction periods which follow these turning points; and finally, the magnitude of the ensuing movements. Without such information, stabilization policies would be difficult to implement and yet the forecasting of these fluctuations in the aggregate economic activity is one of the most difficult and challenging problems facing economists.

"Forecasting" writes Lee<sup>1</sup> "is a bit like fly casting. Its practitioners are always a little startled when their realizations approximate their expectations. Both require patience, careful study, intuition, and the exercise of a considerable amount of judgment".

It is not surprising therefore that the modern approaches to the forecasting of economic fluctuations have seen, at least since the publication in 1915 of Wesley Mitchell's "The Making and Using of Index Numbers"<sup>2</sup>, the development of numerous forecasting techniques which in general followed the improvement in national accounts data and refinements in statistical techniques increasing with computer facilities, together with the use of various theoretical considerations as frameworks for analysis.

#### (a) Forecasting with Leading Indicators

The range of forecasting methods includes: the use of leading indicators developed by the National Bureau of Economic Research (NBER) in the U.S.A. This method consists essentially of analyzing the behaviour of many economic time series over the course of business cycles. A classification of this series is then made in accordance with the cyclical characteristics depending on whether they normally lead, move with, or lag behind cyclical movements in the aggregate economic activity.

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1. M.W. Lee, op. cit., pp. 575-
  2. Bureau of Labour Statistics, U.S. Department of Labor, Bulletin No. 173, (Washington, D.C.: U.S. Government Printing Office, 1915).

Following the work of Mitchell<sup>1</sup>, the stage for the development of these indicators was set by Mitchell and Burns in: 'Statistical Indicators of Cyclical Revivals'<sup>2</sup> and later in the more comprehensive report: 'Measuring Business Cycles'.<sup>3</sup> There are some technical problems related to the compilation of these indicators and to their interpretation. First, many of these series present erratic fluctuations which make it very difficult to ascertain turning points. Adjustment methods are then used to smooth the data and thus attempt to separate cyclical movements from seasonal and erratic fluctuations. A common method used for seasonal adjustment is known as the ratio to moving average method. Other variants of this method assume that the seasonal adjustment factor is constant instead of a constant proportion of each observation. A more complex method which has been used extensively by the NBER is to calculate seasonal adjustment factors which can change over the sample period.<sup>4</sup>

Finally, besides smoothing data for individual services, different indicators can be combined into a single composite series known as a 'diffusion index'. This index simply records the percentage of components of the composite series which has risen over a given time span. The range of each diffusion index is thus defined to extend from 0 percent (when all components are turning down) to 100 percent (when all components are turning up).

The compilation of these series serves as a valuable historical record and furthermore sheds light on the causes of past depressions. It would appear, moreover, that in general, and although with varying lead times, these indicators have signalled in their past performance warnings that the economy was turning down. The problem, however, for stabilization purposes is the need of sufficient accuracy and as such it would appear that the leading indicators as a practical method of forecasting cannot be used very effectively. Perhaps a major reason of this is the fact that peaks and troughs as a result of current economic activity are not as visible as they were in the past, partially because post-war recessions have been relatively mild.

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1. W.C. Mitchell, op. cit.
  2. W.C. Mitchell and A.F. Burns, Statistical Indicators of Cyclical Revivals, Occasional Paper 69 (New York: NBER 1938).
  3. A.F. Burns and W.C. Mitchell, Measuring Business Cycles (New York, NBER, 1946).
  4. i.e., The X-11 Variant of the Census Method II, Seasonal Adjustment Program; Census Bureau Technical Paper 15 (Washington: Government Printing Office, 1965).

(b) Forecasting with Anticipatory Data

Another technique of forecasting is made with the use of anticipatory data concerning consumer attitudes, investment decisions and inventory and sales anticipations. These methods are based on the view that aggregate economic activity is largely determined by exogenous shifts in anticipations and expectations about the future.

The data is generally collected through direct surveys and serves thereafter to compile indicators which will reflect potential future trends in economic activity. One such widely-used survey has been developed by the Survey Research Centre (SRC) at the University of Michigan.

Essentially the information gathered through consumer surveys is of two types: attitudinal data (what the consumer thinks about the general state of the economy) and buying plans, and can be analyzed on a cross-section or time-series basis.

Early cross-section analysis suggested that the buying plans were useful for predicting purchases of consumer durables but that the attitudes were not<sup>1</sup>. Later, however, in a review of 10-year forecasting record of the attitudes and buying plans, Eva Mueller of the SRC found that "throughout, the contributions of car-buying intentions is negligible when attitudes also appear in the equation"<sup>2</sup>. Furthermore, it would appear that the attitudes are more useful in predicting purchases of automobiles rather than other durables. Evans suggest that "success of the attitudes in the early post-war period was due to changing credit and supply conditions; when these variables are included in a regression explaining car purchases, the attitudes make no additional net contribution".<sup>3</sup>

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1. i.e., J. Tobin, "On the Predictive Value of Consumer Intentions and Attitudes", *Review of Economics and Statistics*, Vol. 41, No. 1 (February 1959, pp. 1-11).
  2. Eva Mueller, "Ten Years of Consumer Attitude Surveys: Their Forecasting Record", *Journal of the American Statistical Assoc.*, Vol. 58, No. 4 (Dec. 1963), p. 913.
  3. Michael K. Evans, "Macroeconomic Activity, Theory, Forecasting and Control", Harper and Row, New York, 1969, p. 466

In addition, to consumer surveys, information is also gathered to reflect business investment intentions in the U.S. Such data is issued by the Office of Business Economics and the Securities and Exchange Commission. Other series can be found in privately-sponsored organizations such as, for example, the McGraw-Hill survey of Capital Expenditures. In Canada, the Department of Industry, Trade and Commerce produces similar surveys in conjunction with Statistics Canada. Also such surveys are reported by the Conference Board.

There are some basic differences between consumer attitudes series and business investment surveys. In the latter case, at definite intervals, firms are asked to state both their investment during the previous time-period and their investment plans during the following time-period, but participants are not asked to supply their views on the economy. With reference to the predictive power of these series, Okun states: "The investment anticipations reported in the Commerce-SEC survey have an impressive record of predictive accuracy ...".<sup>1</sup> However, stringent econometric testing by M.K. Evans appears to show "that an investment function of endogenous variables predicts investments just about as well as the anticipations ... (but he adds) ... Although the anticipations and endogenous functions do equally well for total investment, the anticipations alone do outperform an endogenous function for the manufacturing sector".<sup>2</sup> Evans' tests with quarterly data also show that "the anticipations data are more reliable at identifying a turning-point after it has occurred than predicting it in advance".<sup>3</sup>

Besides fixed business investment anticipations, other surveys issue anticipatory data for sales and for manufacturing inventories. Most economists, however, agree that these sales anticipations are of very little value. Okun<sup>4</sup> points out that the January real sales releases, which come out at about the same time as yearly sales anticipations, contain more relevant information about the course of sales during the year than do the anticipatory data. Similarly, inventory anticipations are found to have little forecasting value but with more data on hand they could be of interest to short-term forecasters<sup>5</sup>.

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1. Arthur Okun: "The Predictive Value of Survey of Business Intentions", *American Economic Review Papers and Proceedings*, Vol. 52, No. 2 (May, 1962), p. 221.
  2. Michael K. Evans, op. cit., pp. 472-473.
  3. M.K. Evans, op. cit., p. 476.
  4. Okun, op. cit., p. 219.
  5. Evans, op. cit., pp. 483-486.

(c) The Econometric Approach

The above 'plain' methods of forecasting can certainly be useful to the general understanding of cyclical patterns in economic activity, mainly in relation to past trends. However, because the accuracy in their predictive record is considered poor, the determination process of stabilization policies makes use in additional areas of more sophisticated tools; such as econometric models. Econometric models encompass both theoretical and empirical strands and they can be used both for prediction and general structural analysis of the economy. Before entering into the generation of more complex econometric models used for policy purposes, it is helpful in our context to review briefly some of the "logical constructions" which at one time or another have attempted to provide an explanation of economic cycles. Three such models are considered<sup>1</sup>:

- A - The dynamic multiplier with consumption lag
- B - An inventory-cycle model
- C - The multiplier-accelerator model.

A. The Dynamic Multiplier with Consumption Lag

This model comprises a consumption function of the form:

$$C_t = a + m Y_{t-1} \text{ where } 0 < m < 1 \quad (A1)$$

and an investment function of the form

$$I_t = I \text{ (a positive constant)} \quad (A2)$$

The output determination takes the form

$$Y_t = Z_t = (C_t + I_t \text{ by definition}) \quad (A3)$$

Thus, in (A1) consumption ( $C_t$ ) depends on last period's income ( $Y_{t-1}$ ) with a marginal propensity to consume ( $m$ ). Investment in (A2) is constant through time.

From (A1), (A2) and (A3), we get:

$$Z_t = a + I = mY_{t-1} \quad (A4)$$

If we define:

$A = a + I =$  total autonomous expenditure,  
and eliminating  $Z_t$  between (A3) and (A4), we have

$$Y_t - mY_{t-1} = A \quad (A5)$$

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1. This is an exposition followed by Nicholas Rau in: 'Trade Cycles: Theory and Evidence'. MacMillan, London, 1974.

To find an equilibrium income or the level of income  $\bar{Y}$  which if obtained in period  $t_0$  can be obtained subsequently in other periods as well, we pose

$Y_t = Y_{t-1} = \bar{Y}$  in (A5) and we get:

$$\bar{Y} = m\bar{Y} = A \text{ or } \bar{Y} = \frac{A}{1-m} \quad (\text{A6})$$

which is the familiar Keynesian multiplier expression.

If we now want to consider the general case where  $Y_0$  is not necessarily equal to  $\bar{Y}$ , what would happen to income as time goes on can be expressed by defining:

$Y_t = Y_t - \bar{Y}$ ; where  $y_t$  is the deviation of period (t) income from equilibrium income.

By subtracting (A6) from (A5) we get:

$$Y_t - mY_{t-1} = 0 \quad (\text{A7})$$

which yields:

$$Y_1 = mY_0$$

$$Y_2 = mY_1 = m^2Y_0$$

$$Y_3 = mY_2 = m^3Y_0$$

and so on. Thus for each t,  $Y_t = m^t Y_0$ , which in turn gives us:

$$Y_t = \bar{Y} + m^t (Y_0 - \bar{Y})$$

Furthermore, since  $0 < m < 1$ ,  $m^t$  will become very small as t becomes large. So as time goes on,  $Y_t$  approaches  $\bar{Y}$ .

#### B. The Inventory-cycle Model

In this model the consumption function is determined as follows:

$$C_t = a + mY_{t-1} \text{ where } 0 < m < 1 \quad (\text{B1})$$

and the investment function as:

$$I_t = \bar{I} \text{ (a positive constant)} \quad (\text{B2})$$

the output determination takes the form:

$$Y_t = Y_{t-1} + r (\bar{S} - S) \text{ (where } r \text{ and } \bar{S} \text{ are positive constants)} \quad (\text{B3})$$

The Stock accumulation writes:

$$S_t - S_{t-1} = Y_t - I_t - Z_{t-1} \quad (\text{B4})$$

and setting  $Z_t = C_t + I_t$  and  $A = a + \bar{I}$  as before we have

$$Z_t = A - mY_{t-1} \quad (\text{B5})$$

We note that the main difference between Models A and B lies in the output-determination equation. However, in Model B the assumption is that producers do not respond simultaneously to demand but rather desire in the long run to carry over a constant quantity  $\bar{S}$  of stocks (or inventories) from period to period.

If  $S_t$ , for example, happens to be equal to the desired quantity  $\bar{S}$ , firms will simply continue production at the level of the previous period. If on the other hand,  $S_t$  falls short or exceeds  $\bar{S}$ , then production is either increased or diminished from period (t-1) to period (t) by an amount proportional to the size of the stock-discrepancy ( $\bar{S} - S_t$ ). This assumption is expressed by (B3) with  $r$  measuring the speed of stock-adjustment.

Equation (B4) expresses the assumption that all demands are met either out of current production or out of stocks. The net excess ( $Y_{t-1} - Z_{t-1}$ ) of production over demand during period t-1 will then be equal to net stock accumulation during that period ( $S_t - S_{t-1}$ ).

Under these assumptions we can now express the behaviour of  $Y_t$ . If we lag (B3) by one period (i.e. replace (t) by (t-1) throughout and subtract the resulting equation from (B3) itself, we obtain:

$$Y_t - Y_{t-1} = Y_{t-1} - Y_{t-2} - r(S_t - S_{t-1}) \quad (B6)$$

Eliminating ( $S_t - S_{t-1}$ ) between (B4) and (B6) we obtain

$$Y_t - (2-r) Y_{t-1} + Y_{t-2} = rZ_{t-1} \quad (B7)$$

If we no lag (B5) by one period and eliminate  $Z_{t-1}$  between the resulting equation and (B7) we obtain:

$$Y_t - (2-r) Y_{t-1} + (1-rm) Y_{t-2} = rA \quad (B8)$$

There is an important difference between (B8) and (A5). In Model B, unlike Model A, income is determined by its values in the preceding two periods. Equation (B8) is therefore known as a second-order difference equation. Because of this in Model B equilibrium income is defined to be that income level  $\bar{Y}$  which, if it obtained in the first two periods, would be maintained thereafter. By (B8)  $\bar{Y}$  is given by

$$\bar{Y} - (2-r)\bar{Y} + (1-rm)\bar{Y} = rA \quad (B9)$$

Since  $1-2 + r+1 - rm = r(1-m)$ , we have:

$$\bar{Y} = \frac{A}{1-m}$$

as before.

Again as before, we set  $y_t = Y_t - \bar{Y}$  and subtract (B9) from (B8) to obtain:

$$y_t - (2-r)y_{t-1} + (1-rm)y_{t-2} = 0 \quad (B10)$$

Now this is a second-order difference equation which can be solved applying the appropriate formulae yielding from (B10) the following:

$$y_t + by_{t-1} + cy_{t-2} = 0$$

where  $b = r-2$ ,  $c = 1-rm$

Since  $r$  and  $m$  are both positive,  $c < 1$ . Also  $1 + b + c = r(1-m) > 0$ , since  $r > 0$  and  $m < 1$ . Furthermore,  $b$  will be negative provided that  $r < 2$  (i.e. provided firms do not 'violently overshoot' when adjusting for stock-discrepancies). It follows that the time-path of  $y_t$  displays either monotonic stability or damped oscillations, so that income will approach  $\bar{Y}$  in either steady or an oscillatory manner. The necessary and sufficient condition for oscillations may here be written  $(r-2)^2 < 4(1-rm)$ . Since  $r > 0$ , this is equivalent to  $r < 4(1-m)$ . For example, if  $r = 0.6$  and  $m = 0.8$  the path to equilibrium displays damped oscillations.

C. The Multiplier-Accelerator Model

The most familiar version of this model writes as follows:

Consumption function:

$$C_t = a + mY_{t-1} \quad (0 < m < 1) \quad (C1)$$

Investment function:

$$I_t = \bar{I} + v(Y_{t-1} - Y_{t-2}) \quad (v > 0) \quad (C2)$$

Output determination:

$$Y_t = Z_t \quad (C3)$$

This is exactly like Model A except for the acceleration term in the investment equation (C2).

Simple manipulations show that:

$$Y_t - (m+v)Y_{t-1} + vY_{t-2} = A \quad (C4)$$

Where  $A = a + \bar{I}$  as usual. Again as usual, equilibrium income  $\bar{Y}$  is given by

$$\bar{Y} = A / (1-m)$$

and the deviation  $y_t = Y_t - \bar{Y}$  of income from equilibrium satisfies the second-order difference equation

$$Y_t + b_{t-1} + cY_{t-2} = 0$$

where, here

$$b = -(m+v) \text{ and } c = v$$

Since  $m$  and  $v$  are positive,  $v < 0$ , while  $1 + b + c = 1 - m > 0$   
 $y_t$  approaches zero if and only if  $v < 1$ .

The condition for oscillations reduces here to the inequality  
 $(m + v)^2 < 4v$ , which may be shown to be equivalent to:

$$[1 - (1-m)]^2 < v < [1 - (1-m)]^2$$

These results may be summarized as follows:

- (i) If  $v$  is small [ to be precise if  $v < [1 - (1-m)]^2$ ,  $y_t$  approaches  $\bar{y}$  steadily.
- (ii) If  $v$  is slightly less than 1, to be precise, if  $[1 - (1-m)]^2 < v < 1$ , then  $y_t$  approaches  $\bar{y}$  in an oscillatory fashion, the deviation  $y_t$  experiencing damped oscillations.
- (iii) If  $v$  is slightly greater than 1, to be precise, if  $1 < v < [1 + (1-m)]^2$ , then  $y_t$  oscillates explosively about  $\bar{y}$ .
- (iv) If  $v$  is large, to be precise, if  $v > [1 + (1-m)]^2$ , then  $y_t$  moves cumulatively away from  $\bar{y}$ .

#### 1.4 STABILIZATION: THE CURRENT STATE OF THE ART

##### (a) From Cycles to Trends and the Art of Fine Tuning

At the end of M.K. Evans'<sup>1</sup> 1969 edition book on macroeconomic activity, the last paragraph of his concluding chapter reads as follows:

"The business cycle is potentially still very much a part of aggregate economic activity but definite steps have been taken to counteract it.

Thirteen years after the trough of the Great Depression was reached, the Employment Act of 1946 was passed, ensuring that no such situation would occur again. Now that we know much more about the use of monetary and fiscal policy tools, it is time to extend this Act to make it an effective weapon against less severe recessions.

The theory of how monetary and fiscal tools can be applied ... suggest that if the cycle cannot be completely eliminated, it can at least be mitigated to such an extent that the economy will remain near full employment at all times".

Indeed, for a short while in the late 1960's and early 1970's, the use of Keynesian aggregate monetary and fiscal instruments in the articulation of economic policy coupled with perhaps the confidence resulting from the unprecedented growth of the American economy and the longest peacetime expansion on record, left the impression that the stabilization problem per se had been resolved. 1965 was widely hailed as the year the business cycle was "conquered". The whole context of economic policy-making had become one of fine tuning through the handling of the proper, effective monetary and fiscal policy controls available.

With substantial refinements in the basic Keynesian framework<sup>2</sup> and the possibilities offered by the development of computer technology, analysts could simulate and forecast the effect of slight changes in fiscal and/or monetary policy upon the rate of growth of the economy, prices and unemployment. Although sophisticated econometric modelling aimed at

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1. M.K. Evans, op. cit., p. 607.
  2. For the basic Keynesian framework and subsequent elaborations see part three.

capturing, depending on the degree of the model's disaggregation, the ever-increasing complexities of economic systems and their interrelationships; basically, however, it remains that the relation between output and labour is rendered within the framework of Neo-Classical production functions\* and, the relation between labour and prices, within that of Phillips curves. Therefore through proper aggregate demand management, including automatic stabilizers, the growth in output is assured. As a matter of fact the post-war era has been one of almost uninterrupted growth for the economies of Western Europe, Japan, the United States and Canada. Absolute declines in output from year to year have been extremely rare. Cyclical expansions are being defined to be periods of fast growth and cyclical contractions periods of slow growth. The peak of the business cycle is not one any more in which the rate of growth of output passes from positive to negative, the cycle is 'adjusted-for-trend' and how the rate of growth of output passes from above to below its long-run average level. Thus policy guidance becomes a matter of finding the required trend rate of growth for the economy and through fiscal and monetary tools reduce the fluctuations above or below the trend to respectively contain prices, inflation or unemployment. This is what has come to mean the art of fine tuning of the economy during the 1960's. Later on, however, economists have come to the realization that economic systems remain vulnerable, particularly to exogenously inflicted shocks. During the 1960's, fluctuations in economic activity that occasionally showed up as absolute changes in GNP (nominal or real) were customarily treated as deviations from a rising trend, lead to debate the question whether the business cycle had become obsolete<sup>1</sup>.

(b) Has the Business Cycle Really Disappeared?

It is evident that if "Economic stabilization exists when fluctuations in the aggregate economy do not carry resource utilization beyond a range of 95-96 percent of full employment and prices are held at comparatively stable levels, then, "most western economies" have not really enjoyed economic stability much of the time since the passage of the Employment Act of 1946".<sup>2</sup> Further more, failure is seen to have generally been on the price-stability front.

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1. Record of the 1967 London Conference published in Martin Bronfenbrenner, ed. "Is the Business Cycle Obsolete" (New York: Wiley - Interscience 1969).
  2. M.W. Lee, op. cit.

\* Particularly Cobb-Douglas functions.

By 1975, it was clear, writes Kein, "that the U.S. economy was suffering its more severe recession since World War II. In fact, some in the public press had discussed the possibility of another Great Depression".<sup>1</sup> Moreover, at the eve of 1979 still "the behavior of prices and real economic activity during a period of 'stagflation' leads to one of most vexing policy challenges economists face".<sup>2</sup>

J. Forrester<sup>3</sup> suggests that there are perhaps two possible misinterpretations in current economic thinking. First, monetary policy since World War II has often been given, perhaps wrongly, credit for reducing the severity of recessions. Second, the so-called Phillips curve relationship gives little guidance for how unemployment would respond to monetary policy. To the concern that has been expressed about the failure of monetary policy to cope with the recent recessions, the explanation, says Forrester "may be simply that money policy has at all times had little leverage over employment and the level of economic activity".<sup>4</sup>

In addition, reports Klein<sup>5</sup>, the way we measure trends, and the way we treat them after they are measured, have often crucially affected our ability to see - let alone measure - business fluctuations since World War II.

The truth of the matter may be as underlined by Forrester<sup>6</sup> that: "The presumed leverage of governments in deciding the mix of inflation and unemployment in the economy may well rest on a number of fallacies and misconceptions. First, the less severe recessions since 1945 may be simply a consequence of superposition of short and long-term cycles. Second, capital investment has been considered a necessary link in the dynamics of the business cycle, whereas the business cycle appears possible without variations in capital stock or changes in investment in fixed capital. Third, interest rates and credit are believed to be major influences on investment decisions,

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1. Phillip A. Klein: Business Cycles in the Post-war World, American Enterprise Institute for Public Policy Research, Washington, D.C., Study No. 42, 1976; p. 2.
  2. P.A. Klein, op. cit., p. 3.
  3. Jay W. Forrester: "Business Structure, Economic Cycles, and National Policy"; in Futures; June, 1976.
  4. J.W. Forrester; op. cit.
  5. P.A. Klein, op. cit., p. 7.
  6. J.N. Forrester, op. cit.

whereas stronger influences probably come from fluctuating inventories, backlogs, profitability expectations, and procurement delays. Fourth, and perhaps most seriously, the Phillips curve has been interpreted as a general relationship between all sources of inflation and all causes of unemployment."

These views, if not explicitly recognized as such, are however shared by a larger number of economists. Modigliani summarizes this situation by stating that: "The serious deteriorations in economic stability since 1973 must be attributed in the first place to the novel nature of the shocks that hit us, namely, supply shocks. Even the best possible aggregate demand management cannot offset such shocks without a lot of unemployment together with a lot of inflation. But, in addition, demand management was far from the best. This failure must be attributed in good measure to the fact that we had little experience or even an adequate conceptual framework to deal with such shocks."<sup>1</sup>

(c) The Emerging New Directions

Clearly, the search towards effective stabilization policies still implies the possibility to forecast and control cyclical fluctuations. But with the "disappearance" of the pre-war business cycle, economists are taken to task to provide an acceptable conceptual framework in order to explain the type and nature of present instability. If, as Klein suggests, "the classical business cycle might not have been tamed after all"<sup>2</sup>, then the problem becomes one of being able to perceive its manifestations through some new form of statistical evidence. Says Klein "Each cyclical episode has elements which make it unique as well as elements which suggest that it is part of the long-run pattern of cyclical fluctuation. This long-run pattern has been sufficiently pronounced to justify continued efforts to develop both business-cycle theory and better techniques of cyclical measurement".<sup>3</sup> In this vein, it appears that B. Higgins has first suggested that cyclical variations take now the form of shifting trade-off curves.<sup>4</sup>

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1. Franco Modigliani; *The Monetarist Controversy or, "Should We Forsake Stabilization Policies?"* In AER, March 1977.
  2. P.A. Klein; op. cit., p. 20.
  3. P.A. Klein; op. cit., p. 20.
  4. Benjamin Higgins; *Trade-off curves and Regional Gaps* in D.R. Eckaus and Bhāgwati, *Development and Planning: Essays in Honor of P.M. Rosenstein-Rodau*, London (George Allen and Unwin), 1972.

The recognition that there are cyclical shifts in trade-off curves (TOC) and that these shifts may be systematic, has come only recently to the forefront. Indeed, Robert Solow of M.I.T., in a recent article, leans towards the view that the shifts are haphazard, while recognizing the possibility of systematic shifts.<sup>1</sup>

Jay Forrester<sup>2</sup> of the systems analysis group of the same institution, however, on the basis of a large model with interacting cycles of various lengths, concludes that the shifts are generated by the operation of the entire system. The interactions of the "business cycle" (about 5 years), the "Kuznet cycle" (15 to 25 years) and the "Kondratieff long wave" (50 years), may explain why recessions since 1945 were less severe than pre-war cycles; we may be on the upswing of a long wave. Professor Forrester adds, "our work to date suggests that the balance of inflation and unemployment in the economy depends in a complex way on the many modes of behaviour in the economy as well as on the government policies being followed ... changes in money supply or changes in the position of the economy relative to the long-wave fluctuations will tend to cause shifts in inflation and unemployment that cannot be described in terms of simple movements along a fixed trade-off curve".<sup>3</sup>

In addition to this suggested correlation between the shifts of TOCs, and the operation of the economic system as a whole, Higgins'<sup>4</sup> contention is to put emphasis on discontinuous shifts in the "accelerator" (relating investments to increases in output) and in the employment multiplier (relating increases in employment to investment). Says Higgins, "Our argument is not dependent on the existence of long waves, but proof that long waves do exist would tend to strengthen our position; that is, a long-sustained boom in the capital goods industries would tend to lengthen the "period of investment", raise capital output ratios, lower the employment multiplier without lowering the income multiplier, and thus aggravate tendencies towards simultaneous inflation and unemployment".<sup>5</sup>

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1. Robert M. Solow "Jobs, jobs, jobs: How to create them without Re-inflation": Across the Board, Vol. XIV, No. 1, Jan. 1977.
  2. J. Forrester; op. cit.
  3. J. Forrester; op. cit.
  4. Benjamin Higgins; Public Works and Stabilization, PRG Research paper, Department of Public Works, Ottawa, June 1978.
  5. B. Higgins; op. cit.

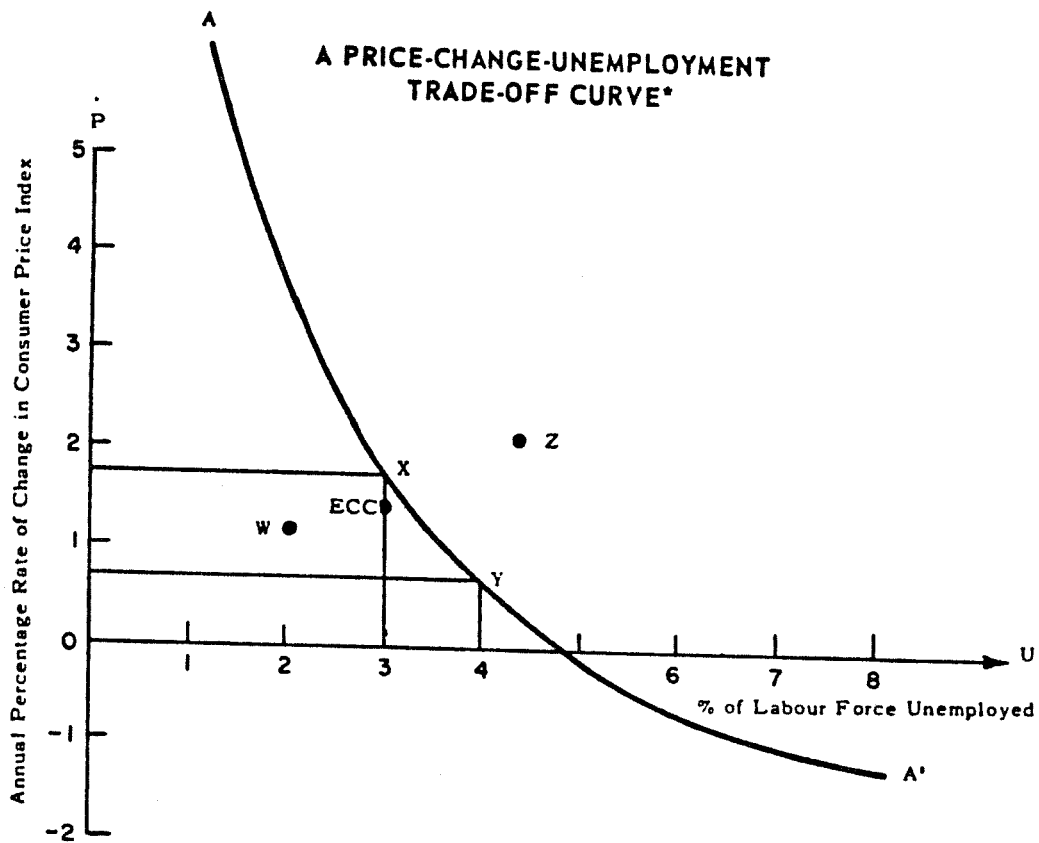
## 2. THE EMPIRICAL CONTEXT

### 2.1 The Trade-off between Unemployment and the Price Level, and the Theory of Optimum Policy Combination

The concept of a 'Trade-off' is applied in economics when two or more objectives or goals appear to be in conflict<sup>1</sup>. This concept bears relevance in policy making when it becomes a matter of choosing between two of society's objectives considered both important but which conflict with each other to a certain extent. Thus in terms of policy evaluation and assuming that a trade-off relationship exists between say objectives A and B, the key question to be considered is how much of one objective must be foregone in order to move a step closer towards the other. In other words it becomes necessary in this case to evaluate the quantitative terms of the "trade-off" between goals A and B.

This can be done by considering first a 'single' trade-off curve showing combinations of unemployment and inflation levels as represented in the following figure:<sup>2</sup>

- 
1. Tinbergen has shown that it is possible to attain each objective fully, thus avoiding conflicts among objectives, provided one uses as many instruments as there are objectives. In reality, however, it is widely accepted that the number of instruments generally falls far short of the number of objectives that society wishes to pursue. i.e. Jan Tinbergen, *Economic Policy: Principles and Design* (Amsterdam: North Holland Publishing Company, 1956).
  2. From: *Price Stability and High Employment. The Options for Canadian Economic Policy Special Study No. 5* Economic Council of Canada, by R.G. Bodkin, E.P. Bond, G.L. Reuber and T.R. Robinson, Ottawa, Queen's Printer, 1966. The points plotted are based on G.L. Reuber, "The Objectives of Canadian Monetary Policy, 1949-61: Empirical Trade-offs and the Reaction Function of the Authorities" *Journal of Political Economy*, Vol LXXII, No. 2 (April 1964), pp. 109-132.



\*The points plotted are based on G.L. Reuber, "The Objectives of Canadian Monetary Policy, 1949-61: Empirical Trade-Offs and the Reaction Function of the Authorities," *Journal of Political Economy*, Vol. LXXII, No. 2 (April 1964), pp. 109-132. The trade-off curve is drawn on the assumptions that foreign prices remain constant and that the effects of the estimated lags have been fully worked out.

The general shape of this trade-off curve is that of being convex to the origin. This implies that the relationship is asymptotic to the price change axis and flattens out along the unemployment axis. Thus the expected rate of inflation rises increasingly rapidly as the rate of unemployment is reduced; which is the result of the slope of the AA' curve not being constant over the usual range of unemployment.

Among the factors which determine the slope and position of the trade-off curve include underlying structural elements of the economy such as for example its resource base, its rate of technical change, the attitudes and short-term expectations of the public, its institutional arrangements; in particular its labour markets and its price setting mechanisms, and its international relationships.

Furthermore the assumption is that if such structural elements change, the curve may shift. However it is thought generally: 'that such shifts will take place only during some comparatively long periods of time'.<sup>1</sup>

Sometimes policies are specifically designed to shift the trade-off curve. For example wartime price controls or other types of income policies as has been suggested in part one.

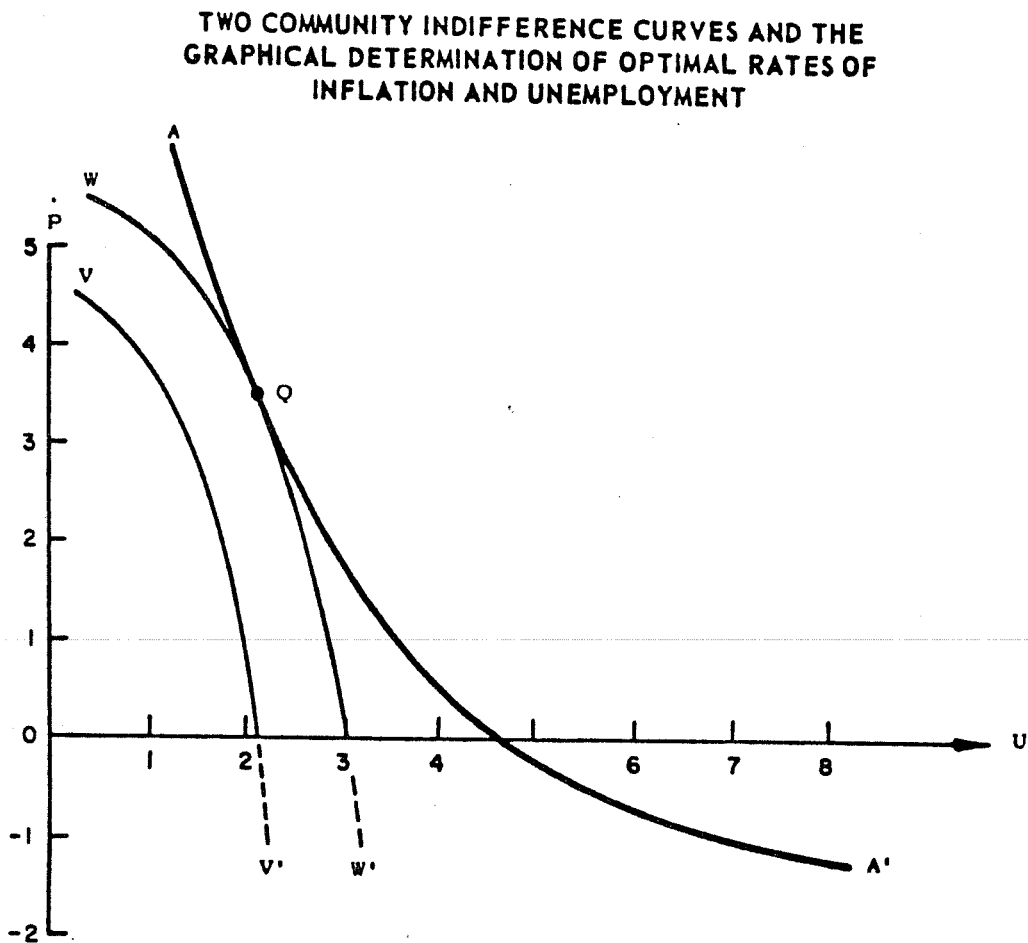
In an open economy such as Canada, the structural features of other economies (particularly the U.S. economy) may affect the shape and position of the trade-off curve.

Assuming for now that we have a satisfactory estimate of the functional relationship between unemployment and price levels yielding a trade-off curve similar to that of the preceding graph, we are faced with a number of combinations of unemployment and inflation (points along the curve), which outcome is equally possible during a given period of time. Suppose, furthermore, that the possibilities of shifting the trade-off curve towards the origin have been exhausted. The policy makers face now the choice of determining which point on the trade-off curve will provide an optimum combination of some inflation and some unemployment which is acceptable to society.

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1. Price Stability and High Employment; ECC, Special Study No. 5, September 1966, p. 7, op. cit.

For this, the theory of optimum policy combination postulates a family of community indifference curves; say  $VV'$  and  $WW'$  as represented in the following graph.<sup>1</sup>



1. From ECC Special Study No. 5, Sept. 1966, p. 28, op. cit.

On this graph, the community indifference curves are concave from the origin and reflect a diminishing marginal rate of substitution of price level stability for unemployment as greater price stability is achieved at the expense of greater unemployment. Societies that prefer high employment would thus have relatively steep community indifference curves. On the other hand societies that put more value on price stability would have relatively flat community indifference curves.

In the preceding graph point Q is the point of tangency between a possible community indifference curve WW' and the given trade-off curve AA'. Point Q represents in that case the social optimum. A departure from Q along the trade-off curve in either direction would lead to less than a social optimum.<sup>1</sup>

## 2.2 The Derivation of the Trade-off Curve and its Theoretical Foundations

The theoretical foundation upon which rests the assumed conflict between the levels of unemployment and price stability and thus of the relationship between unemployment and prices as postulated in the preceding section, is centered around the wage adjustment relationship. Basically, the wage adjustment relationship is an application to the labour market of the concept that prices rise in response to excess demand and fall in response to excess supply. Since money wages constitute the basic pricing ingredient in the labour sector, they may thus be expected to rise with excess demand when unemployment rates are below "normal", or at functional levels, and to fall with excess supply when unemployment rates are high.

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1. Whether Q is in fact the point at which the relative economic costs of inflation and unemployment are equal is difficult to ascertain. G.L. Reuber in: *The Objectives of Canadian Monetary Policy*, op. cit. suggests that Q approximates an optimum combination provided that one assumes a free rate of foreign exchange and focuses only on the effects of real output and ignores the issue of distributional effects.

In addition if workers and managers are assumed to be free from any 'money illusion', money wage changes may be also related to current or immediate past rates of change in consumer prices.<sup>1</sup>

Thus a basic relationship between wages, prices, and unemployment can be written as follows:

$$\dot{w} = f(U, \dot{P}_c, Z)$$

Where  $\dot{w}$  represents the changes in the money wage  $w$ , and  $\dot{P}_c$  changes in consumer prices and  $Z$  the potential effect of other variables upon the wage rate.

The connection between the rate of inflation and that of unemployment needs in addition that a link be established between wages changes and price changes. This is developed through the relationships between prices and costs.

Through the profit maximization assumption of economic theory with respect to the firm, we have the condition that marginal cost equals marginal revenue;  $MC=MR$ . However since  $MC$  is equal to the money wage divided by the marginal physical product (MPP) of labour, we can write:

$$\frac{w}{MPP} = P (1 - 1/n),$$

where  $n$  denotes the numerical value of the price elasticity of demand.

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1. For a review of the theoretical framework related to the wage adjustment relationship see: Otto Eckstein 'A Theory of the Wage Price Process in Modern Industry', Review of Economic Studies, Vol. XXXI, (Oct. 1964) pp. 267-286. Also W.G. Bowen's; 'The Wage Price Issue' (Princeton, N.J., Princeton University Press, 1960). Also R. Bodkin; 'The Wage Price Productivity Nexus' (University of Pennsylvania Press, Philadelphia 1966); especially chap. 3, 4 and 5. We follow here closely the model presented in chapter 2 of the ECC special study No. 5, op. cit.

Assuming a log linear or Cobb-Douglas type production function, where the marginal physical product of labour is always a constant proportion ( $K_1$ ) of the average product ( $Q/N$ ), the preceding equation further yields:

$$\frac{w}{K_1 Q/N} = P (1 - 1/n)$$

which could be rewritten<sup>1</sup> as:

$$P = K \frac{w}{Q/N} \text{ where } K = n \cdot \frac{1}{n-1} \frac{1}{K_1}$$

$$K = \frac{n}{n-1} \cdot \frac{1}{K_1}$$

Finally assuming that  $K$  is approximately constant, by differentiating the above equation we can write:

$$\dot{P} = \dot{W} - \dot{A}$$

Where the dot represents the percentage rate of change and  $A$  represents the average productivity of labour, namely the  $Q/N$  ratio. This equation states that the percentage change in the price level is equal to the difference between the percentage change in the money wage and the percentage change in labour productivity.<sup>2</sup>

The above formulation holds as such in the case of a closed economy. However in the Canadian case the openness of the economy is a fact which must be taken into account. Import prices need to be incorporated into the cost

1. Under a markup approach i.e. S. Weintraub, 'A General Theory of the Price Level, Output, Income Distribution and Economic Growth', (Philadelphia 1959), it can be shown that the results are also equivalent; see Bodkin et al, pp. 14-15, ECC Special Study No. 5, op. cit.
2. Some important implications stem from this theoretical formulation in the context of a closed economy. For example assuming a continuous growth in productivity over time there could be three possible effects on the price level: if money wages do not change, the price level can go down; if the growth of wages matches that of productivity, prices will remain constant; finally if wages rise more rapidly than productivity, the price level will rise. The above implies as well that the distribution of the total product between wage and nonwage incomes remains constant.

structure of domestic production. If  $P_m$  represents the effect of import prices and is incorporated to the preceding equation determining the changes in the general price level, this will result in the following formulation:<sup>1</sup>

$$\dot{p} = \alpha (\dot{w} - \dot{A}) + (1 - \alpha) \dot{P}_m$$

Finally, it was mentioned at the beginning of this section that prices rise in response to excess demand and fall in response to excess supply. This effect can be embodied in the preceding formulation by letting (D) be an indicator of these variations in the product market. The incorporation of (D) in the final price level change relationship yields the following equation:

$$P = B_0 + B_1 \dot{w} - B_2 \dot{A} + B_3 \dot{P}_m + B_4 D \quad (1)$$

where the B's are parameters.

Substituting into (1) the value of  $\dot{w}$  from the first stated relationship yields:<sup>2</sup>

$$\dot{p} = B_0 + B_1 \left( \frac{a_0 + a_1 \dot{p}_c + a_3 Z}{u} \right) - B_2 \dot{A} + B_3 \dot{P}_m + B_4 D \quad (2)$$

From (2) if the assumption is made that the price level of all final output changes at the same percentage rate as the price level of consumer goods and services; then  $\dot{p}_c = \dot{p}$ , and (2) becomes:

$$\dot{p} (1 - B_1 a_2) = B_0 + B_1 a_0 + a_1 B_1 \frac{\dot{p}}{u} + B_1 a_3 Z - B_2 \dot{A} + B_3 \dot{P}_m + B_4 D \quad (3)$$

1. Both import and export prices can have indirect effects on domestic prices. The latter are ignored or assumed to be reflected under the effects of the price level of imported materials.
2. From;  $\dot{w} = f(u, \dot{p}_c, Z)$  earlier, this form yields:

$$\dot{w} = a_0 + a_1 \left( \frac{1}{u} \right) + a_2 \dot{p}_c + a_3 Z,$$

for statistical estimations. Furthermore, since it is generally thought that the rate of change of wages is a nonlinear function of the unemployment rate, the relationship is represented by making the wage change variable a linear function of the reciprocal of the unemployment rate.

From (3), the derived trade-off relationship can be written:

$$\dot{P} = \frac{B_0 + B_1 a_0}{1 - B_1 a_2} + \frac{a_1 B_1}{1 - B_1 a_2} \cdot \frac{1}{U} + \frac{B_1 a_3}{1 - B_1 a_2} Z - \frac{B_2}{1 - B_1 a_2} \dot{A} + \frac{B_3}{1 - B_1 a_2} \dot{P}_m + \frac{B_4}{1 - B_1 a_2} D \quad (4)$$

This trade-off equation can be displayed as the previous two dimensional curve relating the rate of unemployment and the expected rate of change of the price level, provided that assumed values for all of the other variables in equation (4) are specified. However, the trade-off curve, like the trade-off equation is premised on a given institutional background so that the parameters in the relationship can be assumed as fairly stable.

### 2.3 Empirical Estimates of the Trade-off Relationships

A substantial number of modified versions of the above trade-off relationships were fitted to data of different countries. One of the earlier estimations which has become a classic is that by the late Prof. A.W. Phillips.<sup>1</sup>

In that article Phillips estimated the empirical relationship between the level of unemployment as a percentage of the labour force and the percentage rate of change of wage rates for Britain, employing data for the years 1861-1957. Phillips found in subsequent tests that the relationship was fairly stable. As a result Phillips suggested the possibility of a conflict between the objectives of full employment and price level stability.

While Phillips did not attempt to estimate directly the relationship between unemployment and the rate of change in prices, Professor Richard G. Lipsey reassessed Phillips' relationship and provided a formulation linking the changes of the rate of unemployment to the changes in the level of prices.<sup>2</sup>

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1. A.W. Phillips, "The Relationship Between Unemployment and the Rate of Change of Money Wage Rate in the United Kingdom, 1861-1957", *Economica*, N.S., November 1958, pp. 283-299.
  2. Richard G. Lipsey, "The Relation Between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1862-1957: A further analysis", *Economica*, N.S., February 1960, pp. 1-31.

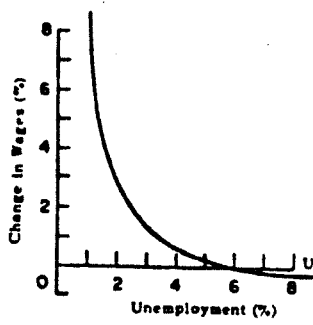
Interestingly Lipsey's estimates also suggest that the wage adjustment relationship did not remain stable over the past century. For example the period 1862-1913 was considerably different from the post 1920's, when the expected annual rate of increase in wages was considerably greater at every level of unemployment.

However among several other estimates of the wage adjustment relationships for the British economy, that of Klein and Ball<sup>1</sup> while formulated differently tend nevertheless to corroborate Phillips' view of the sensitivity of wage changes to the level of unemployment. This estimated relationship was linear. Subsequently Ball<sup>2</sup> studied the forecasting accuracy of his and Klein's wage adjustment relationship for a period of time after that to which the relationship had been fitted. Ball found that this relationship predicted actual wage changes most poorly during the period between the third quarter of 1958 and the third quarter of 1959, a time of recession in Britain. A possible explanation of these results was suggested as being the result of the nonlinearity in the wage adjustment relationship, a feature which never became apparent during the sample period because the level of unemployment was never very large.<sup>3</sup> Nevertheless a particularly important result of the Klein and Ball estimates was the appearance of an almost fully compensatory relationship between changes in the price level, after a time lag and changes in wage rates.

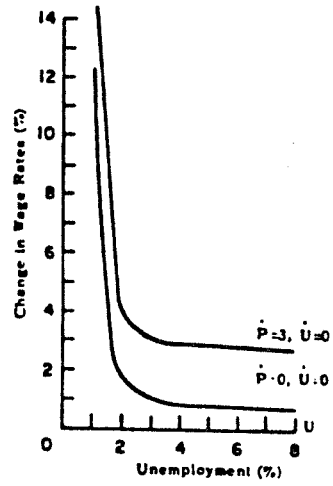
These fitted trade-off curves are shown in the following graphs.

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1. L.R. Klein and R.J. Ball, "Some Econometrics of the Determination of Absolute Prices and Wages", *Economic Journal*, September 1959, pp. 465-482.
  2. R.J. Ball, "The Prediction of Wage Rate Changes in the United Kingdom 1957-60", *Economic Journal*, March 1962, pp. 27-44.
  3. See also: Bodkin et al; p. 43, Special Study No. 5, ECC, op. cit.

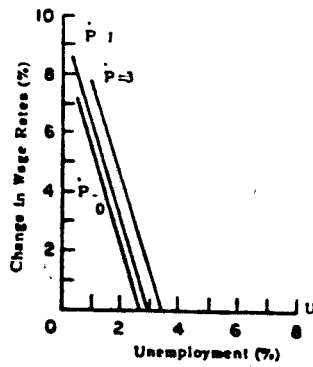
WAGE ADJUSTMENT RELATIONSHIP  
FOR BRITAIN (1861-1913):  
PHILLIPS



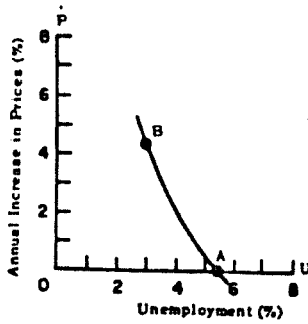
WAGE ADJUSTMENT RELATIONSHIP  
FOR BRITAIN (1923-39, 1948-57):  
LIPSEY



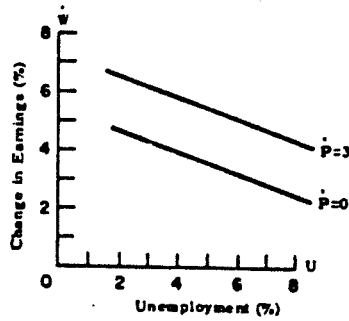
WAGE ADJUSTMENT RELATIONSHIP  
FOR BRITAIN (Fourth Quarter  
1956, from 1948-56 Data):  
KLEIN & BALL



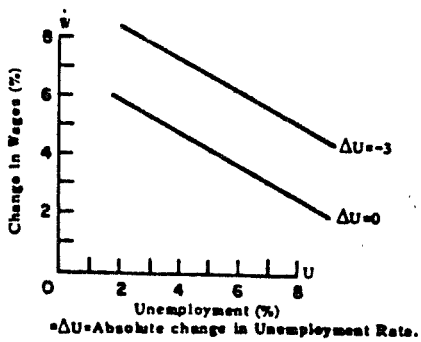
**TRADE-OFF CURVE FOR THE UNITED STATES (1946-60): SAMUELSON & SOLOW**



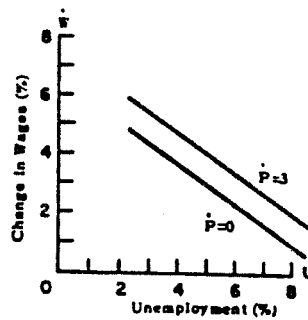
**WAGE ADJUSTMENT RELATIONSHIP FOR THE UNITED STATES (1948-58): BHATIA**



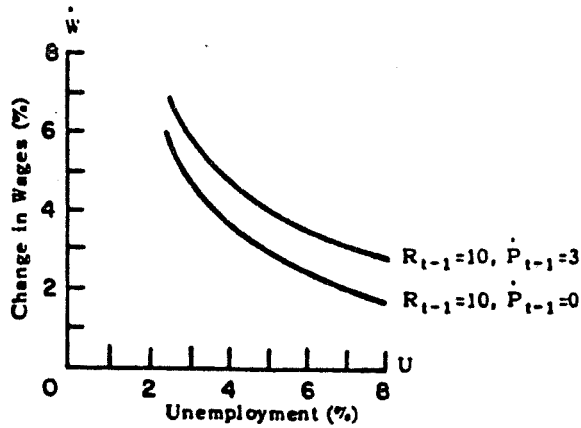
**WAGE ADJUSTMENT RELATIONSHIP FOR THE UNITED STATES (1948-58): BOWEN & BERRY<sup>9</sup>**



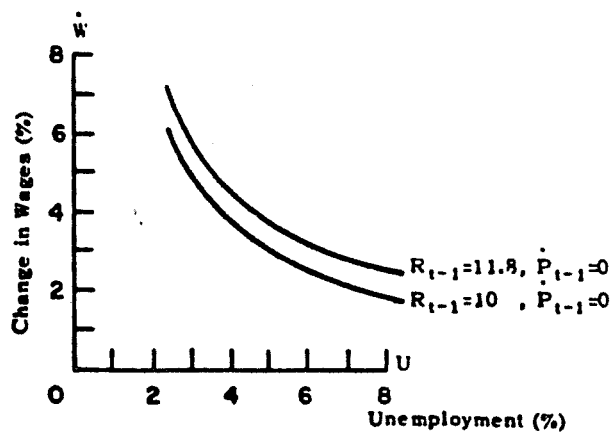
**WAGE ADJUSTMENT RELATIONSHIP FOR THE UNITED STATES (First Quarter 1960, from 1948-57 Data): KLEIN & BODKIN**



**WAGE ADJUSTMENT RELATIONSHIP  
FOR THE UNITED STATES, WITH ALTERNATIVE  
PRICE INFLATION RATES (1947-60):<sup>a</sup>  
PERRY**

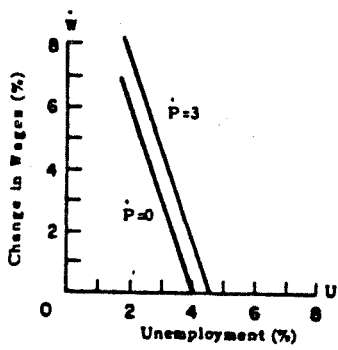


**WAGE ADJUSTMENT RELATIONSHIP  
FOR THE UNITED STATES, WITH ALTERNATIVE  
PROFIT RATES (1947-60):<sup>a</sup>  
PERRY**

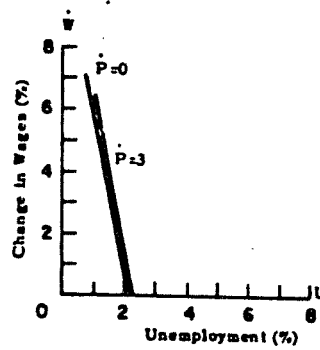


<sup>a</sup>R = Profit Rate (%).

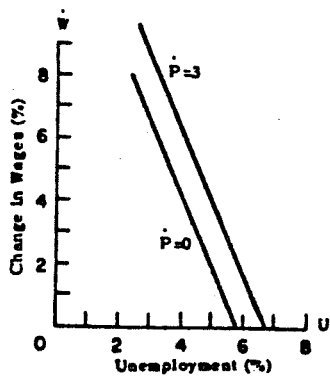
**WAGE ADJUSTMENT RELATIONSHIP  
FOR WEST GERMANY (First Quarter 1960,  
from 1952-59 Data):  
KLEIN & BODKIN**



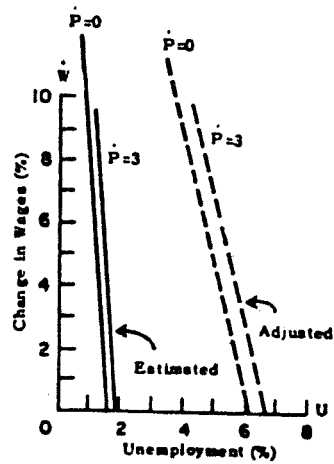
**WAGE ADJUSTMENT RELATIONSHIP  
FOR FRANCE (First Quarter 1960,  
from 1952-59 Data):  
KLEIN & BODKIN**



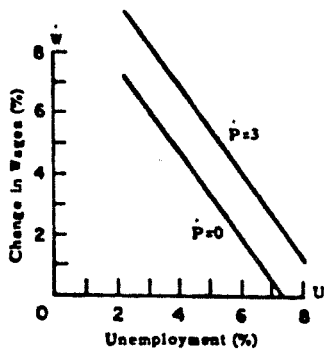
**WAGE ADJUSTMENT RELATIONSHIP  
FOR BELGIUM (First Quarter 1960,  
from 1952-59 Data):  
KLEIN & BODKIN**



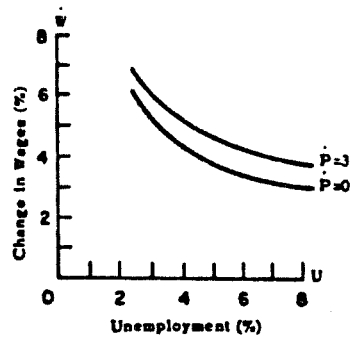
**WAGE ADJUSTMENT RELATIONSHIP  
FOR JAPAN (1930-36, 1951-58):  
KLEIN & SHINKAI**



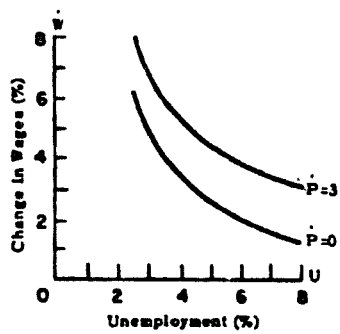
**WAGE ADJUSTMENT RELATIONSHIP  
FOR CANADA (First Quarter 1960,  
from 1952-59 Data):  
KLEIN & BODKIN**



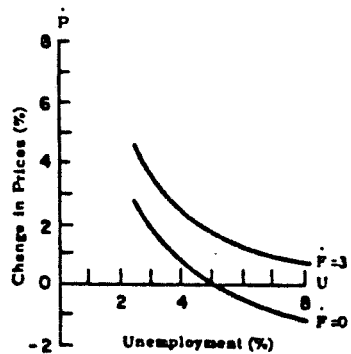
**WAGE ADJUSTMENT RELATIONSHIP  
FOR CANADA (1946-58):  
KALISKI**



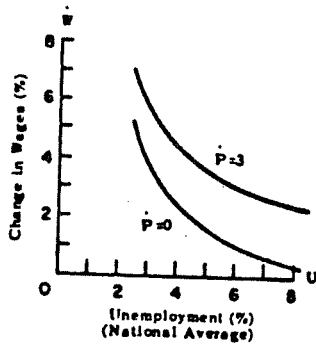
**WAGE ADJUSTMENT RELATIONSHIP  
FOR CANADA (1949-61):  
REUBER**



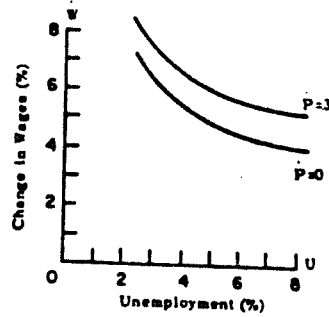
**TRADE-OFF CURVE FOR  
CANADA (1949-61):  
REUBER**



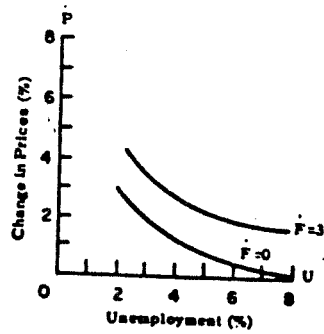
WAGE ADJUSTMENT RELATIONSHIP  
FOR CANADA, ORGANIZED SECTOR  
(1946-62):  
VANDERKAMP



WAGE ADJUSTMENT RELATIONSHIP  
FOR CANADA, UNORGANIZED  
SECTOR (1946-62):  
VANDERKAMP



TRADE-OFF CURVE FOR  
CANADA (1946-62):  
VANDERKAMP



Empirical estimates of the trade-off relationship between the rate of wage changes and the level of unemployment were performed in a number of countries. These include for the United States studies by Samuelson and Solow<sup>1</sup>, Bhatia<sup>2</sup>, Bowen and Berry<sup>3</sup>, Klein and Bodkin<sup>4</sup> and G.L. Perry.<sup>5</sup> All of these studies do not yield similar results. Some appear to underline more than others the sensitivity of the wage adjustment relationships to variations in the unemployment rate, in particular those of Perry and of Klein and Bodkin.

Furthermore a number of wage adjustment relationships were estimated for West Germany, France, and Belgium by Klein and Bodkin<sup>6</sup> and for Japan by Klein and Shinkai.<sup>7</sup>

For the Federal Republic of Germany the rate of change in wages appears to be quite sensitive to the rate of unemployment. For France it appears that the rate of change in wages is extremely sensitive to the level of unemployment but not very sensitive to variations in the rate of change of consumer prices.<sup>8</sup> For Belgium the rate of change in wages is sensitive to the level of unemployment though less so than in France. In the case of Japan changes in wages appear to be very sensitive to the rate of unemployment.

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1. Paul A. Samuelson and Robert M. Solow, "Analytical Aspects of Anti-inflation Policy" *American Economic Review*, May 1960, pp. 177-194.
  2. R.J. Bhatia, "Unemployment and the Rate of Change of Money Earnings in the United States 1900-1958", *Economica*, N.S., August 1961, pp. 286-296.
  3. William G. Bowen and R. Albert Berry, "Unemployment Conditions and Movements of the Money Wage Level", *The Review of Economics and Statistics*, May 1963, pp. 163-172.
  4. Lawrence R. Klein and Ronald G. Bodkin, assisted by Motoo Abe, "Empirical Aspects of the Trade-Offs among three goals: High Level Employment, Price Stability, and Economic Growth", in *Inflation, growth, and employment, a series of Research Studies for the commission on money and credit* (Englewood Cliffs, N.J.: Prentice-Hall, 1964).
  5. G.L. Perry, "The Determinants of Wage Rate Changes and the Inflation Unemployment Trade-Off for the United States", *Review of Economic Studies*, Vol XXXI, No. 88 (October 1964), pp. 287-308.
  6. Klein and Bodkin, *op. cit.*
  7. L.R. Klein and Y. Shinkai, "An Econometric Model of Japan, 1930-1959", *op. cit.*
  8. Bodkin et al, *op. cit.*, argue that "French wage changes may in fact be more sensitive to price changes than the Klein Bodkin results suggest. The French consumer price level may not, be representative of "true" variations in the cost of living. If this is so, the resulting regression co-efficients may be more a reflection of errors in the data on French consumer prices than an indication of the sensitivity of wage changes to this influence". See special study No. 5, ECC footnote page 56.

A number of wage adjustment relationships were also estimated for Canada. Klein and Bodkin<sup>1</sup>, employing quarterly data for the years 1952-59, estimated a linear form for which the predicted wage changes appear to be quite sensitive after a short time lag to changes in the price level. However a nonlinear relationship for Canada used by S.F. Kaliski<sup>2</sup> indicates very little sensitivity of wage increases to the rates of unemployment when in the range of 5 to 8 percent.

G.L. Reuber<sup>3</sup> like Kaliski using a nonlinear form of the wage adjustment equation and quarterly data for the period 1949-61 found a steeper relationship than that estimated by Kaliski. This would indicate a greater degree of sensitivity of wage changes to the rate of unemployment.

Furthermore, Reuber in addition postulated that changes in consumer prices are a linear function of changes in wages and changes in import prices. This is a relevant feature with respect to the openness of the Canadian economy. Nevertheless Reuber was unable to uncover any significant impact of changes in labour productivity on changes in the consumer price level. However, in the combined relationship for price changes and unemployment as estimated by Reuber, it is apparent that both the percentage rate of change in wages, and the percentage rate of change in the price level, are sensitive to variations in the rate of unemployment. Moreover, the rate of foreign inflation appears to have a substantial effect upon the position of the trade-off relationship.

John VanderKamp<sup>4</sup> has also estimated the wage adjustment and trade-off relationships for Canada, using post-war quarterly data for the period 1946 through 1962. VanderKamp uses a two sector labour model. An organized sector includes mining, manufacturing, construction, and public utility industries and has over than 40 percent of its employees in union memberships. The unorganized sector comprises agriculture, forestry, trade, finance, and services industries, and has only an average of 8 percent of its

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1. Bodkin and Klein, op. cit.
  2. S.F. Kaliski, "The Relation Between Unemployment and the Rate of Change of Money Wages in Canada" *International Economic Review*, January 1964, pp. 1-33.
  3. G.L. Reuber, "The Objectives of Canadian Monetary Policy, 1949-61", op. cit.
  4. John VanderKamp, "Wage and Price Level Determination: An Empirical Model for Canada". *Economica*, N.S., Vol XXXIII, No. 130 (May 1966), pp. 194-218.

workers unionized. According to Vanderkamp, estimated wage changes in the organized sector appear to be fairly sensitive to variations in the level of unemployment. However, wage increases are less sensitive to price changes in the unorganized sector, and wage changes appear to be less sensitive to variations in unemployment for the unorganized sector.

It is also apparent in the Vanderkamp trade-off relationship that the predicted rate of increase of the domestic price level is also responsive to the rate of change of international prices.

All these different estimations are presented for comparison in the following tables.<sup>1</sup> These comparisons, taking account of differences in the underlying features of the economies considered, suggest nevertheless that in many instances, although with different degrees, and in particular for the case of the United States and Canada; there appears to be a conflict between the goals of full employment and price stability.

Finally Bodkin et al<sup>2</sup> estimated under a number of specifications the historical relationships for Canada between prices, wages and unemployment to see whether the relationships between these variables can be regarded as relatively stable. They conclude that the evidence on the issue of the stability of the historical relationships is mixed and inconclusive. The authors feel however that the post-war period (to 1965) represented a fairly stable period for the trade-off relationship. They caution nevertheless against unduly optimism by underlining that the results of their estimations notwithstanding, "over the long-run future we may, in fact, experience conditions which are less favourable from the standpoint of economic policy than the quarterly estimates (for the period 1953-65) of the trade-off relationship suggest".<sup>3</sup>

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1. Tables from ECC special study No. 5, p. 71-72, op. cit.
  2. In ECC special study No. 5, op. cit.; specially chapter 7.
  3. Bodkin et al, op. cit. p. 220.

**A Comparison of Wage Adjustment Relationships  
(Unadjusted Unemployment Rates)**

Country	Source of Estimate	Annual Rate of Unemployment Associated with a Percentage Change in Wages:		Annual Rate of Change in Wages			
		Equal to Country's Own Productivity Growth Rate	Equal to 2½ Per Cent Per Year	Associated with No Change in Prices and an Unemployment Rate of:		Associated with a 3 Per Cent Change in Prices and an Unemployment Rate of:	
				3%	6%	3%	6%
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Britain .....	Phillips (1861-1913)	2.3	2.1	1.2	-0.1	-	-
Britain .....	Lipsy (1923-39, 1948-57)	1.8	1.7	1.0	0.8	3.1	2.9
Britain .....	Klein & Ball (4th quarter, 1956)	2.1	2.0	-1.0	-11.0*	1.3	-8.7*
Britain .....	Dicks-Mireaux & Dow (1950-56)	-	2.0	-	-	-	-
United States	Samuelson & Solow (Post-War)	-	5.5	-	-	-	-
United States	Bhatia (1948-58)	7.5	8.0	4.4	3.2	6.3	5.2
United States	Bowen & Berry (1948-58)	7.8	8.2	5.4	3.7	-	-
United States	Klein & Bodkin (1948-57)	5.4	5.6	4.4	2.3	5.5	3.4
United States	Perry (1947-60)	6.0	6.6	5.2	2.7	6.3	3.8
West Germany	Klein & Bodkin (1st quarter, 1960)	2.0	3.2	3.2	-6.2*	4.7	-4.6*
France .....	Klein & Bodkin (1st quarter, 1960)	1.2	1.7	-	-	-	-
Belgium .....	Klein & Bodkin (1st quarter, 1960)	-	4.7	6.6	-0.5	8.8	1.6
Japan .....	Klein & Shinkai (1930-59)	1.0	1.4	-	-	-	-
Canada .....	Klein & Bodkin (1st quarter, 1960)	5.2	5.6	6.2	1.9	8.4	4.0
Canada .....	Kaliski (1946-58)	6.5	10.0	5.1	3.2	5.9	4.1
Canada .....	Reuber (1949-61)	4.4	5.2	5.0	2.0	6.9	3.9

\* There is reason to suspect that the wage adjustment relationship is not linear at rates of unemployment over 4 or 5 per cent. Thus the large rate of wage decline indicated by the estimated relationship at higher levels of unemployment would not be relevant.

**A Comparison of Wage Adjustment Relationships  
(Unemployment Adjusted to a Common Definition)**

Country	Source of Estimate	Annual Rate of Unemployment Associated with a Percentage Change in Wages:		Annual Rate of Change in Wages			
		Equal to Country's Own Productivity Growth Rate	Equal to 2½ Per Cent per Year	Associated with No Change in Prices and Unemployment Rate of:		Associated with a 3 Per Cent per Year Change in Prices and an Unemployment Rate of:	
				3%	6%	3%	6%
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Britain.....	Philips (1861-1913)	3.5	3.2	2.8	0.5	-	-
Britain .....	Lipsey (1923-39, 1948-57)	2.7	2.6	1.7	0.9	3.7	3.0
Britain .....	Klein & Bell (4th quarter, 1956)	3.2	3.0	2.4	-4.2	4.7	-1.9
Britain .....	Dicks-Mineraux & Dow (1950-56)	-	3.0	-	-	-	-
United States	Samuelson & Solow (Post-War)	-	5.5	-	-	-	-
United States	Bhatia (1948-58)	7.5	8.0	4.4	3.2	6.3	5.2
United States	Bowen & Berry (1948-57)	7.8	8.2	5.4	3.7	-	-
United States	Klein & Bodkin (1948-57)	5.4	5.6	4.4	2.3	5.5	3.4
United States	Perry (1947-60)	6.0	6.6	5.2	2.7	6.3	3.8
West Germany	Klein & Bodkin (1st quarter, 1960)	1.5	2.4	-0.3	-13.1*	1.2	-11.6*
France .....	Klein & Bodkin (1st quarter, 1960)	2.3	3.2	3.1	-5.8*	3.5	-5.4*
Japan .....	Klein & Shinkai (1930-59)	4.2	5.5	13.3	0.5	15.5	2.8
Canada .....	Klein & Bodkin (1st quarter, 1960)	5.2	5.6	6.2	1.9	8.4	4.0
Canada .....	Kaliski (1946-58)	6.5	10.0	5.1	3.2	5.9	4.1
Canada .....	Reuber (1949-61)	4.4	5.2	5.0	2.0	6.9	3.9

\*There is reason to suspect that the wage adjustment relationship would not continue to be linear, in this range of the unemployment rate.

## 2.4 Shifts in the Trade-off Curve and Recent Experience

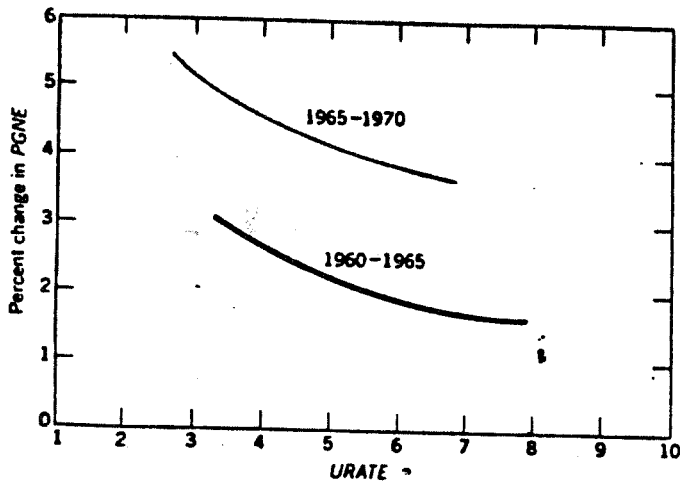
While data provided by the post-war period till the end of the 1960s suggest that a trade-off relationship similar to the Phillips derived relationship for Britain, could indeed have existed<sup>1</sup> between changes in the level of wages, prices and unemployment in a number of countries including Canada; the following decade, the 1970s provides data that can hardly sustain the assumptions made with respect to the stability of the trade-off relationship. On this issue Paul Wonnacott writes:

"... the 1970s have provided a sobering and saddening experience. The Phillips curve has conspicuously resisted efforts to shift it down. Indeed, the economy has been inflicted simultaneously with high rates of inflation and high unemployment. We seem to be getting the worst of both worlds; far from shifting down, the Phillips curve has shifted up - in spite of our efforts."<sup>2</sup>

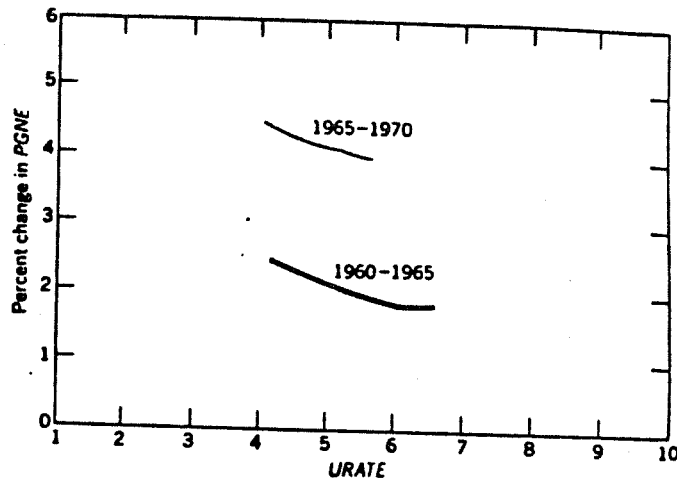
Evidence of shifts in the trade-off curve for Canada is provided through the use of the CANDIDE model by Bodkin, Chabot-Plante and Sheikh.<sup>3</sup> The authors examined three distinct subperiods: 1960-1965, 1965-1970, and 1970-1974. The period 1970-1974 constituted a forecast because data was available till 1971. As a result of their analysis they obtained evidence of upward shifts in the trade-off curve. These shifts are shown in the following two graphs:<sup>4</sup>

- 
1. Among others, Arthur M. Okun had concluded on the basis of U.S. observations for 1954-68, that the data "fit a hyperbola like a glove" in: "Inflation; Its Mechanics and Welfare Costs", Brookings Papers on Economic Activity, 1975, vol. 2, p. 354.
  2. Paul Wonnacott; *Macroeconomics*, 1978 revised edition, (Richard D. Irwin Inc., Homewood, Illinois) p. 343.
  3. R.G. Bodkin, F. Chabot-Plante and M.A. Sheikh: "Canadian Experience with Recent Inflation as viewed through CANDIDE". A reprint from *Analysis of Inflation: 1965-1974*; Joel Popkin Editor; Studies in Income and Wealth vol. 42, NBER, U.S. 1977.
  4. From Bodkin, Chabot-Plante and Sheikh, op. cit., p. 427.

Shift of the Trade-off Curve over Time under Fiscal Policy (GCURRK), 1960-1965 and 1965-1970



Shift of the Trade-off Curve over Time under Monetary Policy (MHPC), 1960-1965 and 1965-1970



(URATE = Unemployment rate)

(PGNE = Inflation rate)

Why is the trade-off curve shifting to the right making thus the trade-off between unemployment and inflation much worse and rendering increasingly difficult the implementation of stabilization policies? A number of explanations are being put forward. There are those who believe that the inflation of the 1970s cannot be explained without reference to the cost push effect of oil and other commodities. The staff of the Federal Reserve in the U.S. has estimated that international developments accounted for a large, although not preponderant, share of the inflation of 1971-73.<sup>1</sup>

1. Richard Beruer, Peter Clark, Jared Euzler, and Barbara Lowrey, "International Aspects of Recent Inflation", Paper No. 3 of Studies in Price Stability and Economic Growth (Washington, D.C. Joint Economic Committee, U.S. Congress, August 1975) see also George L. Perry, "The United States", in Edward R. Fried and Charles L. Schultze, eds., Higher Oil Prices and the World Economy: The Adjustment Problem (Washington, D.C. Brookings Institution, 1975) pp. 95-103.

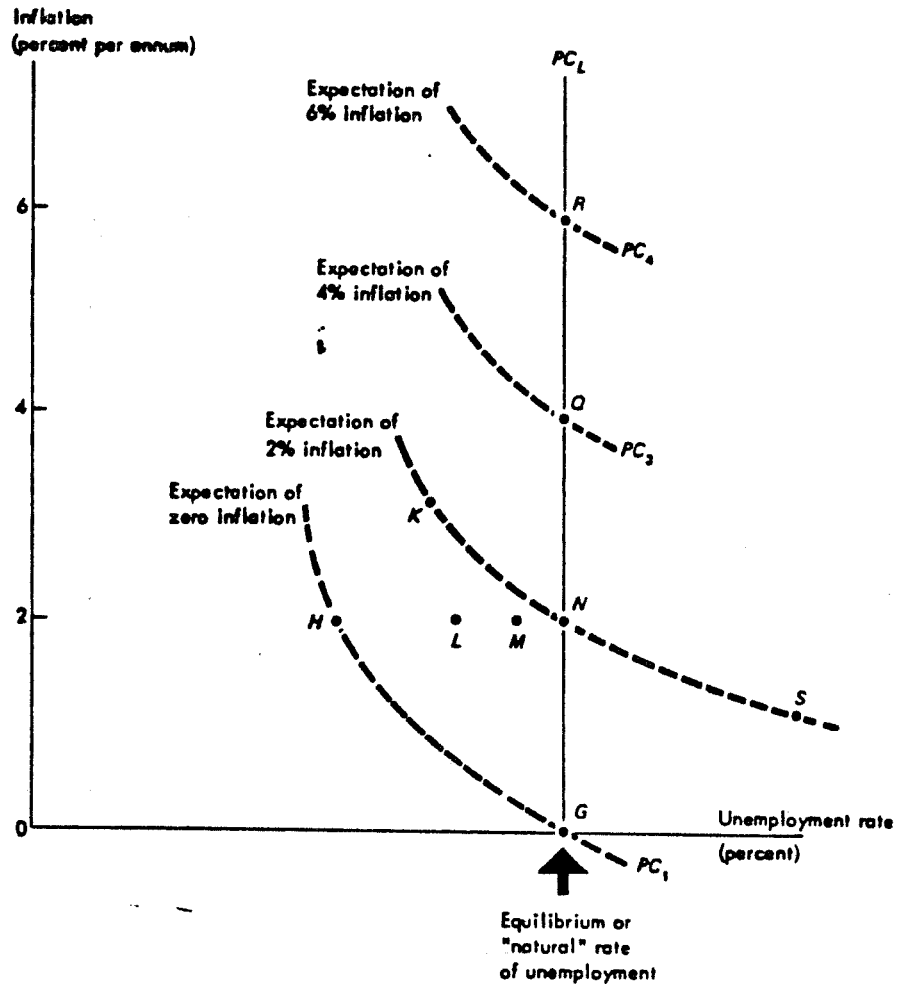
Another explanation is with reference to the composition of the labour force.<sup>1</sup> The argument presented is based on the substantial changes in the composition of the labour force during the past two decades. Participation rates of women and young people have increased significantly, so does unemployment in these categories. As a result the weighted average rate of unemployment tends to rise. Hence the rate of unemployment associated with any rate of inflation tends to be greater and as a consequence the trade-off curve shifts upward.

A more controversial explanation refers to the view that improved unemployment insurance and higher welfare payments have reduced the cost of being unemployed, thus increasing upward pressures on the unemployment rate. According to Herbert G. Grubel, Dennis Maki, and Shelly Sax,<sup>2</sup> changes improving Canadian unemployment benefits in 1971, added 0.8 percent to the unemployment rate. An alternative estimate of 0.7 percent has been made by C. Green and J.M. Costineau.<sup>3</sup> Furthermore Gramlich<sup>4</sup> suggests that the minimum wage may have also an impact on the unemployment rate.

A further explanation of shifts in the trade-off curve is based on the 'Accelerationist' thesis. Essentially the accelerationists argue that as inflation continues inflationary expectations follow suit and wage contract negotiators keep pushing for higher wages in anticipation of higher inflation. As a result the trade-off curve moves upward and to the right. There is not complete agreement, however, on the actual shape of the trade-off curve. One school of thought led by Friedman and Phelps argue that the economy under inflationary expectations process will nevertheless tend to move in the long

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1. See: George L. Perry, "Changing Labor Markets and Inflation", Brookings Papers on Economic Activity 1970, vol. 3, pp. 411-41. Also Ulman and Wachter. "The Changing Cyclical Responsiveness of Wage Inflation", Brookings Papers on Economic Activity, 1976, vol. 1.
  2. H.G. Grubel, D. Maki and S. Sax, "Real and Insurance-induced Unemployment in Canada", Canadian Journal of Economics, May 1975, pp. 174-91.
  3. C. Green and J.M. Costineau, "Unemployment in Canada: The Impact of Unemployment Insurance" (Ottawa: Economic Council of Canada, 1976), p. 114.
  4. Edward M. Gramlich "Impact of Minimum Wages on Other Wages, Employment, and Family Incomes", Brookings Papers on Economic Activity, 1976, vol. 2 pp. 409-51. See also Finis Welch "Minimum Wage Legislation in the United States" Economic Inquiry, September 1974, pp. 285-318.

run into a position of equilibrium at a point where unemployment is equal to the 'natural' rate.<sup>1</sup> This is represented by the following graph.<sup>2</sup>



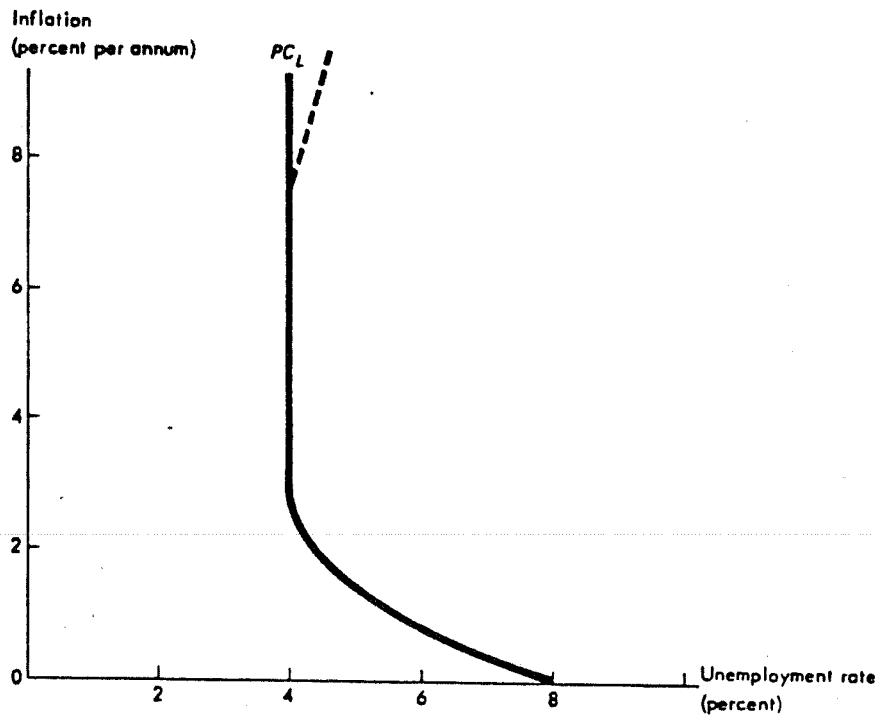
1. Milton Friedman: "The Role of Monetary Policy", American Economic Review March 1968, pp. 1-17; and: in his Nobel lecture, "Inflation and Unemployment" reprinted in the journal of Political Economy, June 1977, pp. 451-72; Edmund S. Phelps, "Money Wage Dynamics and Labor Market Equilibrium", in Phelps, ed., Microeconomic Foundations of Employment and Inflation Theory (New York: N.W. Norton, 1970), pp. 124-66; and Phelps, "Phillips curves, Expectations of Inflation and Optimal Unemployment Overtime", Economica, August 1967, pp. 254-81.
2. From P. Wonnacott, Macroeconomics p. 355, op. cit.

In the above graph, through each of the points of long-run equilibrium G, N, Q, and R, there is a short-run curve, reflecting contracts based on the respective rates of inflation. For example, assume that the short-run trade-off curve goes through N and is based on the expectation by contracts negotiators that there will be a continuing rate of inflation of 2 percent per year. At this point if there is an unexpected increase in aggregate demand, the economy will move along this trade-off curve to point K. However K is unstable for the same reason that H is unstable. Inflation exceeds the rate expected when contracts were negotiated. As a result when contracts again are due for renegotiation, workers will push for higher nominal wages to make up for current and expected inflation. As a consequence the short-run curve shifts upward to the right. Eventually, the economy will tend to move back toward a stable point on a long run vertical trade-off curve<sup>1</sup> such as (PC<sub>L</sub>), unless the government is willing to create enough demand to cause an ever-accelerating rate of inflation.

Arthur Okun concedes that: "We are all accelerationists now".<sup>2</sup> However if economists would agree that the long term relationship of the trade-off curve is steeper than the short-term, not all would agree that it is vertical.

Eckstein and Brinner<sup>3</sup> for example argue that the long run relationship curves downward and to the right. This curve is shown in the following graph.<sup>4</sup>

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1. This brings us back to the old classical position: in the long run, the aggregate supply function is vertical, and changes in demand affect prices, not real output or the unemployment rate. See also part three of this dissertation.
  2. Arthur Okun; "Inflation: Its Mechanics and Welfare Costs", p. 356, op. cit.
  3. Otto Eckstein and Roger Brinner; 'The Inflation Process in the United States', (Washington, D.C.: Joint Economic Committee, February 1972). Also Robert J. Gordon, "Wage-Price Controls and the Shifting Phillips Curve", Brookings Papers on Economic Activity, 1972, vol. 2, pp 404-6. Also for a theoretical view: James Tobin, "Inflation and Unemployment", American Economic Review, March 1972, p. 11.
  4. From P. Wonnacott, p. 358, op. cit.



The implication of such a curve is that workers are concerned with their real incomes after adjustment for inflation. This is represented by the vertical portion of the curve. However workers would be reluctant to accept cuts in their nominal wages<sup>1</sup> assuming that money illusion plays also a role and that workers would not accept the overt humiliation of a cut in nominal wages during a period of stable prices. Thus the trade-off curve slopes downward to the right as it approaches the horizontal axis.

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1. This is an important proposition in Keynes' view of the aggregate supply function; that nominal wages are downwardly rigid.

While the lower parts of the trade-off curve appear to hold the center of attention, interestingly are questions being raised on the shape of its upper parts. Wonnacott states that: "There are grounds for believing that the curve bends outward to the right as it rises (as shown in the preceding graph)".<sup>1</sup> The reason is that high rates of inflation may disrupt the financial system with subsequent effects on the production processes hence contributing at the same time to high rates of unemployment.

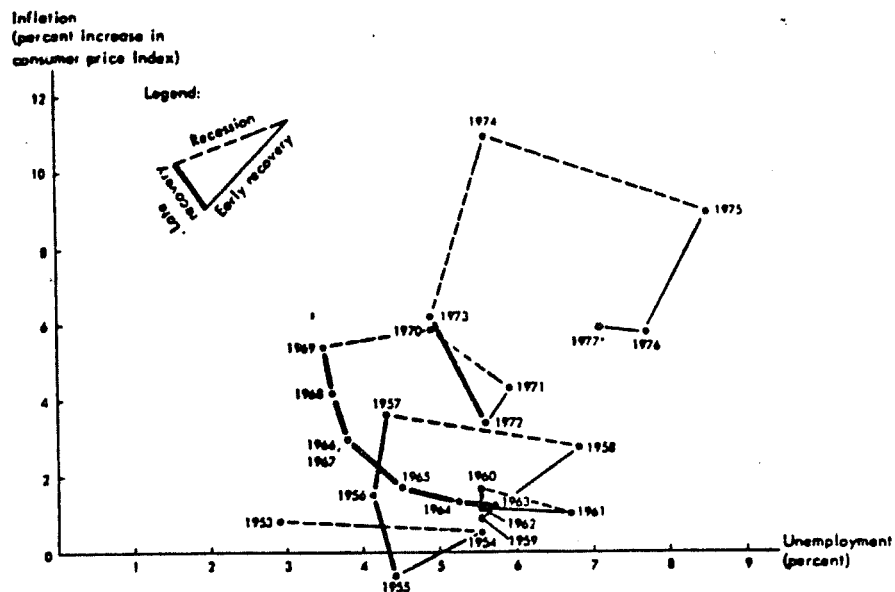
Finally some have expressed the view that shifting trade-off curves may relate to Business Cycles. The recognition that there are cyclical shifts in the trade-off curves, and that these shifts may be systematic, has come only recently to the forefront. Professor Solow<sup>2</sup> leans towards the view that the shifts are haphazard, while recognizing the possibility of systematic shifts. Professor Jay Forrester, on the basis of a large model with interacting cycles of various lengths, concludes that the shifts are generated by the operation of the entire economic system. The interactions of the 'business cycle' (about 5 years), the 'Kuznets cycle' (15 to 25 years) and the 'Kondratieff long wave' (50 years) may explain why recessions since 1945 were less severe than prewar cycles; we may be on the upswing of a long wave. Professor Forrester adds, "our work to date suggests that the balance of inflation and unemployment in the economy depends in a complex way on the many modes of behaviour in the economy as well as on the government policies being followed ... Changes in money supply or changes in the position of the economy relative to the long-wave fluctuations will tend to cause shifts in inflation and unemployment that cannot be described in terms of simple movements along a fixed trade-off curve".<sup>3</sup> B. Higgins appears to agree with Forrester by stating: "our own view is similar in contending that the shape, position, and shifts of the trade-off curves emerge from the operation of the economic system as a whole - government policy included. But within

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1. P. Wonnacott; p. 360, op. cit.
  2. Robert M. Solow "Jobs, Jobs, Jobs: How to create them without Re-inflation?" Across the Board, Vol. XIV No. 1 Jan. 1977.
  3. Jay W. Forrester "Business Structure, Economic Cycles, and National Policy", Futures: the Journal of Forecasting and Planning, vol. 8 No. 3 June 1976 pp. 195-214.

that system we put primary emphasis on discontinuous shifts in the 'accelerator' (relating investment to increases in output) and in the employment multiplier (relating increases in employment to investment)".<sup>1</sup>

Additional evidence on the relationships between trade-off curves and economic cycles is provided by P. Wonnacott.<sup>2</sup> Wonnacott provides the following graph based on U.S. data:<sup>3</sup>

**Inflation and unemployment in the United States, 1953-1977**



1. Benjamin Higgins "Public Works and Stabilization" Policy Research paper, Public Works Canada, Ottawa 1977.
2. P. Wonnacott, Macroeconomics p. 361-362, op. cit.
3. Wonnacott, p. 363, op. cit.

Although Wonnacott does not elaborate on the reasons of this apparent cyclical pattern in the shifts of the trade-off curve,<sup>1</sup> there is a suggestion that movements in productivity levels during the business cycle result in higher per unit costs with falling employment in periods of recession.

## 2.5 From Trade-off Curves to Trade-off Zones; a Statistical Foundation

As suggested in the above sections, the evidence on the issue of the stability of the historical relationships of the trade-off curve is mixed and inconclusive. Furthermore the wide variations that occurred in both the level of prices and the level of unemployment after 1970 have rendered all too difficult the fitting of a reasonable curve to the data, even under the assumption that the "curve" has moved upwards and to the right. Under such circumstances the 'Phillips type' trade-off curve while it may perhaps still lend itself to further theoretical elaboration is, in point of fact, of no great use to the practical policy maker.<sup>2</sup>

This situation warrants at least a different approach in dealing with the empirical evidence. In the following statistical model an attempt is made, before establishing a theoretical framework, to determine if there is any consistency in the behaviour of the presumed relationship between the level of unemployment and that of prices, as displayed by factual data, and if so how this could be formulated.

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1. Interestingly, Wonnacott reports in this context the thesis that "an unscrupulous President might generate a political business cycle to enhance the chances of reelection". op. cit. p. 363 see also Raymond Fair, 'The Effects of Economic Events on Votes for President' (New Haven: Yale University, Cowles Foundation Discussion Paper #418 January, 1976); also by Fair: "Growth Rates Predict November Winners" New York Times, January 25, 1976. Also; Assar Lindbeck, "Stabilization Policy in Open Economics with Endogenous Politicians" American Economic Review, May 1976, pp. 1-19; and C. Duncan MacRae, "A Political Model of the Business Cycle", Journal of Political Economy, April 1977, pp. 239-63; and W.D. Nordhaus, "The Political Business Cycle", Review of Economic Studies, April 1975, pp. 169-90.
  2. Nobelist K. Arrow said in an interview: "The position of the liberal activist has been greatly injured because we are unable to reconcile full employment and price stability". Business Week, April 16, 1979.

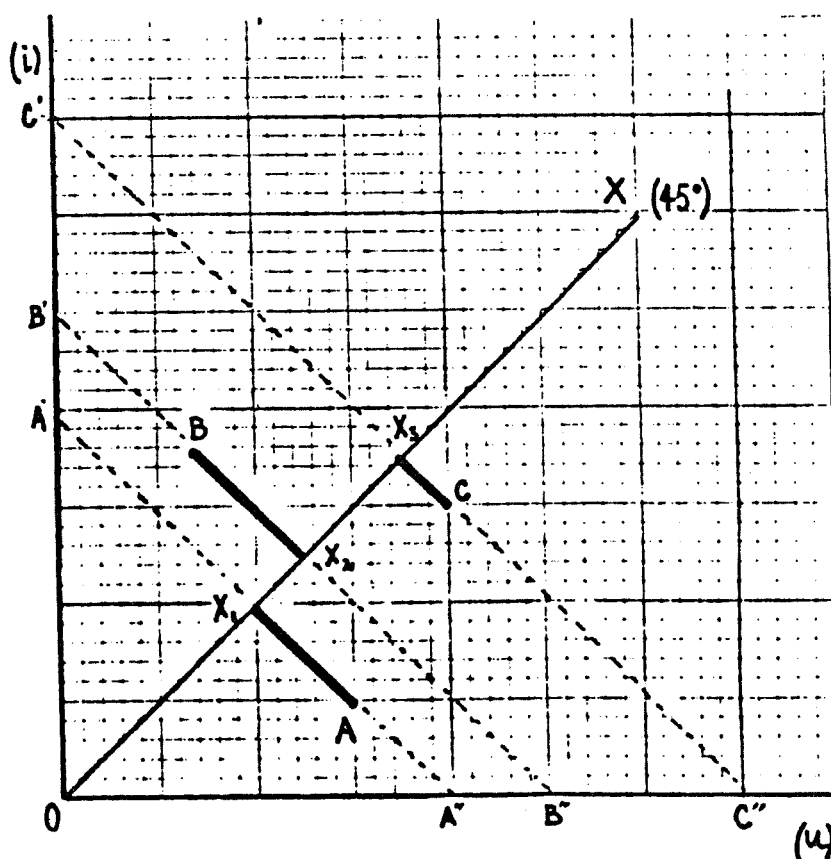
Assume then, that the level of inflation ( $i$ ) (percentage increase in the consumer price index) is displayed in the vertical axis, and the level of unemployment ( $n$ ) (rate of unemployment) on the horizontal axis.

The combination of annual 'inflation' and 'unemployment' is displayed by a number of points (one for each year) in the quadrant.

From the origin  $O$ , trace a  $45^\circ$  line ( $OX$ ). Points along this line represent each a combination of equal amounts of inflation and unemployment for each of the respective years.

Assume furthermore that factual data for the years 1, 2 and 3 is displayed respectively by points  $A$ ,  $B$  and  $C$  either north or south of the  $45^\circ$  line. From  $A$ ,  $B$  and  $C$  project a perpendicular upon  $OX$ ;  $AX_1$ ,  $BX_2$ ,  $CX_3$ . If  $AX_1$ ,  $BX_2$  and  $CX_3$  are extended towards both axis, they will cut the axes respectively at  $A'A''$ ,  $B'B''$  and  $C'C''$  forming with the origin  $O$  a triangle such as  $A'OA''$ ,  $B'OB''$  and  $C'OC''$ .

This is represented in the following graph:



In the context of stabilization policy and assuming that the ultimate objectives consist in attempting to bring unemployment and inflation towards 0, it can be said that any point within a zone such as determined by A'OA" is better off<sup>1</sup> than any point within a zone A'B' B"A" if:

$$A'OA'' < B'OB''$$

and

$$A'B'B''A'' = B'OB'' - A'OA''$$

Furthermore:

All points along A'A" have the same combinatorial value of inflation and unemployment. Similarly with points along B'B", C'C" etc. ...

Thus the combined value  $(i + u)$  at  $X_1$  equals the value at A  
and at  $X_2$  equals the value at B  
and at  $X_3$  equals the value at C etc.

In fact the value of points  $X_1, X_2, X_3 \dots$  can be taken as proxies for Okun's discomfort index (combination of unemployment plus inflation).

Hence the rate of substitution between inflation and unemployment along any A'A", B'B" etc. ... is equal to 1

and at  $X_1, X_2, X_3 \dots; i = u$

thus  $AX_1$  is the variance  $Z_1$  (in terms of either inflation or unemployment) between the value at point A in relation to the value at point  $X_1^2$ .

Similarly  $BX_2 = Z_2$

and  $CX_3 = Z_3$

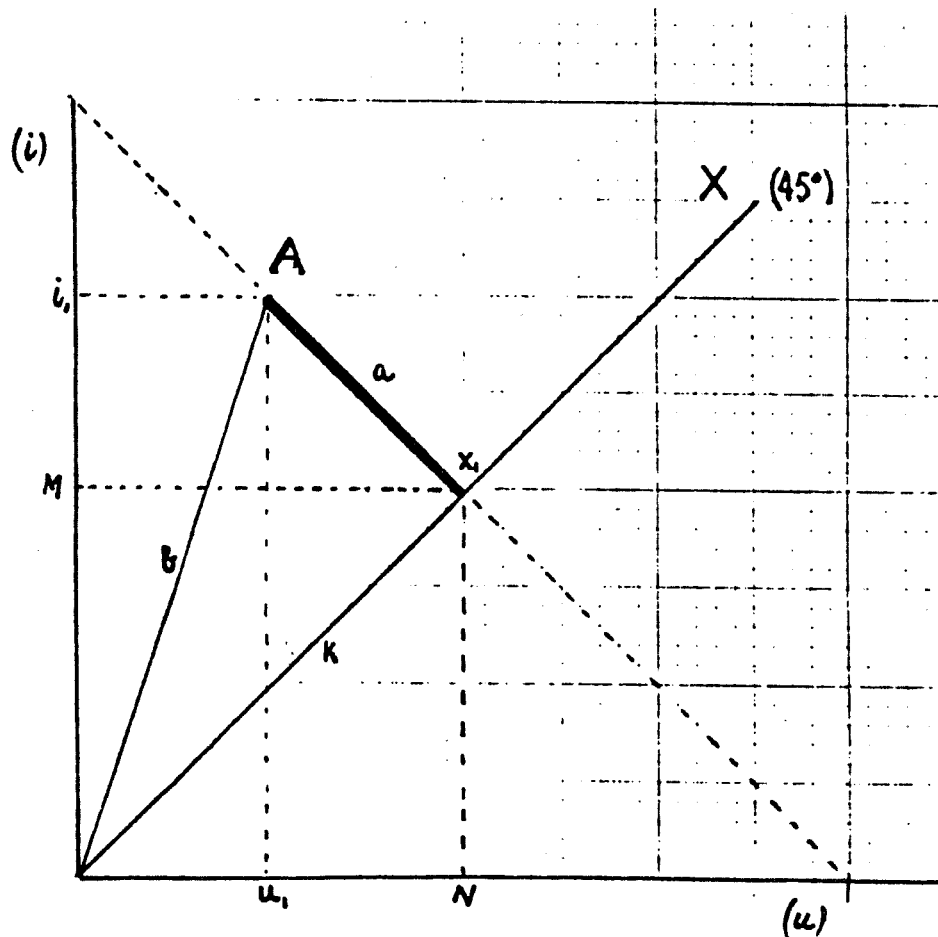
- 
1. Note that it is not necessary at this point to determine if and to what extent there is conflict among these two objectives.
  2. It can also be interpreted as the amount involved in the substitution from  $X_1$  to A.

Furthermore  $X_n$  can be seen moving along  $OX$  in either direction and depending on the particular time period ( $t$ ). These shifts in  $X_n$  can be determined for each ( $t$ ) by the vector  $OX_n$ .

Thus the shift in  $X_n$  during the time period  $t_2 - t_1$  equals to  $OX_2 - OX_1$ .

With these basic definitions we can now compute for each combination of inflation and unemployment in time the variance  $Z$  to the  $45^\circ$  line either in terms of ( $i$ ) or ( $u$ ) and the distance  $OX_n$  from the origin.

For this consider the following graph:



Assume A is given North of the  $45^\circ$  line; the perpendicular from A on  $OX$  is  $AX_1$

call  $OX_1 = k$ ;

and  $AX_1 = a$ ;

and  $OA = b$ ;

in terms of  $(i)$  and  $(u)$  and considering the orthogonal rectangle<sup>\*</sup>  $AX_1O$  we have the following:

$$a^2 = b^2 - k^2 \quad (1)$$

and considering the rectangle  $Ai_1O$  we have:

$$b^2 = i_1^2 + u_1^2 \quad (2)$$

Also considering the orthogonal projections  $X_1M$  and  $X_1N$  upon respectively  $Oi$  and  $Ou$  we have:

$$k^2 = \overline{X_1M}^2 + \overline{X_1N}^2 \quad (3)$$

But since:  $X_1M + X_1N = Ai_1 + Au_1 = u + i$

we can rewrite (3) as:

$$k^2 = 2\left(\frac{u + i}{2}\right)^2 \quad (4)$$

substituting (4) and (2) into (1) yields:

$$a^2 = i^2 + u^2 - 2\left(\frac{u + i}{2}\right)^2 \quad (5)$$

(\*) right triangle

From (5) and (4) we have:

$$a = i^2 + u^2 - 2\left(\frac{u+i}{2}\right)^2 \quad (6)$$

and:

$$k = 2\left(\frac{u+i}{2}\right)^2 \quad (7)$$

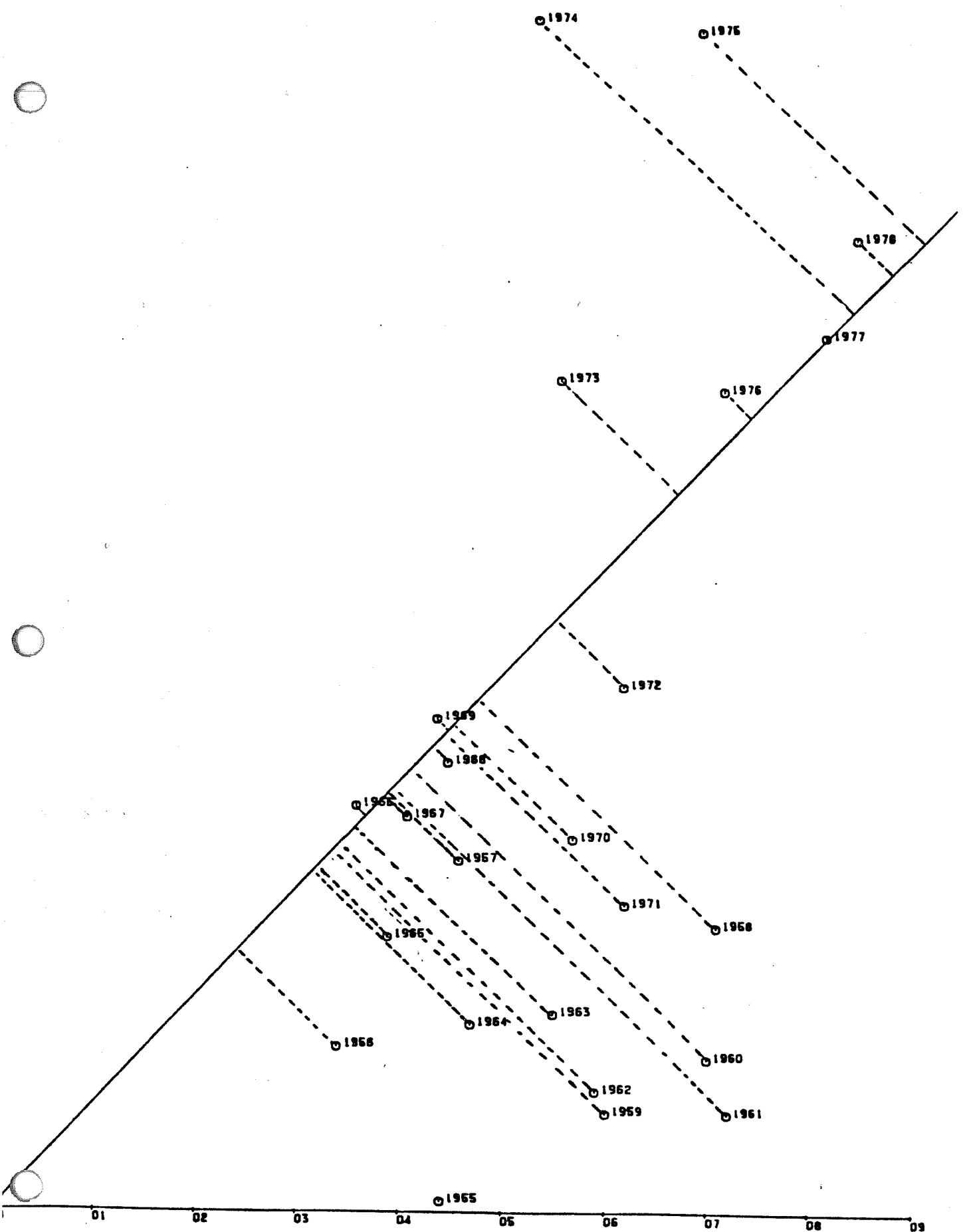
Therefore, the variance (Z) to the 45° line of a given point representing a combination of inflation and unemployment (u + i), and the distance from the origin of the projection of that point upon the 45° line can be expressed in terms of the given u and i.

The same technique applies for points South of the 45° line or for those points which happen to coincide with the 45° line.

Applying the above technique to Canadian data on unemployment and price levels<sup>1</sup> for the period 1955-1978, results in the effect represented in the following graph.

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1. Statistics Canada series; Rates of unemployment series and rates of change in the CPI (Consumer Price Index).



UNEMPLOYMENT RATE

Furthermore, within the above statistical framework, shifts in the discomfort index ( $u + i$ ) whether towards the origin 0 or away from it can be clearly perceived and computed for each respective year or period through the resulting points along the  $45^\circ$  line.

Similarly variations away or towards the  $45^\circ$  line representing the locus of points where  $u = i$ , can be defined and computed by the variance ( $Z$ ) which would yield for the respective years relative weights either in terms of inflation (in the case inflation is higher than unemployment) or in terms of unemployment (in the case unemployment is higher than inflation).

Moreover the model when applied to the policy making context could be used (with minimal transaction costs) as a simple device to verify the actual effect of a given policy. For example did indeed the policy succeeded in shifting the discomfort index (an expression of both objectives at the same time) towards the origin, or did the situation become worst through movements away from 0.

Also by the same token estimation of the variance ( $Z$ ) would indicate if it is inflation as opposed to unemployment that has become worst or better; or vice-versa.

Finally the model could be used for trend analysis and for a number of correlations with other variables. For example  $Z$  variances expressed in terms of inflation could be correlated to variables representing instruments of monetary policy (i.e. money supply) in order to assess the effect of the latter upon the former.

Similarly  $Z$  variances expressed in terms of unemployment could be correlated to variables representing instruments of fiscal policy (i.e. public expenditures) in order to assess the effect these policies have upon the rate of unemployment.

In addition to a number of statistical uses, the model would also lend itself to interpretation and qualification of 'Trade-off ZONES', the general theory being that zones determined far away from the origin 0 are worst off than zones closer to 0.<sup>1</sup>

Furthermore a general pattern may emerge by considering zone sub-quadrants (or octants) i.e.: upper right or lower right, etc. ... Further theoretical developments may consist in finding significant correlations between specific zones and a given economic structure.

## 2.6 Are Shifting Trade-off Zones related to Business Cycles?

Having designed in the previous section a consistent statistical framework for the identification and estimation of variations in the levels of inflation and unemployment we proceed in this section to analyze through the statistical indicators yielded by the above model if these variations are indeed systematic and if they can be correlated significantly to some economic factors thus suggesting an underlining theoretical basis.<sup>2</sup>

1. The orthogonal lines cutting the 45° line determine in fact the perimeter of a specific zone through junction with the axes. A problem however results in determining in which one of the upper or lower zone a given point in fact lies. The problem can be solved by always defining a zone as a triangle with summit 0 and an orthogonal line as the triangle base. This technique yields sub-zones (differences between triangles) and here again it is a matter of definition. A sub-zone can be defined in accordance with a particular configuration of points reflecting similarities. For example the proximity of a number of orthogonal lines can be interpreted as forming a single band with the upper and lower lines forming the limits. A single band could be taken as proxy for a trade-off curve and consideration of shifting bands as proxies for shifting trade-off curves. It is important to underline however that the trade-off zones model is not built upon the same premises as the trade-off curve model. While it is thought here, that the underlining rationale of the former is statistically consistent and can thus be used for the analysis of variations in levels of unemployment and inflation, its statistical indicators should not be confused with those of the latter model. In other words zones are not necessarily reflection of Phillip curves. They could on the contrary be used in the context of a different theoretical framework.
2. Note again that until this point we are still not concerned with the possibility of a conflict between (i) and (u) and thus orthogonal lines cutting the axes should not be interpreted as linear Phillips curves.

First, let us examine in the next series of graphs the cyclical behaviour if any, of variations in the indicator OX (annual percentage change of movements along the 45° line).

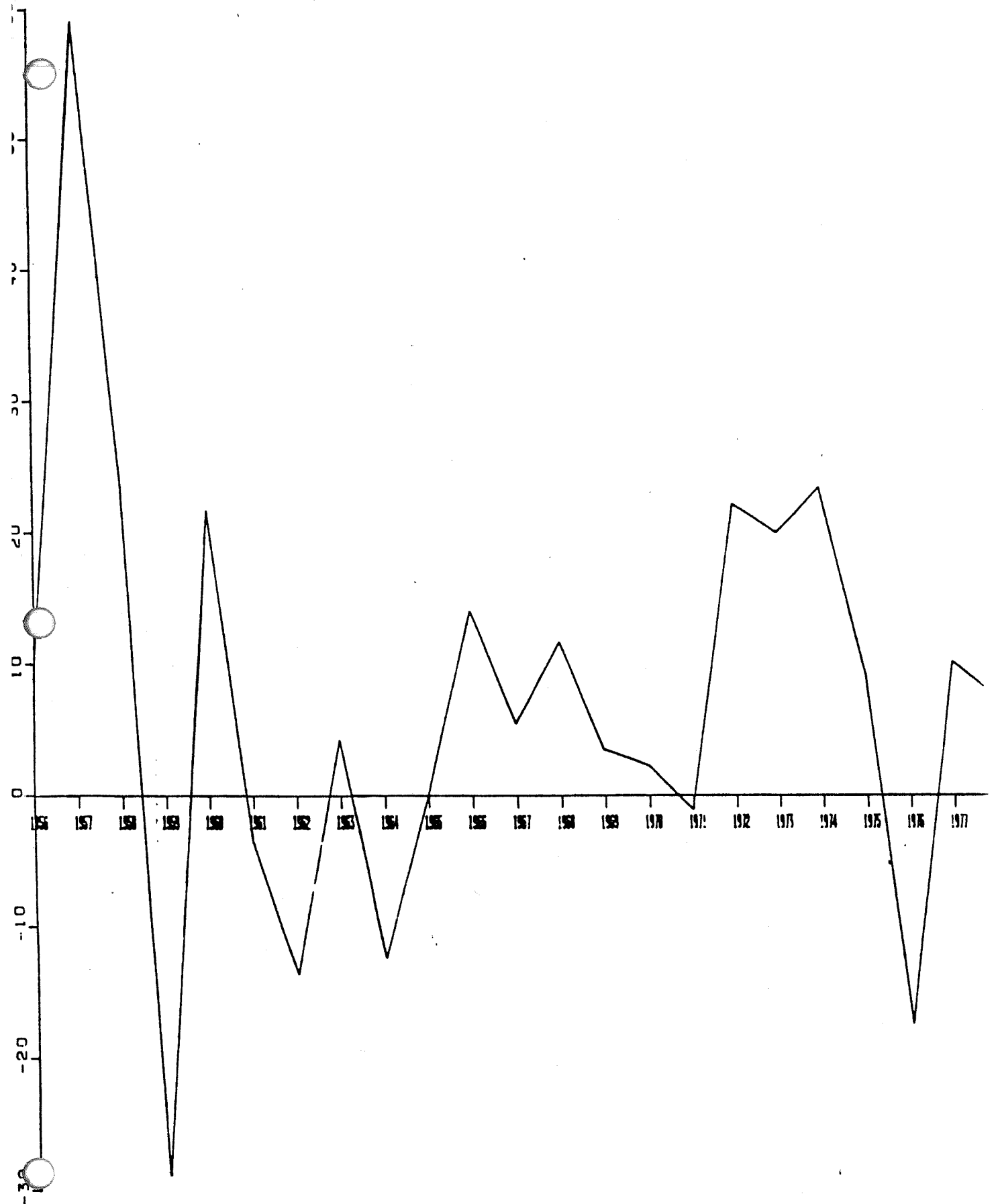
In graph 2.6.1 the variations of X are displayed for each respective year. There appears to be a definite cyclical pattern with the following peak and trough years:

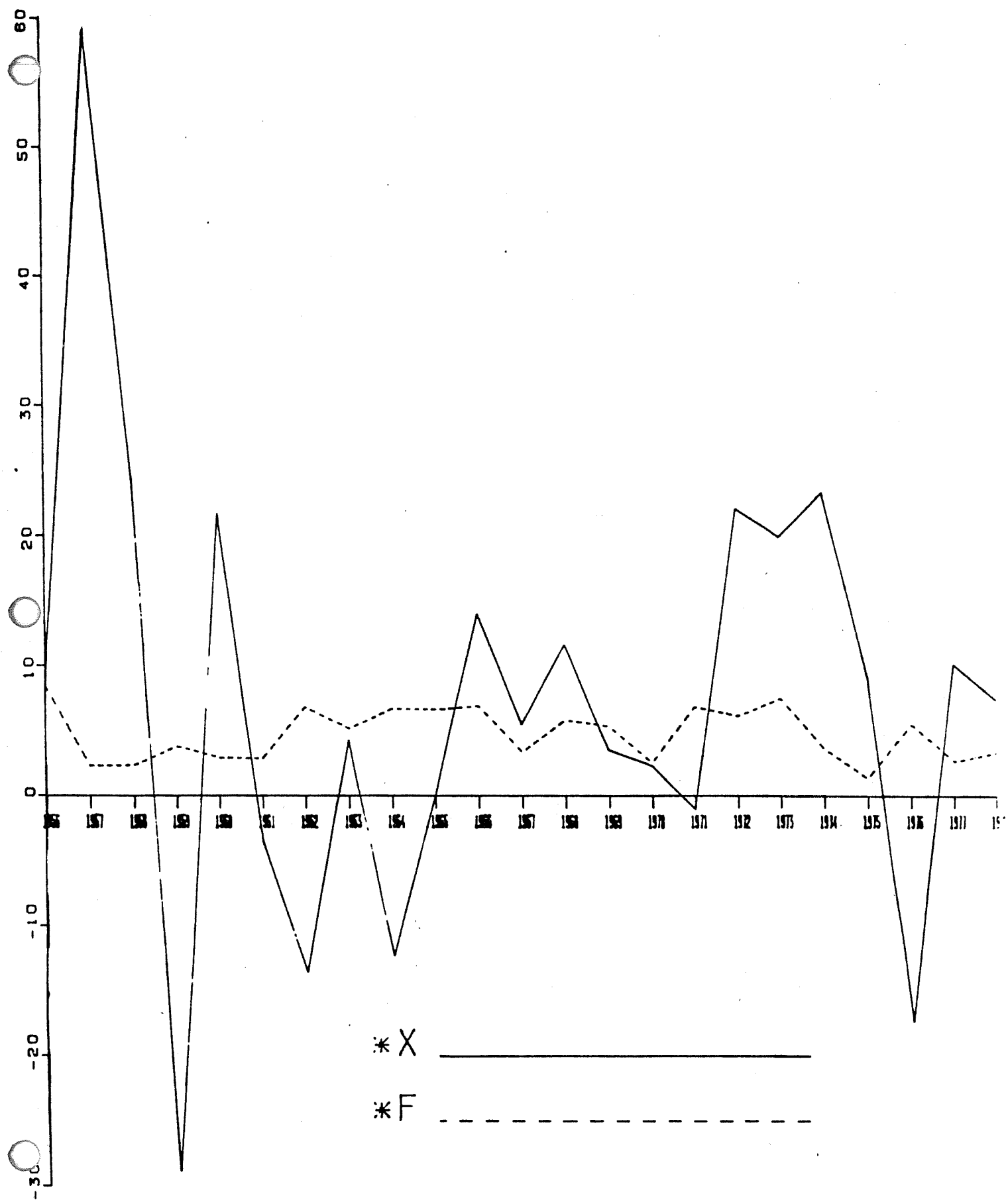
Peak Years	Trough Years
1957	1959
1960	1962
1963	1964
1966	1967
1968	1971
1972	1973
1974	1976
1977	

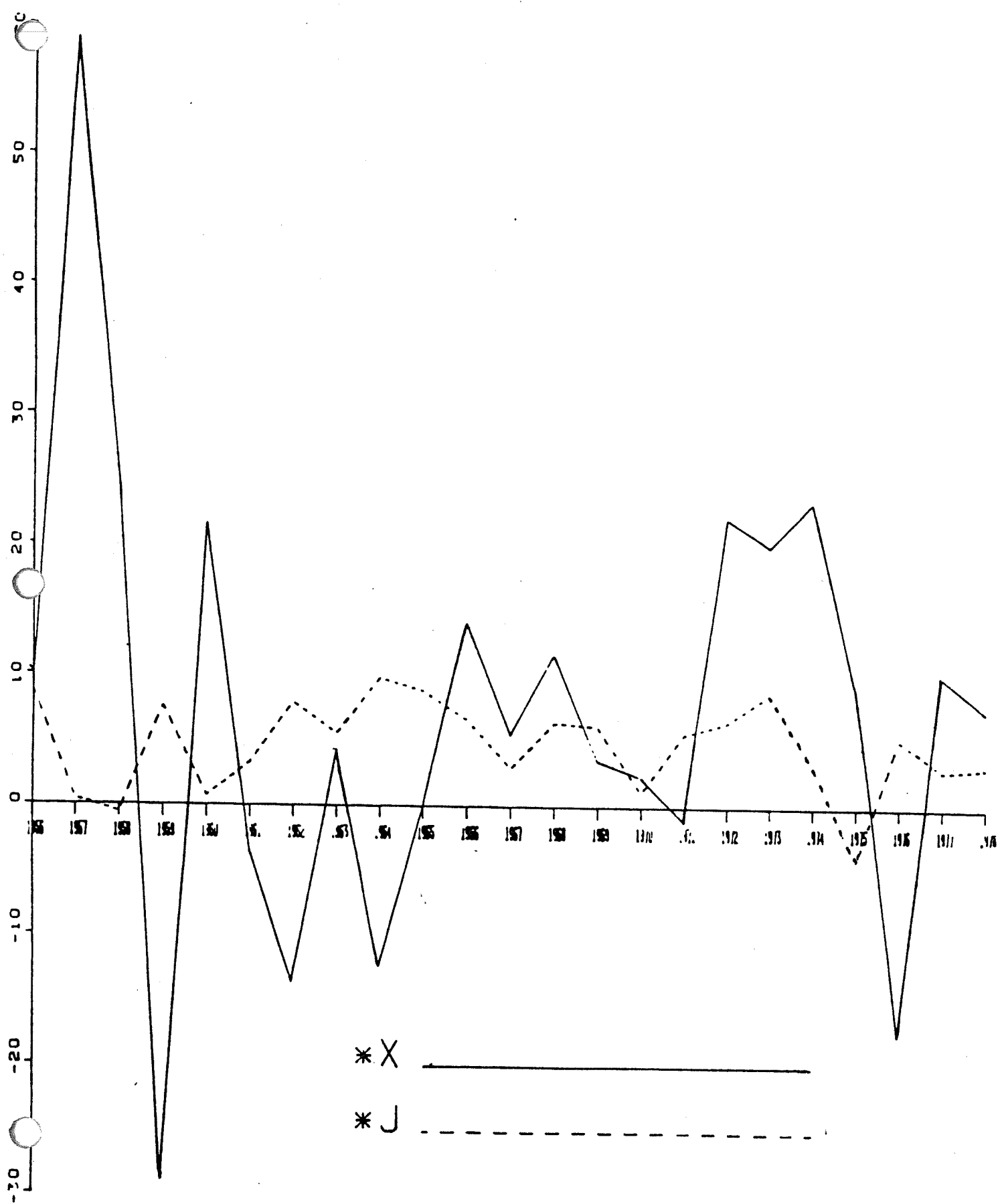
Furthermore the pattern appears to yield a cycle close to 3 years in duration; that is an approximate period of 3 years from peak to peak or from trough to trough.

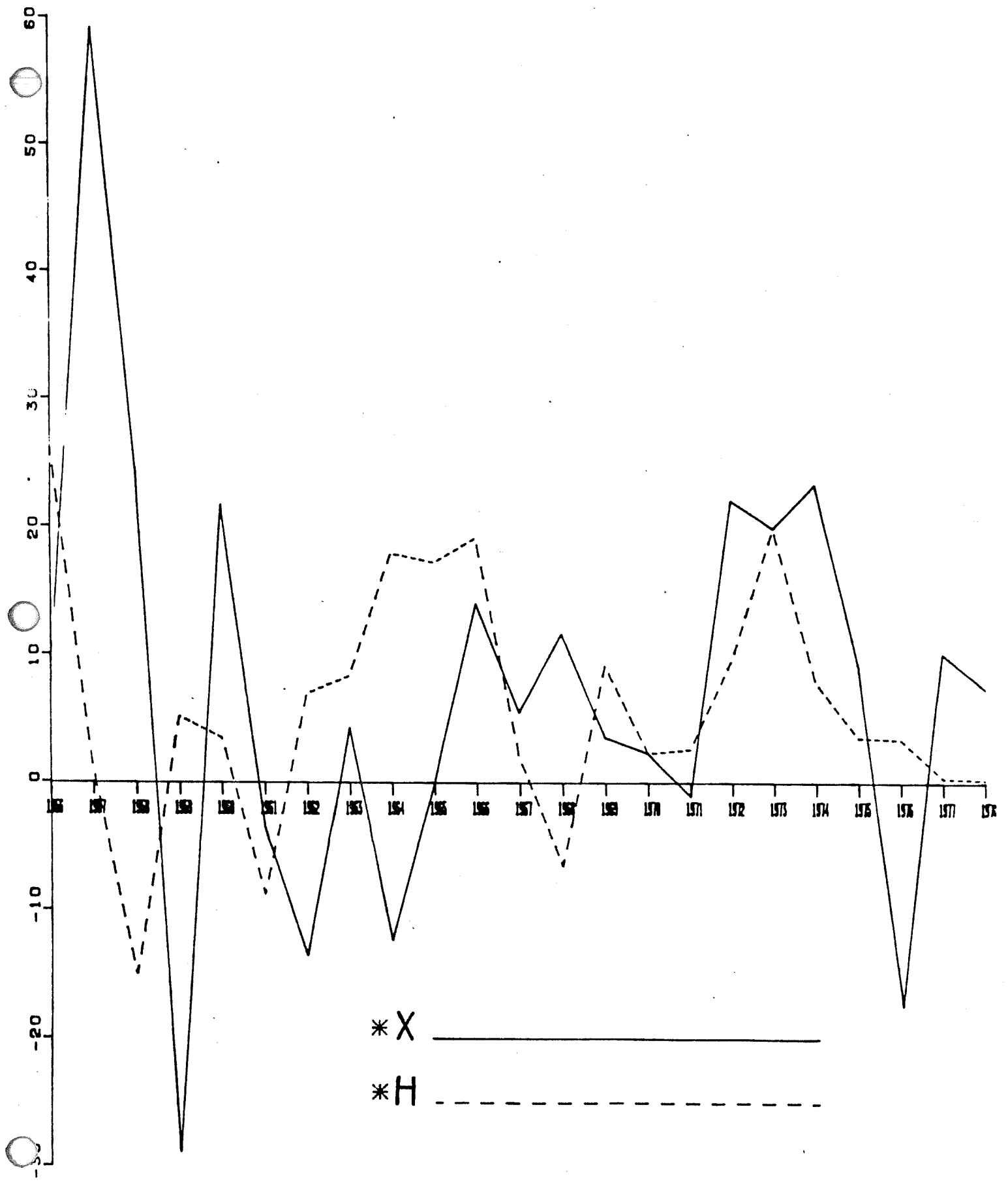
In addition, trough points below zero are a reflection of movements towards the origin (in relation to the previous year situation), thus expressing a certain degree of achievement in the policy objectives with respect to (u) and (i). On the other hand, peak points above zero reflect a worsening of the situation. Also, trough points above zero while still expressing shifts away from the origin, indicate that these shifts occur with lesser speed than in the preceding period, thus suggesting that some variables connected with the phenomenon might be acting as brakes upon the entire process.

The following three graphs attempt to correlate the annual percentage variations of X with similar variations in respectively: Constant Gross National Expenditures, total production goods index (proxy for physical output), and investment in machinery and equipment in constant terms.









Graph 2.6.2 showing the correlation between the cyclical pattern of X and that of GNE indicate interestingly enough that an inverse relation between the variations of X and those in GNE appear to have occurred. That is peak years in GNE correspond to trough years in X and vice-versa<sup>1</sup>. With the exception however for the years 1967, 68 and 69, this anti-cyclical pattern of X in relation to GNE is consistent.

In graph 2.6.3 an analogous correlation is established between variations in (X) and (J); the total production goods index (a proxy for physical output). Here the anti-cyclical pattern of X in relation to (J) is clearly perceived. Again this general cyclical relationship between these two variables is consistent for the overall period considered with the exception of the years 1967 and 1968.

Finally in graph 2.6.4, the annual variations in X are correlated with annual percentage changes in variable H representing real investment in machinery and equipment. Here the anti-cyclical pattern of X in relation to H is even more striking. The cyclical relationship between these two variables is consistent through the sampling period with the exception for the years 1966 and 1967 and with perhaps a slight lag structure being involved in the general pattern.

What then can be suggested by this behaviour in the aforementioned variables? First that variations in X, or in other words shifts in trade-off zones, appear to be correlated to the business cycle. Second, that variations in X appear to be more sensitive to fluctuations in real investment (machinery and equipment) as opposed to fluctuations in physical output and fluctuations in real aggregate expenditures.

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1. Visually graph 2.6.2 would have gained if GNE variations were displayed on a different scale.

A step-wise regression conducted with X being the dependent variable upon variations in (J), (H) and (F) confirms this general perception in the sensitivity ranking of independent variables, although the correlation of the variables as stipulated remains weak ( $R^2 = .29$ ).<sup>1</sup> However when a lag structure is introduced; that is when variations in X in period t are made dependent on variations in H, J and F in period  $t_{-1}$ , the regression results improves considerably ( $R^2$  close to .40). While these regression results may still show that the econometric form of the relationship between these variables needs further refinements, they are, however, indicative of the underlining cyclical pattern in the behaviour of X.

Furthermore, this behaviour warrants further examination of business cycle mechanics in attempting to construct a plausible theoretical framework for the explanation of the variations in inflation and unemployment levels. We now turn, therefore, to a review of business cycle theories, before undertaking a reexamination of the empirical evidence in the case of Canada.

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1. See regression results in appendix, and discussion in part four.

### 3. REVIEW OF BUSINESS CYCLE THEORIES

#### 3.1 Pre-Keynesian Theories of the Cycle

##### (a) The Origins of Modern Cycle Theory

The origin of modern cycle theories can perhaps be traced back to early developments in the areas of value theory. It will be recalled that Adam Smith recognized several meanings for the term 'value' and finally adopted two which he presented generally throughout his writings. He wrote, for example, that:

"The real price of everything is the toil and trouble of acquiring it ... What is bought with money or with goods is purchased by labour, as much as what we acquire by the toil of our own body. That money or those goods indeed save us this toil. They contain the values of a certain quantity of labour which we exchange for what is supposed at the time to contain the value of an equal quantity. Labour was the first price, the original purchase money that was paid for all things. It was not by gold or by silver, but by labour, that all the wealth of the world was originally purchased; and its value to those who possess it, and who want to exchange it for some new productions, is precisely equal to the quantity of labour which it can enable them to purchase or command."<sup>1</sup>

Of course, A. Smith recognized that it was not simply a matter of the amount of labour time involved, for the quality of labour used was a part of his 'embodied' labour concept of value. However, Smith also noted that:

"every commodity ... is more frequently compared with other commodities than with labour. It is more natural therefore to estimate its exchangeable value by the quality of some other commodity than by that of the labour which it can purchase."<sup>2</sup>

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1. Adam Smith, *The Wealth of Nations* (New York: Modern Library, 1937); pp. 30-31.
  2. *Ibid.*, p. 31.

While Smith often mixed these two concepts of value he suggested that embodied labour gave REAL value, whereas exchange value was only a NOMINAL value. This was enough to set the heritage of what was to become, on the one hand, a main current of analysis constructed in real terms and dealing with classical equilibrium, and on the other hand, an undercurrent applying the 'exchange value' concept and resulting in an analysis construed in terms of departures from equilibrium.

Ricardo, by adopting the embodied labour position, erected a structure of economic principles which served as the foundation of the classical school. By contrast, Malthus adopted the exchange value idea, which was to lead to consideration of short-term fluctuations and thus a framework for cycle theory to develop at a later stage.

The Ricardian approach, however, and its consideration of long-term analysis dominated the 19th century setting the development of Classical economics, while Malthus and his attempts were relegated to a secondary role, a feature which limited the effects of an early development in cycle theory.

It is worthwhile at this point to reflect on the differences between these two analytical approaches for they can shed more light on the nature of the business cycle.

Ricardo, considering the two meanings of value given by Smith, suggested that 'from no source do so many errors, and so much difference of opinion ... proceed, as from the vague ideas which are attached to the word value'.<sup>1</sup> It is not that Ricardo helped much in clarifying this situation; in fact, it was said that what he wrote on the subject leaves much to be desired.<sup>2</sup> But what was important for latter developments is the fact that Ricardo settled down to a reiteration of the term NATURAL VALUE giving it a meaning closely akin to that of Smith's REAL VALUE.

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1. David Ricardo, *The Principles of Political Economy* (Everyman ed.; London: J.M. Dent & Sons, Ltd., 1911); p. 5.
  2. See for example W.J. Barber, *A History of Economic Thought*, Pelican Books, 1967. Also analyses of this topic by Knight, Stigler, Viner, and Schumpeter.

Ricardo recognized that the market price would at times depart from his natural price and said:

"In making labour the foundation of the value of commodities, and the comparative quantity of labour which is necessary to their production, the rule which determines the respective quantities of goods which shall be given in exchange for each other, we must not be supposed to deny the accidental and temporary deviations of the actual or market price of commodities from this, their primary and natural price."<sup>1</sup>

This statement is important because it implies that deviations from 'natural' prices are short-lived and that in the long run there would always be an equilibrium situation. The implications of this reasoning are considerable as they relate to the evolution of cycle theory. Maurice Lee suggests<sup>2</sup> that the major tenets stemming from Ricardian value theory appear therefore to be the following:

- 1) There can be no such thing as general overproduction.
- 2) There can be no such things as general unemployment.
- 3) The economy tends always to be at equilibrium.
- 4) Equilibrium tends always to be at full-employment levels.
- 5) Disequilibrating forces tend to set in motion other forces which move the economy back into the equilibrium position. This is true whether the disequilibrating forces are:
  - a) Abnormally high or low prices,
  - b) Abnormally high or low wages,
  - c) Abnormally high or low profits,
  - d) Abnormally high or low interest payment, or
  - e) Abnormally high or low rental payments.

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1. Ricardo, op. cit., p. 48.  
2. Maurice W. Lee, op. cit., p. 206.

- 6) And finally, in terms of Ricardian value theory, there can be no such thing as a business cycle; hence, there is no room for the development of a study of the economic cycle.

Ricardian value theory produced thus the static-equilibrium economics which was to dominate economic thinking for the better part of the 19th century. While Malthus, adopting the exchange value concept, was at once brought to a consideration of short-run influences and although his attempts were circumscribed by the limitations of Ricardian equilibrium analysis, he may be credited with pioneering the way to modern business cycle theory. It was to the detriment of cycle theory, says Lee<sup>1</sup>, that Ricardo and certain of his followers were much better pamphleteers than Malthus and his associates. Schumpeter says that Malthus was "in the most unenviable position an economist can be in, namely, in the position of having to defend plain sense against another man's futile but clever pirouettes".<sup>2</sup>

The limitations of Ricardian equilibrium analysis, with its belief in the absurdity of over-production or under-production, was so prevailing that there was no possibility of explaining departures from equilibrium in terms of forces internal to the economy. So much so, that J.A. Hobson who collaborated with a businessman, A.F. Mummery, in a book The Physiology of Industry, stating the case that excessive savings were responsible for under-employment and periods of bad trade, was as a result ordered to discontinue his lectures in economics at the university. Hobson says that he learned of his dismissal due "to the intervention of an Economics Professor who had read my book and considered it as equivalent in rationality to an attempt to prove the flatness of the earth."<sup>3</sup>

However, since violent swings in the level of economic activity were becoming increasingly difficult to overlook, some economists who were denied the possibility of explaining these swings within the established economic framework, turned to consideration of causes laying outside the system itself and thus came up with EXOGENOUS cycle theories.<sup>4</sup>

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1. M.W. Lee, op. cit., p. 209.
  2. Joseph A. Schumpeter, op. cit., p. 483.
  3. An address by J.A. Hobson reprinted in J.H. Keynes, The General Theory of Employment, Interest and Money (New York: Harcourt, Brace & Co., Inc., 1936); pp. 365-66.
  4. M.W. Lee, op. cit., p. 210.

W.S. Jevons<sup>1</sup> and Henry L. Moore<sup>2</sup> were two economists who sought to trace the cause of economic fluctuations to periodic variations in the weather cycle. However, subsequent investigators found that such correlations were of dubious value.

Meanwhile, within the Ricardian tradition, Alfred Marshall was one who showed concern about the Ricardian dilemma. He noted, for example, that: "Inconstancy of employment is a great evil, and rightly attracts public attention. But several causes combine to make it appear to be greater than it really is".<sup>3</sup> Despite this recognition, he however regularly concluded that such variations within one industry will be offset by contrary movements in another, thus rejecting in final analysis, the idea of general under-employment. In the following passage Marshall comes closest to a recognition of the real nature of business cycles and, like Keynes many years later, he places heavy emphasis upon variations in expectations. Nevertheless, Marshall did not explore explicitly the implications of his own assumptions.

This passage reads as follows:

"... though men have the power to purchase, they may not choose to use it. For when confidence has been shaken by failures, capital cannot be got to start new companies or extend old ones ... In short, there is but little occupation in any of the trades which make fixed capital ... The diminution of the demand for their wares makes them demand less of other trades. Thus, commercial disorganization spreads: The disorganization of one trade throws others out of gear, and they react on it and increase its disorganization.

The chief cause of the evil is a want of confidence ... Confidence by growing would cause itself to grow; credit would give increased means of purchase and thus prices would recover ... with a revival of industry prices rise."<sup>4</sup>

Contrasted to Marshall position, J.A. Hobson, finally made a sharp break with the Ricardian tradition. This came in 1896, as a result of his study on unemployment.<sup>5</sup>

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1. W.S. Jevons, *Investigations in Currency and Finance* (London: MacMillan & Co.; 1884).
  2. Henry L. Moore, *Economic Cycles: Their Law and Course* (New York: MacMillan & Co., 1914); and *Generating Economic Cycles* (New York, MacMillan & Co., 1923).
  3. Alfred Marshall, *Principles of Economics* (8th ed., London: MacMillan & Co., Ltd., 1930); p. 687.
  4. *Ibid.*, pp. 710-11.
  5. J.A. Hobson, *The Problem of the Unemployed* (London: Methuen & Co.; 1896).

This study writes M.W. Lee: 'is actually one of the first rounded analyses of the business cycle itself'<sup>1</sup>; in point of fact, Hobson writes:

"Bad trade appears as a general lowness of prices and profits, but, regarded as a disease of the industrial structure, it takes the shape of a general slackness of under-use of the various factors of production."<sup>2</sup>

Hobson took also issue with some of the fundamental classical premises such as, for example, with the view that surpluses in one area were the complement of deficiencies in other parts of the economy. Against Say's Law, which held that there could be no over-production since everything produced provided the demand for production, Hobson noted that many individuals produced more than they needed to consume and that this situation could result in a market that becomes congested. At this point; "goods cannot be sold at their former prices but must be disposed of at a considerable price reduction, if indeed they may be sold at all. Entrepreneurs' incomes drop, their purchasing power declines, and the economy as a whole is driven to lower and lower levels. It is therefore over-saving and under-consumption which are the principal causes of the trade cycle."<sup>3</sup>

(b) Classification of Pre-Keynesian Cycles Theories

In the forty years between Hobson's publication of "The Problem of the Unemployed" in 1896, and the appearance of Keynes' General Theory in 1936, a great range of cycle theories came to the fore. M.W. Lee<sup>4</sup> distinguishes the following:

- i) Purely monetary theories
- ii) Monetary over-investment theories
- iii) Non-monetary over-investment theories
- iv) Under-consumption theories
- v) Psychological theories (including the 'error' theories).

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1. M.W. Lee, op. cit., p. 214.
2. J.A. Hobson, op. cit., p. 59.
3. M.W. Lee, op. cit., p. 214.
4. M.W. Lee, op. cit., p. 219.

M.K. Evans<sup>1</sup> gives a somewhat more compressed classification distinguishing between: Monetary, Non-monetary and Supply theories. Essentially, these two classifications encompass the same subject matter.<sup>2</sup>

i) Purely Monetary Theories of the Cycle

Wicksell<sup>3</sup>, a Swedish economist, appears to have first clearly taken issue with the problem of equilibrium as it relates to the monetary system by drawing a distinction between the production system and the monetary system. By doing so, he provided the ground-work on which the monetary theories of the cycle could be developed.

Wicksell distinguished the market rate of interest from the long-term 'real' or 'natural' rate of interest. In terms of the classical view, the market rate of interest could not be really different from the so-called natural rate of interest; if it temporarily departed from that level, the automatic counteracting market forces would quickly drive it back to equilibrium.

Wicksell suggested that if the money system was not in equilibrium (i.e., the market rate of interest and the natural rate of interest were not identical), then the production system would not be in equilibrium either. Thus, if the market rate of interest were below the natural rate, investors would expand their operations specially in the construction of plant and equipment. If the market rate of interest was above the natural rate of interest, production would be discouraged, prices would fall, profits would decline and a general contraction would occur.

R.G. Hawtrey, an English economist, followed on Wicksell tracks and provided a more comprehensive analysis of the workings of the monetary system.<sup>4</sup>

According to Hawtrey, all changes in the level of economic activity are but reflections of changes in the money flow. Thus, the ultimate cause of

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1. M.K. Evans, op. cit., p. 327.
  2. Lee's classification appears to be more detailed and is the one followed here.
  3. Knut Wicksell: i.e. Geldzins und Guterpreise (1898), republished in an English translation as "Interest and Prices" (London: MacMillan & Co., Ltd., 1936).
  4. i.e.: Good and Bad Trade (London, 1913); Currency and Credit (London, 1928); Monetary Reconstruction (New York, 1926); The Art of Central Banking (London, 1933); Capital and Employment (London, 1937).

economic fluctuations lies in the money system. It follows from this that if the effective money supply could be stabilized, then economic fluctuations would be eliminated throughout the economy. Hawtrey suggested that the principal factor affecting the money supply is the credit mechanism and as banks raise and lower interest rates, they discourage or encourage expansion of the economy. Responding to the objection that small changes in the interest rate do not really have a great deal of effect upon the general economy, Hawthrey introduced a concept which plays a central role in his theory. He said that wholesalers and other middlemen located between the producer and the ultimate retailer are more sensitive to small changes in the interest rate than are others in the economy. Assume, for example, that the economy is at the end of an expansion phase. At this point, manufacturers are operating at capacity levels; wholesalers are striving to acquire increased stocks of goods to hold and distribute to retailers; and this high level of activity is financed through a large volume of bank loans. The banks, in turn, are feeling the pinch as their excess reserves are drawn down; to protect themselves they raise their rates on new loans. At this point, contraction begins to occur. As the cost of loans increases, middlemen are therefore quickly affected by the new interest rate pattern. Unable to support this new level of costs, they contract their orders from manufacturers.

The manufacturers, in turn, with declining volume, reduce their purchases of materials and begin lay-off of their workers. Throughout the economy, a decline in incomes takes place as payrolls are reduced and orders are scaled down. Some businesses begin to fail. Prices fall and there is a drive towards positions of liquidity. Loans contract, and bank reserves begin to cumulate. After this deflation has proceeded for a time, interest rates begin to fall until ultimately their low level encourages entrepreneurs to borrow and expand again. Consumer incomes begin to rise and there is an increase in effective demand for goods and services. This process sets in the new recovery until the late stages of the expansion phase.

#### ii) Monetary Over-investment Theories

Another group of theories put the emphasis differently. These theories suggest that the real problem is a breakdown in the production system. They place the emphasis in an over-investment process among the heavy durable

goods industries, which is as a result of disproportionate movements of investment as contrasted with consumption. Thus a period of expansion is a period of over-investment and a period of contraction would be a period of under-investment.

Friedrich Hayek<sup>1</sup> is perhaps most representative of this school of thought. Hayek's equilibrium concept stresses a balance between producer goods and consumer goods levels of production. He sees the production process as being composed of stages, with the consumer goods industries representing the lowest stages. Thus, equilibrium exists in the economy when these different stages are in such relation to each other so that the production process itself is not unduly lengthened or shortened. In other words, equilibrium would exist when the demand and supply for both consumer goods and producer goods are balanced. If this condition is met, there will be no tendency to expand consumption at the expense of investment, or investment at the expense of consumption. In such a situation, the economy will be moving in a position of stability. However, this equilibrium may be upset by changes in the money supply or by changes in the savings-investment relationship.

If savings takes place before investment (i.e., voluntary savings through holding back of consumption), then there will be a decrease in consumption accommodating a proportional increase in investment spending without a tendency for prices to advance. This, in effect, will mean a shift of resources from the production of consumer goods to the production of producer goods; however, total employment in the economy will not be changed. If, on the other hand, investment comes before saving (i.e., banks extend credit to the investment markets through an expansion of bank loans), there will be an expansion of investment without a contraction of consumption. The durable goods industries will thus expand together with the consumer goods industries, adding up to an expansionary phase in the overall economy. This upswing phase sees increasing demand for employment and other factors of production and a general tendency for prices and costs to go up. During this upswing phase, the structure of production becomes more capital-using.

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F.A. Hayek; *Monetary Theory and the Trade Cycle* (New York, 1933); *Prices and Production* (London, 1935); *Profits, Interests and Investments* (London, 1939).

According to Hayek, this process will continue until the structure of production has been returned to a state of balance. At the height of the upswing phase, costs will be driven up in the investment goods industries, profits will shrink, and interest rates on bank loans will rise. Entrepreneurs will begin to curtail their operations and the downturn will be on. In this process the structure of production shrinks, workers are laid off, income falls and bank reserves begin to pile up. This process of contraction continues until once again it becomes profitable to borrow and begin a new expansion.

Furthermore, Hayek suggests that the solution to this problem of economic fluctuations is to keep money 'neutral'. Unless the effective money supply is held constant, investment will be induced (money supply expands) or discouraged (money supply contracts).

### iii) Non-monetary Over-investment Theories

Non-monetary over-investment theories suggest that over-investment is the basic cause of instability. However, they differ from the monetary over-investment theories by not attaching much significance to the role played by monetary factors.

Michel Tugan-Baranowsky's work is considered as pioneering in that area.<sup>1</sup>

Essentially, Tugan-Baranowsky distinguishes between FREE CAPITAL (i.e., the supply of loanable funds), and REAL CAPITAL (i.e., the actual investment in plants and machinery). He likens the free loan capital to the steam which builds up in the cylinder of an engine. When the pressure has mounted sufficiently, the piston is set in motion and comes to the end of the cylinder; the steam escapes, and the piston returns to its former position.

Thus, as free loan capital cumulates within the economy, it builds up pressures which force the economy into an expansion. This free loan capital is converted into real capital (investment goods). As the expansion is underway, loan funds are fully absorbed and interest rates go up sharply. The expansion loses its steam and a contraction is underway.

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1. i.e.: 'Studien zur Theorie und Geschichte der Handels Krisin in England' (1901); first published in 1894, and in a French edition as 'Les crises industrielles en Angleterre' (1913).

During the contraction period, the most violent declines are felt in the industries which supply fixed real capital, and as these industries cancel orders for materials and let employees go, their decline is transmitted to other parts of the economy, through the means of the monetary system. During the contraction prices fall and those who live on fixed incomes are able to save more and more. Eventually, this becomes a principal source of cumulation of free loan capital for the next expansion.

Among those who followed Tugan-Baranowsky; Arthur Spiethoff<sup>1</sup> was best known for having contributed largely to the development of the non-monetary theories of the cycle. Spiethoff sees expansion and contraction take place through movements within and among the following four divisions in the economy:

- 1) Non-durable consumer goods
- 2) Durable and semi-durable consumer goods
- 3) Durable capital goods
- 4) Materials supplied to durable goods industries.

During a period of depression, there is excess capacity with respect to capital investment and as a consequence orders for durable capital goods and for materials are low. Then as the upturn begins, these heavy goods industries begin to expand their activities and must replace old equipment and ultimately make plans for the expansion of capacity. This makes the primary and initial impact of an expansion period greater in the materials and durable goods producing industries. Prices begin to rise, and profits too, inducing further investment to these industries. As the expansion gets underway, it results in the payment of additional wages and therefore adds to the aggregate income of those in the economy. Spending increases and shortages begin to show up in the consumer fields, while resources in the form of investment continue in the heavy goods industries. Then as the new investment wave begins to come into production, the outpouring of consumer goods begins to hit the market. More heavy goods plants come into production and suddenly it becomes apparent that the economy is now in a condition of over-investment. Returns upon investment fall rapidly, prices drop and workers are laid off. The contraction process begins. The lower twinning

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1. i.e.: 'Krisen, Handwörterbuch der staatswissenschaften' (1925).

point is reached when prices and costs have dropped enough to make renewed investment attractive.

Spiethoff suggests that the real turn may not take place unless some outside stimulant takes place; such as new inventions, favourable crop reports, or some other factor causing a reversal of the pessimistic psychology of the depression. Expectations play therefore an important role in this analysis, as in the case of 'overproduction' which Spiethoff attributed partly to errors in forecasting market demand.

Among non-monetary investment theorists, Gustav Cassel<sup>1</sup> while following a similar analysis to that of Spiethoff, does not however agree with him that the basic cause of the upper turn into a contraction is an excess of investment with respect to consumption. Cassel suggests that the over-investment is related to the amount of saving available in the economy. For example, in the later stages of an upswing, investment outruns the supply of savings. This causes a sharp upward movement in the rate of interest, investment prospects are then reappraised pessimistically, and a collapse of investment follows. It is therefore the disparity between savings and investment which causes the downturn.

Finally, D.H. Robertson's ideas<sup>2</sup> are very close to those of Tugan-Baranowsky and Spiethoff. Robertson sees the REAL movements, as contrasted with monetary forces, as the causal factors of cyclical movements. His work deals mainly with the integration of real and monetary influences and the manner in which minor and appropriate departures from equilibrium become exaggerated and excessive.

#### iv) Under-consumption Theories of the Cycle

Under-consumption theories, although not accepted as respectable to the end of the mid-thirties, are important because eventually they were to provide the springfold on which Keynes was to recast the core of these ideas into the 'General Theory', giving them new meaning.

As observed above, Hobson's work spearheaded the movement on which under-consumption theories developed before the appearance of the 'General Theory'. Hobson viewed the upper turn and resulting contraction as the

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1. i.e.: 'Theory of Social Economy' (New York: Harcourt, Brace & Co., 1923).

2. e.g. in: 'Money' rev. ed., Cambridge University Press, 1948, and in J.E.L. Dec. 1980, VOL. XVIII, N. 4.

product of oversaving which, in effect, was identical with the concept of under-consumption. This amounted to a repudiation of Say's law. Hobson also made a distinction between saving and the effective use of saving.

Hobson's exposition laid down the general foundation on which the under-consumption theories evolved. Some of these theories have held that under-consumption is caused by the inherent tendency of the economy to accumulate capital investment. Under this reasoning, the outpouring of goods becomes greater with time and ultimately reaches a point beyond the capacity of the economy to consume.

Others have stressed the leakage of income out of the money stream in the form of hoards or uninvested savings. Two writers, Foster and Catchings<sup>1</sup> emerge as having had most impact in this context during this period. The novelty of their work was to bring into the analysis an aspect with reference to the weakening influence of profits.

According to Foster and Catchings, much of the problem stems from the fact that business firms are in business to make profit. In order to maximize their stream of profits, they use at least part of it for reinvestment in their own businesses, which tends to add to the production capacity of the economy and widens the gap between output and consumption. Thus, the real cause of the downturn in the cycle is the failure of consumption to expand in line with the expansion of investment. This failure of consumption makes a part of the investment excessive, and it precipitates a decline of profits, which in turn brings a general contraction of the economy.

Clearly, this sort of analysis leaves some questions unanswered. For example, why should a new flow of output resulting from new investment be regarded as excessive? (i.e., something for which no income and hence no purchasing power are available). Presumably, new investment by using additional resources in the economy would also create additional income. Also in the case of new investment resulting into technological improvement, Foster and Catchings would hold that less will be paid out in wages and material costs. Therefore, incomes received by the community will not increase as greatly as the physical volume of production. However, this need

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1. W.T. Foster and W. Catchings, 'Money' (Boston: Houghton Mifflin Co., 1923); 'Profits' (Boston: Houghton Mifflin Co., 1925); and 'The Road to Plenty' (Boston: Houghton Mifflin Co., 1928).