1-1-1982

Monetary Factors and the Business Cycles

Nattasin Chongsanguan

Eastern Illinois University

This research is a product of the graduate program in Economics at Eastern Illinois University. Find out more about the program.

Recommended Citation

http://thekeep.eiu.edu/theses/2916

This Thesis is brought to you for free and open access by the Student Theses & Publications at The Keep. It has been accepted for inclusion in Masters Theses by an authorized administrator of The Keep. For more information, please contact tabruns@eiu.edu.
TO: Graduate Degree Candidates who have written formal theses.

SUBJECT: Permission to reproduce theses.

The University Library is receiving a number of requests from other institutions asking permission to reproduce dissertations for inclusion in their library holdings. Although no copyright laws are involved, we feel that professional courtesy demands that permission be obtained from the author before we allow theses to be copied.

Please sign one of the following statements:

Booth Library of Eastern Illinois University has my permission to lend my thesis to a reputable college or university for the purpose of copying it for inclusion in that institution's library or research holdings.

I respectfully request Booth Library of Eastern Illinois University not allow my thesis be reproduced because ____________________________

Date

___________

I, ____________________________ request Booth Library of Eastern Illinois University not allow my thesis be reproduced because ____________________________

Date

Author
MONETARY FACTORS
AND THE BUSINESS CYCLES

(TITLE)

BY

NATTASIN CHONGSANGUAN

THESIS
SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

MASTER OF ARTS IN ECONOMICS
IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

1982

YEAR

I HEREBY RECOMMEND THIS THESIS BE ACCEPTED AS FULFILLING
THIS PART OF THE GRADUATE DEGREE CITED ABOVE

DATE

ADVISER

DATE

COMMITTEE MEMBER

DATE

COMMITTEE MEMBER

DATE

DEPARTMENT CHAIRPERSON
MONETARY FACTORS
AND THE BUSINESS CYCLES

A Thesis To Be Submitted To
The Department of Economics
Eastern Illinois University

As Partial Fulfillment of the
Requirements for the Degree of

MASTER OF ARTS IN ECONOMICS

By Nattasin Chongsanguan

B.A. (Political Science and Economics)
Eastern Illinois University, 1980

M.A. in Political Science
Eastern Illinois University, 1981

Spring 1982
Charleston, Illinois
ABSTRACT

The emphasis in the study of economic fluctuations has been placed upon the disequilibrium nature of the growth process with private investment playing such a key role in generating oscillatory behavior. The view taken in this paper, however, is that fluctuations in aggregate economic activity are equilibrium phenomena. Expansionary and contractionary processes are considered as continuous adjustments along an equilibrium path through time.

The Hawtrey-Hicks monetary hypothesis is used in this study to explain irregular fluctuations in economic activity. Monetarist propositions together with rational expectations and dual-decision hypotheses form the underlying assumptions regarding the behavior of the economy and its agents. Four hypotheses are then drawn from the Hawtrey-Hicks analysis for the testing purposes. Quarterly data (1955: I to 1981: IV) are used in single-equation ordinary least squares regression estimations. The conclusion to be drawn from the study is that empirical evidence supports the hypotheses.
ACKNOWLEDGEMENTS

Throughout the development of this thesis I have benefited from the help of many. I am grateful to my thesis committee. I thank Dr. Patrick Lenihan (Chairman). His advice, suggestions and help on an early version of my idea gave me much encouragement to go on. This work owes much to him. I thank both Dr. Paul Fahy and Dr. Abrahim Karbassioon. Their advice, comments and suggestions were extremely helpful.

While drafting the second draft of this work at the East-West Communication Institute in Honolulu, Hawaii, I also benefited from comments and criticisms made by two friends, Patrick Coolen and Chee-Wah Cheah. I thank them.

On a personal level, my gratitude goes to my family for the love, support and encouragement. I would also like to thank Fabienne Bensly for her help and patience.

The responsibility for the errors or other shortcomings contained in this work is mine alone.

Matt Chongsauguan

November 1982
Beaumont, Texas
CONTENTS

ACKNOWLEDGEMENTS ........................................... 1

Chapter

1 BUSINESS CYCLES: TERMINOLOGY AND DEFINITIONS
   Introduction ............................................. 1
   Dynamic Considerations ................................. 4
   References ............................................. 11

2 TOWARD A THEORETICAL FRAMEWORK ................. 14
   The Hawtrey-Ricks Monetary Business Cycles ......... 15
   References ............................................. 21

3 THE FORMULATION AND THE TESTING OF HYPOTHESES
   Post Hoc, Ergo Propter Hoc? .......................... 23
   Hypotheses and Methodology ........................... 24
   Empirical Results ..................................... 28
   References ............................................. 34

SUMMARY AND CONCLUSION ................................. 38

SELECTED BIBLIOGRAPHY ................................... 39
Chapter 1

BUSINESS CYCLES

TERMINOLOGY AND DEFINITIONS

INTRODUCTION

This paper is concerned with economic fluctuations in expanding market economies. Such economies are by nature
dynamic. Any attempt to investigate them must also be dynamic.
Unlike statics and comparative statics which locate, describe,
and compare equilibrium positions, dynamic analysis investi-
gates motion of an economy through time.

For the purpose of this analysis, economic fluctuations
or business cycles can be defined as oscillatory movements
in the general level of economic activity as measured by
such variations in the real Gross National Products (Glahe,
1977: 254). A business cycle (Figure 1-1) may be divided
into four phases:

a) expansion during which [aggregate economic] activity is successively reaching new high points;
b) leveling out, during which [aggregate economic] activity reaches a high point and remains at that
level for a short period of time; c) contraction, during which [the volume of] aggregate economic
activity recedes from the peak level for a sus-
tained period until the bottom is reached; and
d) recovery, during which aggregate economic acti-
vity resumes after the low point has been reached
and continues to rise to the previous high mark
(Creenwald et al., 1973: 65).
Figure 1-1: The Phases of the Business Cycle
The turning point is the point where "an expansionary phase is replaced by a contractionary phase or vice versa" (Pearce, 1981: 434). Peaks and troughs are known as turning points (Glahe, 1977: 251).

Recession is the "contractionary phase of the business cycle which follows a peak and ends with a trough" (Pearce, 1981: 368). In addition:

A recession is considered a mild version of... the slump. If the underlying growth rate of output (or income) is sufficiently positive, a recession may be marked by a fall in the growth rate with no absolute fall in output (Pearce, 1981: 368).

This study takes the macrodynamic approach in its analysis of economic fluctuations. Macrodynamics designate the area of economics that deals with the development of market economies (see Cornwall, 1979). Its objective is to describe and explain both economic fluctuations and growth patterns in such markets over time. Shackle (1968: 1) noted:

The task of dynamic economics is to describe the inherent character of an economy in such a way that, given the particular situation existing at one moment...it is possible to deduce the situation which will ensue...after some arbitrary interval.

The predominant view is that expanding market economies grow in an uneven manner. The emphasis has been placed upon the disequilibrium nature of the growth process with private investment playing such a key role in generating oscillatory
behavior (see Keynes, 1936). The view taken in this paper, however, is that fluctuations in aggregate economic activity are equilibrium phenomena (see Barro, 1981; Lucas, 1980). More specifically, expansionary and contractionary processes are considered as continuous adjustments along an equilibrium path through time.

There are four propositions\(^1\) upon which this paper builds:

1) The money supply is the predominant influence on aggregate income.

2) When the money supply is increased, the excess money balances placed in the hands of the public are disposed of through increased expenditure on goods and services as well as on credit instruments.

3) The investment sector of the economy is inherently stable.

4) The allocative (sectoral) details of aggregate demand between sectors are irrelevant for explaining short-run changes in money income.

\(^1\)These four propositions were listed by Karl Brunner in his description of monetarism (Mayer, 1978: 3). See also Mayer (1978); Johnson and Roberts (1982); Vane and Thompson (1979); and Johnson (1972).
DYNAMIC CONSIDERATIONS

In taking a dynamic approach in the attempt to examine fluctuations in aggregate economic activity, market transaction adjustments are considered as occurring through a continuous time-frame. Gandolfo (1981: 4) pointed out:

Although individual economic decisions are generally made at discrete time intervals, it is difficult to believe that they are coordinated in such a way as to be perfectly synchronized (that is, made at the same moment and with reference to the same time interval as postulated by period analysis) while, on the other hand, it is plausible to think that they overlap in time in some stochastic manner. As the variables that are usually considered and observed by the economist are the outcome of a great number of decisions taken by different operators at different points of time, it seems natural to treat economic phenomena as if they were continuous.

In this section, a brief discussion of different types of movements of time-series data will be presented. The analysis of one of the major weaknesses of the cobweb model will follow. A more fruitful dynamic model may be constructed by building upon the "rational expectations" and the "dual-decision" hypotheses.

To understand dynamic analysis, it is necessary to begin with a brief discussion of different types of movements of time-series data. Christ (1966: 158-176) noted that the pattern of the observed movements of time-series data may be classified as being either systematic or random. Systematic
movement, as opposed to random, implies succession of numbers conforming to some pattern (see also Rau, 1974). Within the classification of systematic movement, Christ (1966), Rau (1974), and Baumol (1970) further classify the series as being either monotonic or periodic. Let us discuss each briefly.

By monotonic movement, the value of the observed series is continuously increasing or decreasing through time. Monotonic series do not reverse their direction. The first type of monotonic movement, a linear function of time, traces an arithmetic progression (or regression) in which the increase (or decrease) between points is a constant amount. The second, a growth trend, represents a geometric progression in which the differences between the values of the series are of a constant ratio, as opposed to a constant increment. The third, a quadratic function, may be increasing or decreasing by a constant ratio.

The most simple of the trigonometric functions to be used in explaining fluctuations are periodic movements in which values for the observed time-series repeat themselves. In a periodic movement, there is a reversal of direction from an upward movement to a downturn and then again a reversal in an upward direction, or vice versa. The oscillation from high point to high point or from low point to low point through time is called the period. In these trigonometric
functions, the pattern repeats itself regularly as opposed to a non-periodic movement in which the time lapse varies from oscillation to oscillation.

A more complicated function to describe either damped or anti-damped behavior of periodic movements can be expressed as

\[ y = k^t a \sin(w-\theta) + b \]

where \( k, a, w, \theta \) are positive constants, \( t \) is an angle, and \( b \) is a constant. If the amplitude of the fluctuation decreases to zero, the motion is stable or damped \((k < 1)\). If the amplitude increases, the motion is explosive or anti-damped \((k > 1)\).

The Cobweb Model

Dynamic analysis in economics is nothing novel. Rudimentary dynamics emerged in the field of price theory as early as 1925 with the Marshallian and Walrasian notions of stable and unstable supply-demand intersections (see Samuelson, 1952).

The simplest and perhaps most successful attempts at dynamic economic theories is the cobweb model. This model (Figure 1-2) seeks to explain non-market-clearing situations with time lags. It should be noted that price and quantity are allowed to vary while leaving both the supply and demand functions unchanged. Current quantity demanded of a
Figure 1-2: The Cobweb Model
good \( (D_t) \) is determined by current market price \( (P_t) \). The lag is assumed to occur on the supply side of the market: the quantity of good producers provide at time \( t \) \( (S_t) \) is determined by the previous period's price \( (P_{t-1}) \). Algebraically:

\[
D_t = f(P_t) \quad (1)
\]

\[
S_t = g(P_{t-1}) \quad (2)
\]

The condition for market-clearing is when

\[
D_t = S_t \quad (3)
\]

**Rational Expectations**

Cobweb models of dynamic behavior depend upon "irrationality of expectations" in which the price at time \( t \) will be the same as the price at time \( t-1 \) or even a simple extrapolation of it (Maddock and Carter, 1932: 48). The basic behavioral assumption of economic behavior is that economic agents do the best they can with what they have. Applying this same principle to the formation of expectations, rational behavior would necessarily dictate the acquisition and processing of information and the subsequent formation of expectations (see Ruth, 1951). Granted that individuals may not have all the necessary information, their expectations are rational if they are optimal predictions based upon the availability of information (Barro and Fischer, 1976: 156). Simple algebraic formulations that embody these
ideas can be expressed as

\[ P_t^e = E(P_t/\text{Inf}_{t-1}) \]  

where \( P_t^e \) denotes the expectation formed at time \( t \) of the price level that will prevail at time \( t+1 \); \( E \) is an expectation operator; \( P_t \) is the current price level; \( \text{Inf}_{t-1} \) is all information available at time \( t \).

\[ S_t = a(P_t - P_t^e) + U_t^s \]  

where \( a \) is a constant; \( U_t^s \) is a random term that shifts supply through unanticipated changes.

\[ D_t = -b(P_t - P_t^e) + U_t^d \]  

where \( b \) is a constant; \( U_t^d \) is a random term that shifts demand through unanticipated changes.

\[ U_t = U_t^d - U_t^s \]  

where, by definition, \( U_t \) are zero-mean serially uncorrelated disturbances.

\[ P_t = P_t^e + U_t \]  

in which \( E(P_t^e U_t) = 0; E(U_t) = 0 \). The expected price is an unbiased predictor of the actual price. The market is cleared when the condition expressed by equation (3) is satisfied.

**Dual-Decision Hypothesis**

When the market-clearing condition (3) is not satisfied, maximizing behavior is likely to dictate that expectations about costs, prices, sales, and the rate of return on investment be changed. The "dual-decision" hypothesis formulated
by Clower (1965: 118-120) would then be consistent with the rational expectations hypothesis since both emphasize maximizing behavior. The basic argument in the dual-decision hypothesis is that conventional supply and demand functions yield quantities that buyers and sellers wish to exchange given their "planned" receipts. If realized current receipts differ from these planned receipts, buyers and sellers, constrained by their actual incomes, must revise their plans. It is, hence, the lag in the process of the acquisition and processing of information which leads to false trading.

**Vector Equilibria**

With the assumption of both "rational expectations" and "dual-decision" hypothesis, when market behavior deviates from its equilibrium path, the adjustment process is likely to be continuous. The reason is that a movement in time is unlike a movement in space, there is no turning back to correct past mistakes. Figure 1-3 shows dynamic forces pushing toward an equilibrium trajectory. In the figure, the arrows show motions with respect to time. The shaded area is the region of approximate equilibrium. It is better to visualize this concept as "vector equilibrium." In the price-quantity vector, adjustments are continuous. As such, market behavior will fluctuate along the equilibrium trajectory. The question then is whether expectations are stable? Moreover,
Figure 1-3: Vector Equilibria
If oscillations were to occur, will market behavior which deviates from the equilibrium path move back to it?²

²The April 1982 issue of the Journal of Economic Theory discusses this topic.

³For rigorous treatments of the existence of equilibria in dynamical systems see Varian (1981); Allingham (1975); and Marakov and Rubinov (1977).
REFERENCES


Chapter 2

TOWARD A THEORETICAL FRAMEWORK

To describe an economy as following a multivariate stochastic process as being in equilibrium, is merely to say that at each point in time markets clear, and that economic agents optimize. It is argued, however, that fluctuations around the trend of real economic activity cannot be explained by adhering to these two postulates. Okun (1980: 317) noted:

Any macroeconomics that is connected to microeconomics by a solid bridge must explain how it departs from the classical micro models in its conception of the operation of markets.

It is from the lack of such a bridge that controversy concerning economic analysis arises.

Only recently have rigorous theoretical models been constructed to provide that necessary linkage. This approach by the rational expectations school illustrates how fluctuations can occur while retaining the classical postulates that markets continuously clear and agents optimize. For this school, the assumption of the Walrasian model that all information has zero costs is abandoned. Hence, the imperfections of information available to agents are responsible
for the deviations of the path of the economy from a sequence of gradually shifting equilibrium positions.

This paper also takes the view of the rational expectations school. In this chapter, the Hawtrey-Hicks monetary hypothesis of business cycles will be introduced. Not only does it offer a more fruitful explanation of business cycle phenomenon, it is consistent with the two classical postulates.

THE HAWTREY-HICKS MONETARY BUSINESS CYCLES

Let us start the Hawtrey-Hicks monetary business cycles thesis with the assumption that the economy is at equilibrium. It is not necessary to start at such position but it is much easier. An upward displacement pressure is initiated primarily by an expansion of credit which encourages an expansion of investment (Hawtrey, 1951: 340). The expansion of investment leads to an expansion of consumption and income. This increase in expenditures induces an additional quantity

---

1Hawtrey's work cited here originally appeared in the Dutch De Economist in 1926. It was reprinted as Chapter 5 of Hawtrey's book, Trade and Credit, in 1928. Other useful sources on Hawtrey's hypothesis can also be found in Hansen (1964); Haberler (1964); and Hicks (1950; 1977).

The synthesis of Hawtrey's and Hicks' idea as it is presented in this work, however, is mine.
of outlay for investment purposes. Output, hence, rises steadily.

Increased activity means increased demand. Increased demand, in turn, means increased activity. A reinforcing cycle is set up. A cumulative expansion of credit is, therefore, fed and propelled by a continuous expansion of credit.

Productive activity cannot grow indefinitely. As the cumulative process carries one industry after another to the ceiling of productive capacity, producers begin to ask higher prices for their products. With rising prices, in the short-run, there is a further inducement for producers to borrow since rising prices operate in a similar manner as falling rate of interest--"anticipated" rate of return is increased (Haberler, 1964: 19; Dow, 1968: 140).

With rising demand for loans, commercial banks face a reduction in their excess reserves. After some lags, they adjust their rate of interest. We shall return to this point. As the rate of interest is bid up, the cost of borrowing, for the producers, soon exceeds the benefit to be gained. The crisis phase or the upper turning point occurs when

---

2 Increased production leads to an enlargement of consumers' income and outlay. Hawtrey (1951: 344) called this process, "the vicious cycle."
"the emergence of declining profits ratios is in general restrictive to further increases in output" (Dow, 1968: 217). Consequently, investment declines. With each decline in investment there is further declines in income, consumption, and expenditures. A downward movement is inevitable.

The adjustment lags are responsible for the fluctuations (Hicks, 1950: 148-151). Hicks noted that the most important lag, as in Wicksell's analysis, is the adjustment of the bank rate of interest. The bank rate of interest lags behind changes in the equilibrium rate of interest. The second lag is the adjustment of the stock of money to changes in demand.

Hicks used the IS-LM framework to explain the adjustment lags. Following Hicks (1950: 142), the usual assumption of a given "supply of money" is abandoned. Hicks assumed instead a given "monetary system." Some elasticity in the monetary system can be allowed without changing the essentials in the construction. If the monetary system were assumed to be elastic (Figure 2-1), a rise in the rate of interest (r) would naturally lead to an increase in the supply of money. Following this same train of thought, a rise in r will shift E to "H" on curve LM' not to H' on curve LM. By joining H to "H" and continuing to the corresponding points on other curves, a dotted line curve can be drawn to show the relationship between income (Y) and r with a given monetary system. The
Figure 2-1: LM Schedule Given A Monetary System
curve LM will take the shape corresponding to the nature of the monetary system.\(^3\)

Figure 2-2 represents an expanded cobweb model of the Hicksian mechanism, assuming the LM schedule to remain stationary by relating it to a given monetary system. In addition, by relaxing the assumption that banks are continually loaned up, we can allow a degree of freedom to move off the IS-LM schedules.

If the economy were at equilibrium at point "a" and the IS function were to shift to the right, from IS to IS', the new equilibrium level of r would occur at point "e". The economy, however, does not move directly to point "e" along the path of the LM function. Instead, because of the lags in the response of the bank r and the adjustment in the stock of bank-created money, the initial demand for increased loans owing to the shift of the IS function would be met by an expansion of bank-created money at the going r—if banks were not loaned up.

A new equilibrium position would not immediately be reached. Banks would not know, because of the lag in the

\(^3\)Hicks (1950: 143) noted: A perfectly elastic monetary system would enable Y to expand without any rise in r—so that the adjusted (dotted) curve would become horizontal; an imperfectly elastic system would be represented by a curve of less elasticity in its upper reaches. We can express the principle of liquidity minimum by saying that even a monetary system which is in general inelastic behaves elastically when the rate of interest falls to a low level.
Figure 2-2: Cobweb Model of the IS-LM Functions
acquisition and processing of information, whether the increased demand for loans is due to a permanent shift in the IS function which requires an adjustment in r, or to a monetary departure which requires no adjustment. In addition, the banking industry is by nature oligopolistic, bank r will most likely be "sticky." Banks would not change their rates until they have a good idea of what the new equilibrium rate of interest is.

From point "a" to "b", money and credit become increasingly tight. Money demanded for transaction balances increase in response to the higher level of aggregate income. With pressure of tight money and credit, excess reserves become depleted. Eventually, banks adjust their rate of interest in the direction of "c". At this point, the economy is not at equilibrium. The rate of interest now rises above the equilibrium rate. The quantity of investment demanded becomes smaller at the new, higher bank rate of interest. Consequently, a contraction in aggregate income from point "c" toward point "d" begins. With a reduction in investment, there is a slowdown in the rate of change in aggregate income. This situation leads to further reduction in the rate of change in investment. As the situation compounds, a reduction in aggregate income results.

At current r, there will be a smaller amount of money demanded (relative to supply). Banks will attempt to lend
out their excess reserves. As credit expansion begins, there is once again an upward displacement. Output rises and triggers the whole cumulative process back into action. Recovery begins.
REFERENCES


Chapter 3

THE FORMULATION

AND THE TESTING OF HYPOTHESES

POST HOC, Ergo PROPTER HOC?

Economics as a positive science is a body of
tentatively accepted generalizations about
economic phenomena that can be used to pre-
dict the consequences of changes in circum-
stances (Friedman, 1956: 33).

Every empirical study rests upon a theoretical frame-
work which provides a systematic description of reality. It
selects the essential features and links them together. When
a theory stands up to empirical testings, then it becomes
useful in helping us to understand the workings of our com-
plex economic system.

"Any theory is necessarily provisional and subject to
change with the advance of knowledge" (Friedman, 1956: 41).
Moreover:

...progress in positive economics will require
not only the testing and elaborating of existing
hypotheses but also the construction of new
hypotheses (Friedman, 1956: 42).

In building a mathematical construction to analyze the
"real world," economic theory can aid us in our endeavor.
Without theoretical frameworks to guide us, we may fall into
the trap of the *post hoc, ergo propter hoc* fallacy. Indeed, a good example often cited is the attempt to correlate changes in demand and supply functions which would naturally yield very significant results. Although changes in demand and supply functions may be invariantly correlated empirically, they do not imply causation (see Samuelson, 1965; Hicks, 1979). This is why theory is the essential ingredient of all empirical works.

Economic theory...has two intertwined roles: to provide 'systematic and organized methods of reasoning' about economic problems, to provide a body of substantive hypotheses, based on factual evidence, about the 'manner of action of causes.' In both roles, the test of the theory is its value in explaining facts, in predicting the consequences of changes in the economic environment. Abstractness, generality, mathematical elegance--these are all secondary, themselves to be judged by the test of application (Friedman, 1974: 145).

**Hypotheses and Methodology**

In Chapter 2, the Hawtrey-Hicks thesis of monetary influences on aggregate economic activity in a competitive market economy was introduced. The economy is considered to be basically stable with most elements of instability the product of monetary movements (Crews, 1980: 232).

If money balances grow more rapidly in relation to income than people wish, they will attempt to spend the excess, causing prices to rise. On the other hand, if money grows too slowly in relation to income, people will try to build up their cash balances by reducing spending, which would result in a slowing of income growth... (Crews, 1980: 232)
In this chapter, four hypotheses from the Hawtrey-Hicks monetary business cycles will be tested. They are:

1) Investment is influenced primarily by monetary factors (e.g., the expansion or contraction of credit via the increase or decrease of the money supply). A positive relationship is to be expected.

2) The rate of interest lags behind the increase in the demand for loanable funds, hence a positive relationship between investment and the rate of interest.

3) Assuming that output and the velocity of money are constant, a rise in the commodity price level is to be associated with an increase in the stock of money. Price is also assumed to adjust rapidly.

4) Positive changes in the real GNP are to be associated with positive changes in the money supply.

In addition to the four propositions stated in Chapter 1, the following three are also relevant:

...prices and quantities at each point in time are determined in competitive equilibrium; the expectations of agents are rational, given the information available to them; information is imperfect, not only in the sense that the future is unknown, but also in the sense that no agent is perfectly informed as to the current state of the economy (Lucas, 1981: 179-180).
**The Method**

Quarterly data (1955: I to 1981: IV) are used in single-equation ordinary least squares regression estimations. No attempt is made to specify the structure of the economy.¹ Rather, this study seeks to explain "such broad measures as total spending, prices...in terms of changes in money..." (Crews, 1980: 235). The question is whether this method is appropriate. It is contended that:

...if one is primarily interested in explaining the behavior of a few key variables...it is unnecessary to estimate all the parameters of a large-scale model (Hamburger, 1980: 241).

Moreover, "if the economy is very complicated, it may be too difficult to study even with a very complicated model" (Hamburger, 1980: 241).

Seven variables are used:

1) Nominal GNP.

2) Money supply, as measured by M-1.

¹Hamburger (1980: 240-241) noted: A structural model of the economy attempts to set forth in equation form what are considered to be the underlying or basic economic relationships in the economy. Although many mathematics and statistics complications may arise such a set of equations can, in principle, be 'reduced' (solved). In this way key economic variables, such as GNP, can be expressed directly as functions of policy variables and other forces exogenous to the economy. [The] difference between a structural model and a reduced-form model is largely mathematical and does not necessarily involve different assumptions about the workings of the economy.
3) The GNP deflator.
4) Gross Investment.
5) High-employment budget.
6) Federal Fund Rate.
7) Federal Discount Rate.

Data for the GNP deflator and h-1 (1955: I to 1977: IV) were taken from Table B-2 in the appendix of Dorfman and Fischer (1979), the remaining periods from various issues of the Survey of Current Business. Also from this latter source, Federal Discount Rate and gross investment were taken. The Federal Fund Rate statistics were taken from the February 1982 issue of Business Conditions. The GNP and the high-employment budget figures were taken from the April 1982 issue of the Survey of Current Business. High-employment budget data are used because it eliminates the changes in receipts and expenditures that are automatic responses to fluctuations in economic activity—hence, a better measure of fiscal impact. All data were adjusted seasonally at annual rate.

Notations

In the following regression analysis, these notations will be used:

1) LINV is the logarithm of investment.
2) DFFR is the change in the Federal Fund Rates. DFFR-1, DFFR-2, and DFFR-3 are the quarterly lagged terms.

3) DFDR is the change in the Federal Discount Rates. DFDR-1, DFDR-2, and DFDR-3 are the quarterly lagged terms.

4) LDMS is the logarithm of the change in the money supply. LDMS-1, LDMS-2, and LDMS-3 are the quarterly lagged terms.

5) DLG is the change in the logarithm of the GDP deflator.

6) DLMG is the change in the logarithm of the money supply.

7) DHED is the change in the high-employment budget. DHED-1, DHED-2, and DHED-3 are the quarterly lagged terms.

8) DRQ is the change in GDP divided by the change in the price level. DRQ-1 is the quarterly lagged value.

EMPIRICAL RESULTS

Equation 1

In this regression equation, LINV is regressed on the change in the Federal Fund Rates and the log of the change in the money supply. The lags show how investment in the current period is affected by previous values of the independent variables.
LINVT = 4.3 - .05DLFR + .06DLFR-1 - .009DLFR-2
(103.8)***(-1.61) (1.32) (-.27)
+ .07DLFR-3 + .15LDMS + .13LDMS-1
(2.32)** (4.39)** (3.45)**
+ .15LDMS-2 + .13LDMS-3
(3.78)** (4.20)**

The t-statistics shows the level of significance at 1 percent.
R-squared = .71 F-test (3,39) = 30.5 D-W = .31
SSR = 11.06 S.E. = .33

The value of the Durbin-Watson statistics shows that there exists a problem of serially correlated error terms in the regression equation. This may be explained: a non-linear structure is being fitted into a linear form with non-linear coefficients. The Cochrane-Orcutt iterative technique is then applied to correct the bias. The results follow:

LINVT = 6.3 + .009DLFR + .02DLFR-1
(17.91)***(2.21)** (4.58)**
+ .01DLFR-2 + .009DLFR-3 + .01LDMS
(2.29)** (2.12)** (2.07)**
+ .009LDMS-1 + .008LDMS-2 + .01LDMS-3
(1.41) (1.38) (1.28)**

The t-statistics shows the level of significance at 1 and 5 percent, respectively.
R-squared = .99 F-test (3,39) = 2007.9 D-W = 1.36
SSR = .222 S.E. = .048 rho = .989 (no. of iterations = 3)
It may be argued that the Federal Fund Rates may not be a good indicator in determining the level of investment. Thus, the Federal Discount Rates are also used. There should be no significant statistical difference as to which rates are used -- the hypothesis still remains the same.

\[
\text{LINVT} = 4.5 - .03\text{DFDR} + .05\text{DFDR-1} + .004\text{DFDR-2} \\
\quad (104.69)^{***} (-.82) (.79) (.06) \\
\quad + .17\text{DFDR-3} + .14\text{LDMS} + .13\text{LDMS-1} \\
\quad (2.53)^{**} (4.17)^{***} (3.61)^{***} \\
\quad + .15\text{LDMS-2} + .15\text{LDMS-3} \\
\quad (3.99)^{***} (4.00)^{***}
\]

The t-statistics shows the level of significance at 1 and 5 percent, respectively.

R-squared = .71  F-test (9, 99) = 30.7  D-W = .30
SSR = 10.9  S.E. = .33

The regression equation yields no significant statistical difference. There is a problem of serially correlated error terms as in the previous case. The Cochrane-Orcutt method is again employed. The results follow:

\[
\text{LINVT} = 6.1 + .03\text{DFDR} + .04\text{DFDR-1} + .02\text{DFDR-2} \\
\quad (19.95)^{***} (3.64)^{***} (4.65)^{***} (2.62)^{***} \\
\quad + .03\text{DFDR-3} + .01\text{LDMS} + .01\text{LDMS-1} \\
\quad (3.65)^{***} (2.99)^{***} (1.99)^{*} \\
\quad + .01\text{LDMS-2} + .01\text{LDMS-3} \\
\quad (1.81)^{*} (1.94)^{*}
\]

The t-statistics shows the level of significance at 1, 5 and 10 percent, respectively.
R-squared = .93  F-test (3,99) = 2077.5  D-W = 1.83
SSR = .22  S.E. = .047  rho = .938 (no. of iterations = 3)

From the correlation-matrix, no problem of multicollinearity is detected. The highest value of correlation among the independent variables is less than .70. The regression results support the hypothesis that:

1) Investment is influenced by monetary factors.
2) There is a lag relationship between investment and the rate of interest, hence a positive relation between the two variables.

Equation 2

In this equation, the change in the log of the price level is regressed on the change in the log of the money supply and the change in the high-employment budget.

\[
\text{DLP} = .0007 + .83\text{DLMS} + .0003\text{DHEB} \\
\hspace{1cm} (.07) \quad (354.6)*** \quad (2.69)***
\]

The t-statistics shows the level of significance at 1 percent.

R-squared = .99  F-test (2, 105) = 105216.  D-W = 1.83

SSR = .003  S.E. = .008

No problem of multicollinearity is detected between the two independent variables from the correlation-matrix (the highest value being less than .70). The constant, in this regression equation, is not significantly different
from zero. Clearly, assuming that output and the velocity of money are constant, a rise in the commodity price level is to be associated with an increase in the money supply. The regression equation supports the hypothesis.

**Equation 3**

In the short-run, exogenous changes in the money supply interacting with a stable velocity produce changes in real output. In this equation, the quarterly change in real GNP is the dependent variable.

\[
\text{DGr} = 0.04 + 0.43\text{DGr}-1 + 0.18\text{LDMS} - 0.07\text{LDMS}-1 \\
(0.08) (4.31)** (3.63)** (1.49)
\]

\[- 0.07\text{LDMS}-2 - 0.03\text{LDMS}-3 + 0.05\text{DHEB} \\
(-1.31) (-0.58) (3.14)**
\]

\[- 0.03\text{DHEB}-1 - 0.002\text{DHEB}-2 - 0.003\text{DHEB}-3 \\
(4.60)** (-0.57) (-0.59)
\]

The t-statistics show the level of significance at 1 percent. R-squared = 0.62  F-test (9, 98) = 17.6  D-W = 1.87

SSR = 15.9  S.E. = .40

From the regression equation, past behavior of real GNP (DGr-1) plays a significant role in determining current real GNP. Changes in both the money supply and the high-employment budget in the current period do contribute to a positive change in real GNP. The high-employment budget is statistically negative after the first quarterly lag. No problem of multicollinearity is detected. The highest value of correlation
among the right-hand side variables is less than .70.

The hypothesis that changes in the money supply influence changes in real GDP can find support in the current period. Its quarterly lagged values are negatively related to changes in the real GDP. The t-statistics for LDHS-1 and LDHS-2 show the level of significance at 20 percent.
REFERENCES


Tanner, J.E. (1979) "Are the lags in the effects of monetary policy variable?," Journal of Monetary Economics. 5 January: 105-121.


SUMMARY AND CONCLUSION

The emphasis in the study of economic fluctuations has been placed upon the disequilibrium nature of the growth process with private investment playing such a key role in generating oscillatory behavior. The view taken in this paper, however, is that fluctuations in aggregate economic activity are equilibrium phenomena. Expansionary and contractionary processes are considered as continuous adjustments along an equilibrium path through time.

The Hawtrey-Nicks monetary hypothesis is used in this study to explain irregular fluctuations in economic activity. Monetarist propositions together with rational expectations and dual-decision hypotheses form the underlying assumptions regarding the behavior of the economy and its agents. Four hypotheses are then drawn from the Hawtrey-Nicks analysis for the testing purposes. Quarterly data (1955: I to 1981: IV) are used in single-equation ordinary least squares regression estimations.

While the study does not claim to "prove" the theory, it does claim that empirical evidence supports its analysis. Of course, as mentioned in Chapter 3, at best the test results in a "confirmation till next time" (Machlup, 1976: 140).
SELECTED BIBLIOGRAPHY

(Titles in each reference section are not included.)


Hudson, J. (1932) Inflation: A Theoretical Survey and

Liberty Press.

Keynes, Lord J.M. (1973) The Collected Writings of J.M.
Vol. XIV: The General Theory and After. Part II
Defence and Development. Edited by D. Modridge.


Kuenne, R.E. (1963) The Theory of General Economic Equili-
brum. Princeton, New Jersey: The Princeton University
Press.

Laidler, D. (1977) The Demand for Money: Theories and


Lekachman, R. (ed.) (1964) Keynes and the Classics. Boston:
D.C. Heath and Co.

Sage Publications.

Nash, F. (1976) Methodology of Economics and Other

Haus, J.J. (1975) Economic Cycles. Cambridge, Massachuset-
tas: Wright-Allen Press, Inc.

McCall, J.J. (1982) The Economics of Information and

Columbia University Press.

Franklin.


