Lags in the Effect of Monetary Policy - A Survey

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PREFACE

There has been a great deal written about monetary policy, and about concepts which are, or seem to be, associated with monetary policy. The literature is broad and the opinions and views expressed are almost as large a variety as there are writers and scholars dealing with the subject.

The concept of lags in monetary policy has also been dealt with during the last decade or so, but the literature on this subject is fairly scarce and rather scattered. It is my intention in this thesis to collect the material on lags in monetary policy in a systematic and exhaustive manner and present it in such a way that the reader will get, I hope, a more penetrating and comprehensive view of the subject. Although the material is organized by authors, I attempted to present it in such a way that the vocabulary in each chapter is uniform, consistent and, thereby, comparisons among the studies discussed can easily be made.

I would like to express my gratitude to Professor J. C. Weldon for his generosity in offering suggestions and constructive criticisms, but I would also like to emphasize that the statements of opinions, value-judgements and conclusions in this thesis are solely mine - except when stated otherwise - and, therefore, I consider myself only responsible for them.

CONTENTS

CHAPTER I

MONETARY POLICY: ITS DEFINITION AND DESCRIPTION - A GENERAL VIEW OF THE PROBLEMS

In the relatively short course of its development and growth, Canada has had some economic problems attributable to both mismanagement of currency and credit and to a lack of monetary management. It was not until the 1930's that serious thought was given to the possibility of using the government's huge resources and power, through a central bank, to stabilize the economy, and to temper the course of inflations or deflations. Although the record is far from perfect, we have accepted the fact that, monetary management does play a necessary role in the modern economic machinery, although we recognize the dangers in granting such power to any man or group of men.

In my opinion, it is most fortunate that in developing our system of monetary control we have separated, at least to a large extent, the function of controlling the volume of money and credit, from every-day government operations. This separation of functions was implicit in the creation of the Bank of Canada as an independent agency of the government.[1] However, the growth and development of the Bank over

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1. Final Report of the Commission on Banking and Money (1933).

the last three decades has been conditioned by a world-war, the after effects of a prolonged world-wide depression, a limited war in Korea, and the present overwhelming responsibility of the government to maintain a defense in the Cold War as well as part of the free world leadership. It is understandable therefore, that the separation of the government and the Bank functions has not been as complete as might have been visualized by the founders of the Bank.

The task of the Bank of Canada is simply to manage Canada's monetary affairs - national and international - in the interest of the country, as it is set out in the Bank of Canada Act. A popular subject for discussion today, in academic and non-academic circles, is whether or not "monetary policy", as executed by the central bank has done its job; and if not, why not? A question like this, loosely stated, does not permit any simple and precise answer. Occasionally, however, it is more precisely formulated, and the discussion then becomes more profitable and interesting.

Before we embark upon an examination of the different aspects of monetary policy, the question regarding its meaning must be answered, that is, an adequate definition of monetary policy must be put forward. One way to define monetary policy, and this admittedly is not the only way, is as follows: Monetary policy is an action taken by a government, or by a body empowered by government or legislature,

in order to change the volume or cost of money in existence, with the objects of regulating the purchasing power of money, the balance of external payments and receipts, or the level of business activity.

The main instruments of monetary policy, as per my definition, are open-market-operations, alterations in bank cash or liquidity requirements, quantitative or qualitative control of bank lending, and prescriptions as to interest rates charged or allowed by banks. Debt management is meant to be included in my definition of monetary policy.

Monetary measures of practically all types have, some time or other, collectively fallen short of the full attainment of the objectives set forth. It may be argued that the shortcomings, where recent experience has particularly been unfavourable, result less from the nature of the measures themselves than from faulty application of them. Strong clues to the explanation may also be found in an examination of obstacles, in the financial and political systems, to the successful shaping and execution of policy.

Failure to get the best out of monetary policy may be due to imperfect knowledge and appreciation of the facts, leading to misjudgment of the needs of the situation. It is necessary to know the facts but it is just as necessary to understand the theoretical implications of these facts and this requires something more than statistics.

Beyond knowledge of the facts and foresight as to where indicators are leading, judgement is needed in the selection and application of remedies. And this requires a large amount of what is a little more than mere "experience", that is, it requires a true appreciation of economic theory which, in turn, enables authorities to determine the manner in which human beings and institutions taken all together with pluses and minuses offsetting, would react to the measure that might be adopted. Here too, there is a wide scope for error. Even if we postulate a political machinery where decisions of monetary managers can be implemented without external interference, and even if the implementation of monetary policy, by those who are called upon to do it, is done with full understanding of the theory that lies behind and of the potential consequences of their actions, monetary policy would still have to cope with several serious problems.

The first type of obstacle to successful monetary policy arises from the very fact of the diversity of purposes which monetary policy is expected to serve. The conflict between short-term and long-term problems is getting to be more and more familiar. (For example, when new investment in fixed productive assets has to be checked in order to bring about an easing of immediate inflationary pressure, even though everyone may agree that for the long-run more application of real resources to capital investment is needed). There are also some difficulties in reconciling a reduction of subsidies and increase

of taxes on consumer goods with an appeal for an enlargement of personal savings. It can also be difficult to reconcile higher domestic short-term interest rates with their effects upon an unhealthy balance of current external payments and receipts. Another, rather typical, problem confronting monetary policy is the conflict between full employment and price stability.

Another type of obstacle, which may be found within the structure or mechanism of the monetary system itself, is the possible lack of full harmony between government and central bank as to the proper lines of current policy, and the existence of something less than complete mutual confidence and collaboration between the central bank and commercial banks.[2] It is a fact, however, that those obstacles which are inherent in the financial system, while detrimental to the effectiveness of monetary policy, are rather easy to identify and are relatively easier to cope with than those mentioned earlier.

Established processes of wage determination may also get in the way of monetary policy, particularly when the object is to arrest a persistent upward trend of costs and prices.[3] Perhaps an even more serious problem is present for a country whose export

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2. Evidently these two latter problems do not exist in Canada at the present.

3. Bromfenbrenner & Holtzman: Survey of Inflation, American Economic Review, June 1963.

trade is heavily dependent on world markets for a few primary commodities, and whose income from abroad is therefore subject to wide fluctuation, disturbing the balance of payments and complicating the task of domestic stabilization through monetary policy. (An apparent example for this is the Canadian economy).

One further group of problems, that monetary authorities have to tackle, lies on the border between economics and politics. We cannot possibly avoid, even in this brief discussion of the possibilities of monetary policy, the obstructions and uncertainties that rise from particular systems, forms and obligations of government. In the light of this, much might be said for concentration of responsibility for monetary policy in the hands of a single authority, detached from politics thus avoiding the dangers of divided power; however, in the world as we know it, with so large a spread of purposes and instruments of policy, concentration is impracticable, and the most effective division of responsibility under the circumstances has to be sought.

It appears, that no simple solution is available in this respect. Economic policy in general, and monetary policy in particular have, to some extent, everywhere become indivisibly associated with political government. This being so, while a high degree of flexibility and responsiveness to monetary policy may well be thought desirable, no realist would expect a situation of non-interference in monetary

affairs to prevail. Inescapable responsibilities of government, explicit or implicit, rule out the possibility of any such a reversal of trend. One basic requirement, however, is obvious if we are to minimize the influence of politics upon the shaping and application of monetary policy and cultivate popular appreciation of the issues; this requirement is the disclosure of full information and authoritative analysis and exposition of monetary conditions and policy, from a source which is accepted as being objective and, at least to some extent, politically non-partisan. It also seems necessary that continuous public education in monetary affairs should call not only for the dissemination of statistics by the monetary authority, but also for some regular form of expository activity. The value of such material would not be limited to public instruction but it would provide also a firm basis for objective criticism and constructive suggestions.[4]

In conclusion I wish to emphasize that, one of the most important points that should be considered when one looks at monetary policy, is the process whereby it affects the general economic situation. It is quite acceptable to concentrate on changes in the volume of money as a symptom of the direct and most immediate effect of monetary policy. Another, although different type of approach, is to start from a more sophisticated and obscure concept like the "state

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4. Arguments along the same line may be found in Harry G. Johnson, Canadian Quandary : Problems and Policies, McGraw-Hill, 1964.

of liquidity" used by the Radcliffe Committee.[5] This approach suggests that the state of liquidity, as a determining factor for the size of expenditure does not depend on the existing volume of money so much as on the possibility of mobilizing liquid funds by loans and the sale of bonds. Here the strategic importance is assigned to the access to credit from commercial banks. Still another approach is to view the changes in the rate of interest.[6]

It should be noted that these different approaches are not necessarily incompatible. It is quite reasonable to regard all these different aspects as simultaneous expressions of monetary policy. Should there be any conflict of opinions they would most likely be due to over emphasizing the effects of the volume of money, the liquidity situation, or interest rates.

In evaluating the effects of past policy actions, and in estimating the future impact of a present policy action, it is extremely important to determine how fast the desired effect is achieved. It makes an enormous difference if the policy action will influence investments within a month or if results can only be expected after a year, a year and-a-half, or two years. Consequently, interest is now quite

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5. Committee on the Working of the Monetary System - Report (1958).

6. U. S. Commission on Money and Credit - Report (1962).

justifiably being focussed on the problems presented by time lags.

Since the time period necessary for monetary policy to become effective is rather difficult to calculate accurately, for at different times they may differ themselves, one may very well wonder whether monetary policy, in its usual defined form, has not, if anything, had a destabilizing effect. Since additional pressures may be brought into existence during a decline, and additional stimulus during an upswing, fluctuations in investment may be greater as a result of the monetary policy action. The length of time between the point at which the monetary action should have been taken and the appearance of the actual effect may be so great in relation to the normal course of the business cycle that these measures with high probability will have undesirable results, and merely disturb the economic situation. Friedman has drawn the conclusion, as we will see in Chapter III, where his study is evaluated, that an automatically determined monetary policy, with a minimum discretionary action, and aiming for a constant rate of increase in the money stock over the years, regardless of the variations in economic situations, would give a maximum stabilizing effect.

Although Friedman's conclusions may be rather extreme, particularly in its implications, there are serious reasons for considering the special difficulties in stabilization policies as a result of these time lags. It is quite possible that an active stabilization monetary

policy has a destabilizing effect, eventually followed by a slowing down in the rate of growth.

There are two feasible theoretical solutions whereby the situation can be improved. First, we may increase our knowledge of these time lags so that our forecasting of the timing of the reactions of economic variables to our policy actions will be more accurate, or, secondly, by introducing new types of policy measures, or altering the institutional set-up we can attempt to reduce the length of these time lags. This would probably mean profound changes in the monetary variables themselves.

In the following chapters of this thesis a survey of the types of lags and of the studies, made by several highly competent economists on these lags, should give some insight into the issues and problems involved, and will, it is hoped, enhance our understanding of not only the nature of these lags but also the transmitting process whereby monetary policy actions[7] make themselves felt in the economy as a whole.

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7. A monetary policy "action" can be thought of as being one single (significant) change in the supply or cost of money, or it can also be thought of as a series of changes (following each other closely); in the latter case the new policy requires some time to take place and will be called the policy "campaign."

CHAPTER II

LAGS AND THEIR COMPONENTS

(a) General Background:

The recognition of the problems of lags in the effect of monetary policy is by no means new. For example, in a passage in the Treaties on Money (1930), in which he expressed considerable optimism about the response of the economy to changes in monetary policy, Keynes did draw attention to this problem: "Almost the whole capital of the world is represented by buildings, transport and public utilities; and the sensitiveness of these activities even to small changes in the long-term rate of interest, though within an appreciable time lag, is surely considerable."[1]

For a period of about 15 to 20 years after 1930 there was not too much attention paid to the concept and problems of lags in monetary policy. The most probable reason for that was that during the depressed thirties many leading countries adopted policies of easy money and retained these policies throughout the remainder of the thirties and fourties. Since all the policy instruments were set in one direction the lags in response to monetary policy was not an obvious problem. (The high unemployment existing in the Canadian economy in 1939

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1. J.M. Keynes: Treaties on Money, Chapter VII. Page 364. New York 1930.

could be attributed to the fact that monetary policy which had existed for several years was not sufficiently powerful in its effects to provide a major stimulus to the economy).

It was in the 1950's when flexible monetary policy was restored, that the setting was provided in which the problems of lags in the effects of monetary policy could become significant. With switching between different kinds of policies, easy and tight, taking place about every three years or so, it became a matter of considerable importance whether a proper monetary policy action came soon or late after a change in economic conditions, and whether the response of expenditure and employment came soon or late after the appropriate monetary policy action, or round of actions, has been taken. If, due to the slowness of response of the authorities, and the sluggishness of the response of the economy to a policy action, most of the effect of credit restraint was not felt until the economy was well settled into a recession and, similarly, the effect of credit restraint was not felt until late in the following boom, then the monetary policy action would have the effect of widening the range over which the economy fluctuated. It, therefore, became very important to calculate how long it took the authorities to respond to a change in economic conditions and how much time had to elapse before expenditure and employment responded to a new monetary policy action.

While the problem of lags in monetary policy was present for quite some time, the topic would not likely have received the amount of attention which it has in the absence of the stimulating and provocative work of Professor M. Friedman.[2] His, rather radical, contentions that the lags were long and variable and that, as a result of this, discretionary monetary policy might add to the instability of the economy, stimulated others to engage in research projects which would test this aspect of monetary policy.

While Friedman's approach was a theoretical one, another way of estimating the lags in the response of firms to monetary policy actions is to ask them to estimate the time normally taken to carry out various steps in the process of investment. For example, in the case of investment in industrial plant, firms can be asked (a) how long it takes from the start of the drawing of plans to the start of construction, and (b) how long it takes from the first decision to build to the start of construction, and (c) how long it takes from the start of construction to completion. Similar questions may be asked regarding the purchase of machinery and its production or the purchase and production of any kind of asset. As it can be expected, there is a wide dispersion among these time periods, for each capital item, but for each of these items various averages can be obtained and estimation can be made regarding

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2. M. Friedman: Monetary and Fiscal Framework for Economic Stability. American Economic Review, June 1948, Page 17.

the time period required for initiating and carrying through plans for capital projects. Some work along these lines has been done by T. Mayer in the United States.[3] (See Chapter IV of this thesis).

(b) The Concept and Meaning of Lag:

If one looks at the relationship between monetary policy action and its effects on real variables, he does not find one single time period between the policy action and its effects. It should be realized that the effect of a single instantaneous monetary policy action on the general business activity could be found to begin immediately, starting out gradually, rising slowly and then decline gradually but stay around for a long time. In other words, what we really have is a distributed-lag. Consequently, when we speak of the lag we must take this into consideration, and, therefore, must think of some sort of weighted average of this series of intervals between the monetary policy action on the one hand, and its distributed effect on the other. The number of these intervals can be as many as the number of episodes we can think of at different stages to which the effects of the policy action can be

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3. T. Mayer: Inflexibility of Monetary Policy. Review of Economics and Statistics. Volume XL, November 1958, Page 358-74.

traced.

To illustrate this point, we can think of a policy action - consistent with our definition - say, a large increase in the money supply. The first, initial effect, i. e. one of the first of the series of distributed lags, can be thought of in terms of a change in the current thinking, and plans, of businessmen. The time period between the point when this effect was felt and the monetary policy action, can be thought of as being fairly short, or even as infinitely small - in relative terms - in cases where the information or the "news" of the new policy action can be obtained quickly. Now, in these same terms we may think of several other effects the list of which is by no means complete, and the sequence is not necessarily the one that prevails in each and every case. We may include the number of orders - or their dollar value - for equipment or for replenishing inventories; repair expenditures; capital investments; personal income; consumption expenditure; induced investment and, in turn, induced consumption; the effect of all the above on G. N. P. ; the secondary repercussions of changes in G. N. P. on disposable income, on consumption, on investment and on further income. The time intervals between these effects and the monetary policy action need to be averaged in order to arrive at an acceptable period of time which can be called "the lag".

For each policy action we can derive a similar set of inter-

vals, and the averages of these different sets of intervals would vary from one policy action to another. At one time the average of these lags might be shorter, at another it may be longer, depending on the circumstances, and mainly on whether the policy action is being used in inflation or in deflation. In other words, a tight money policy, if used while there is still a down turn, or an easy money policy applied when there is still an upswing, may have a very short lag in themselves, while if they were used in a boom and a recession respectively their effect would be felt after a substantial lag only. Consequently, if one wants to make a general statement about the lag in monetary policy he would again have to average these average lags that we obtained for different policy actions.

An important point that should be borne in mind is that the time period which the monetary policy action itself takes is not necessarily momentary. Instead, the monetary policy action, as I defined it in Chapter I, is made up of a series of "sub-actions" the effects of which will be felt slowly. Very often the central bank, before commencing a large scale open-market operation, or other monetary action, makes some exploratory selling and buying to prepare the market for the larger scale principal operation to follow. Furthermore, if at the time of the commencement of the central bank's operations the market is too unstable for a large scale selling or buying operation to take place, the Bank proceeds slowly at the beginning and the whole operation may

follow this pattern, meaning that the extra amount of money will be injected into the economy gradually and slowly over a period of time, and possibly by approximately equal amounts.

Consequently, in view of the presence of the gradual execution of monetary policy actions on the one hand, and of the distributed lag in their effects on general economic activity on the other hand, in order to measure the lag, we have to view the time from a series of monetary actions to a series of real effects. In practice the most common, and, perhaps, feasible solution is to take a cut-off point in both series and measure the time period between these points.

At this point the question automatically arises: "How can we determine these "cut-off points"? While, admittedly, there may be several ways of doing this, one method is described in the following. On the monetary side this point would have to be estimated; this means that sufficient amount of information would have to be available from the monetary authority to assist the econometrician, or other researchers, in determining a point - in terms of time - in the sequence of monetary actions. What could be done here, and I emphasize that this is probably not the only alternative, is to take the series of actions which the Bank took in a monetary policy campaign, and which can be assumed as additive, and choose the point of time at which that action took place which represents the largest amount of money in the series of actions.

In other words, if the policy campaign which we are looking at lasts for twenty-one days, let us say from March 1st up to March 22nd, and during this period a certain amount of money is being injected into the economy as a part of this monetary policy campaign, then we take that day among this twenty-one on which the largest amount of money is injected into the system. This is assuming, of course, the daily injections differ from each other. There are two thoughts behind choosing the day of the largest injection as our cut-off point: (a) in terms of magnitude and, therefore, significance, the effects of this action can more easily be traced and measured, and (b) while the effects of the largest injection is more easily traceable, its effects can be thought of as reaching the general economic activity variable at the same speed as the effects of the injections made on any other one day of the twenty-one-day period, although the latter may be less traceable. Therefore, we can consider this as the true representative cut-off point in the series of actions.

If the amount of injections over the twenty-one-day period is the same for every day, then we can take the state of affairs which prevailed on the eleventh day and use that as the cut-off point for this particular monetary policy campaign. By "state of affairs" I mean some values for those economic variables which would immediately and directly reflect the magnitude of the policy action, i. e. in our case

the amount of change in the money supply that took place by the eleventh day.

On the "real" side we can take - and, again this is probably not the only approach - the point of time at which G. N. P. has reached a new level which can be attributed, without any doubt, to the change in the monetary scene, i. e. to the new monetary policy. Admittedly here again some questions may arise: "How can one be sure that the new level of the G. N. P. which we took as a "cut-off" point can solely be attributed to the new monetary conditions, i. e. that it is not also attributable to some exogenous, non-monetary influence?" and, secondly, "If the new level of G. N. P. taken represents only one stage in a series of changes in G. N. P. which may be taking place at the time, how can we justify taking that particular new level of G. N. P. which we did take and not some other level which was reached earlier or perhaps later?"

The answer to the first of these two questions is admittedly not easy, and in this respect one can only say that the researcher would have to be fully aware of the circumstances that surround the particular change in G. N. P., so that he can make sound judgment as to the establishment of the prevailing dominant causal factor. The answer to the second question could be made by stating that the "new" level of G. N. P. taken should be that one which follows the first change,

which is significantly large, let us say .25% or larger, that can be attributed to the change in monetary conditions; i. e. it should be taken at the point of time when the level of G. N. P. turns out to be significantly different from what it would have been had the new policy action not taken place. (It should be noted, however, that this figure should be reduced somewhat as the level of G. N. P. rises, for otherwise the "significant" change may be too large and our lag may, therefore, be lengthened. Another way to get around this is to establish some sort of absolute change, rather than percentage change, which should be, I feel, around the $100-150 million level).

So, using the criterion described in the few paragraphs above, we may determine two cut-off points in the monetary action and in the "real" repercussions respectively, and measure the time period between these cut-off points. The time period between these two points, if the cut-off points in both areas were correctly established, should be equal to the average of the series of intervals which result from the existence of the distributed lags, and which was analysed a few pages back.

(c) The Interpretation of Different Types of Lags:

Writers in economics who dealt with the problem of lags and who found - either after a theoretical or empirical or both kinds of

research - that there was a lag between the monetary policy action and the reaction of the general economic activity, generally split up the overall lag into several components. In this section, I will attempt to examine the various components of "the lag" as they were found by various economists who did research in this field, without elaborating on their methods of research. These studies will be looked at again in much greater detail in the subsequent chapters.

FRIEDMAN[4] He differentiated among three taypes of lags, i. e. he split the total lag into three components:- (i) The Recognition Lag:[5] this represents that period of time which elapses between the need for action and the recognition of this need. This type of lag does not exist for automatic reactions. It could also be made negative if our forecasts would predict, with almost 100% accuracy the movements in economic variables, when there is no discretionary policy used. This means that when we have complete and accurate knowledge of the future and present behaviour of the most important economic indicators, the recognition of a need for an action could precede the

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4. M. Friedman: Monetary and Fiscal Framework for Economic Stability. American Economic Review Volume XXXVIII. June 1948. Also - The Effects of Full-employment Policy on Economic Stabilization: A Formal Analysis, in Essays in Positive Economics. Chicago 1953.

5. M. Friedman: Monetary and Fiscal Framework ....

appearance of the actual need. An important factor which contributes to the length of the recognition lag is the present characteristics of empirical reporting on the behaviour of the different sectors and indicators of the economy. Most vitally important statistics are published at least once a month but in some cases a quarter and in still some other cases four to five months after the period to which they apply. It is evident, therefore, that with the recognized inflexibility of monetary policy, even the appropriate timing of the policy action itself, disregarding for the moment the questions concerning their effectiveness, is rather difficult to achieve.

(ii) The Action Lag : This is the second element in Friedman's "lag", and denotes the time that elapses between the recognition of the need for action and the taking of the action. This may be present even when there are very strong automatic reactions. It seems that this type of lag is significant in monetary policy, although in fiscal policy it may be more important. This, of course, is due to the nature of the monetary policy action. In general, however, one can say that once the need for action appears, the central bank does act, or at least, it is in the position to act immediately. In contrast to procedures connected with fiscal policy measures, the decision and the action regarding monetary policy is

practically entirely up to the central bank.[6]

(iii) Effect Lag :[7] This denotes the time period which elapses between the action and its effects. This lag is present whether or not we have automatically adjusting variables, or whether or not we rely on completely discretionary policy actions. Friedman indicated three main aspects of the problem connected with this third type of lag. First, whether or not its existence is significant from economic policy point of view, that is, if it does exist, is it long enough to make the policy action destabilizing? Second, is it variable? Third, how to measure it accurately? The answer to the first question depends on the views of the person dealing with the problem. Friedman feels that this lag is there and is long enough to make the ordinary monetary policy action destabilizing when applied against the cyclical fluctuations of business. The crucial importance of the second question

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6. One could, of course, put forward an argument, which at times may seem to be quite correct that even if the central bank does recognize the need for the action and acts promptly, due to inaccurate evaluation of the current situation the Bank's actions may turn out to be wrong and inconsistent with economic theory or even with economic common sense. Consequently, the action taken may be inappropriate, under the circumstances, and incorrect even from timing and magnitude point of view. This argument relies on the experience of certain times, and cannot be taken as a general supporting evidence for the existence of the second type of lag in monetary policy, as put forward by Friedman.

7. This term is mine, for Friedman had no specific name for this lag component.

lies with the fact that, if the lag is variable then, even with 100% accurate forecasting of the movements of economic variables, the variability of the lag would introduce an inevitable uncertainty into the policy action, that is, into the timing of the outcome of the action. This uncertainty would inhibit the timing and magnitude of the monetary measure. Regarding the measurement of "the lag", some remarks and suggestions were already made in Section "B" of this Chapter, and in the course of the more detailed examination of the individual models, which will follow in the subsequent chapter, further evidence should come to our attention.

MAYER[8] In this study "the lag" is split up into four components:

(i) Policy Inauguration Lag: This is the time period between changes in economic conditions and the "adoption" of the need for policy actions. This component has two sub-components, the lag with which the information on current conditions becomes available, and the time period required to evaluate the information and make decisions regarding the new policy. Mayer's first lag—component is the same as that of Friedman who called it the "recognition lag."

(ii) Policy Lag : This lag-component consists of the time period which elapses between the recognition of the need for the policy action and the completion of the appropriate policy action. (This is

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8. T. Mayer : Inflexibility of Monetary Policy. Review of Economics and Statistics. Volume XL. November 1958, Page 358-74.

identical to Friedman's "Action Lag"). The existence of this is brought about by the fact that, as discussed in Section "B", monetary policy is generally implemented in such a way that the monetary policy action itself may be spread over several months. The spreading of the monetary policy over several months is made necessary by the nature and characteristics of the financial market. An open-market-operation, in either direction, conducted on a large scale over a period of day, or even several days, would have a serious disturbing effect on the financial market. The large increase, or decrease, in government securities, would bring about a violent fluctuation in the price of bonds, and therefore, in the level of interest rates. Confidence in the stability of the market would be shaken with a repercussion which would at least partially defeat the original purpose of the policy action itself, or would accentuate the effects of the policy action beyond the desired level. [9]

(iii) Credit Market Lag: It is probably true that, the main carrying vehicle for the effects of monetary policy action to the economy is the financial market itself. By reallocating idle funds for a short

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9. This situation can be improved by the central bank if it "conditions" the market, as a preparation for a major operation, by engaging in "preliminary" open-market-operations to create an atmosphere, price and interest-rate level, which is thought to be more conducive for major operations in the market.

or longer period of time, the financial market makes it possible for those who are in need of funds for the purpose of investing to obtain the required financing. The channelling of funds is generally done by a transaction which involves some sort of debt-instrument. The government and its fiscal agent, the Bank of Canada, are always active participants in the financial market, and it is through this media that open market operations attempt to influence the economy.

The credit market lag in fact is the time period which elapses until the money market is affected by the newly adopted monetary policy. The length of this lag depends on three factors: the type of monetary action used, the intensity of the monetary action implemented and the current financial market conditions. Since these factors differ with different times and with every monetary policy action, the credit market lag may turn out to be quite variable.

The fourth and final component of the lag as put forward by Mayer, is the "Output Lag". This is identical to Friedman's third lag, and implies the time period that elapses between the point of time when the action was taken and the stage at which the impact is felt on the general economic activity.

JOHNSON, H. G. & WINDER, W. L.[10] Although their work too will be

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10. Johnson, H. G. and Winder, W. L.: Lags in the Effect of Monetary Policy in Canada. Queen's Printer. November 1962.

elaborated on in a subsequent chapter of this thesis, here we will take note of the lag-components which they found in their econometric research project for the Royal Commission on Banking and Finance.

(i) Inside Lag: This denotes the time period between the appearance of the need for policy action and the taking of the action. This, in effect, is a combination of Friedman's first two lag- components. The Inside Lag is divided into (a) recognition lag, the (b) decision lag, and (c) the action lag, i. e. the time required for putting the action into effect. The recognition and action lag-components are identical to Friedman's first two lags, and very similar to Mayer's "inauguration lag and "policy lag" lag-components.[11]

(ii) Outside Lag: This denotes the time period between the taking of action and the realization of its effects on the economy. This lag-component can further be divided into several components depending on the number of stages considered when tracing the effects of monetary policy on the economy as a whole.[12]

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11. It should be noted that "the lag" applies to the period between two points: policy cut-off point and the final effect cut-off point. (See Section "B"). Any other smaller or sub-period denotes lag-components, i. e. components of which the total lag or "the lag" is made up. In this section we are examining how different writers split up the overall lag into lag-components.

12. See Chapter V for a detailed discussion of this study, also see the summary preceding the table, which is presented later on in this chapter.

KAREKEN and SOLOW [13] They speak of three lag-components.

(i) Inside Lag : Presumably this provided the idea for Johnson and Winder to consider the "inside lag" in their study. This is the time that elapses between the appearance of the recognized need for a policy action and the action of the monetary authority itself. This lag was sub-divided into a "recognition" and "action" lag-component, as it was done by Johnson and Winder approximately $1\frac{1}{2}$ years later.

(ii) Intermediate Lags: The time lag between the "moment" when an action is taken by the central bank, and the point of time at which the banking system begins to be faced with changed conditions. Here a lag may come about, for example for an easy money policy, when the central bank allows more reserves to commercial banks, but the latter, instead of lending or buying securities, hold on to the cash in order to build up their cash reserves to a desired predetermined level. After this level of reserves is reached they will start lending out money or buy securities, but this may take place after a certain period

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13. Ando, Brown, Solow and Kareken: Lags in Fiscal and Monetary Policy published in the volume called Stabilization Policies for the U. S. Commission on Money and Credit. Prentice Hall, 1963.

of time only. Another point in this respect is that there might be a time slippage between the change in bank liquidity and a change in the overall structure of interest rates. [14]

(iii) Outside Lag: The period of time elapsed between the policy action and the consequent change in output. This is the same as Johnson and Winder's "Outside Lag", and Mayer's "Output Lag", as well as Friedman's "Effect Lag."

At this stage it seems appropriate to coordinate the different interpretations of lags and their components by various economists. When we speak of a time lag in general, between the introduction of a monetary measure and its results, we are really referring to a whole series of variable lags.

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14. Lags in the banking system will be dealt with in the last section of this chapter. It seems appropriate here to remark that, in view of the fact that the amount kept as reserves is not income earning, it is very unlikely that chartered banks contribute much to this lag. Banks seem to work to a legally required, or practically established by experience, cash reserves and would probably be rather hesitant to keep more cash around than is required by their every-day transaction needs or by legislation.

We saw that the first type of lag in general is the so called observation lag. There is some time before economic statistics or other material are available to show for instance that serious tendencies towards inflation or unemployment exist, or that the cycle has turned downward.

It takes an additional period of time before the statistical tendencies observed become so marked, or so persistent, that the central bank considers them sufficient to warrant such a decision as a change of the discount rate. This may be called the decision lag. The statistical observations will give the basis for a forecast of economic development. However inadequate methods are used, this forecast must also include a prediction as to the probable effects of the measures contemplated. In this decision lag we may include all the doubts felt as to the true nature of the situation and all the hopes that the tendencies noted will correct themselves, that those who oppose the measures currently taken will be convinced by later statistics.

Once the policy measure has been decided upon and put into force, there is a new series of time lags to be considered. It generally takes time before the raising of discount rates is reflected on the money and capital interest rates, and furthermore, it takes time for the open-market operations, or new regulations on liquidity or reserve ratios, to affect significantly the loan policies of banks. These periods may be

summed up as the "credit lag". It should be noted that what we are dealing with here is not a time lag of any definite duration, determined for instance by the actual structure of the credit market, but a highly variable pattern of reactions over time. Different banks and credit market institutions will be affected with varying rapidity by the policy of the central bank. Their speed of reaction can be best determined by their current state of liquidity.

Nor will credit customers be faced immediately and all along the line with a changed liquidity and interest rate situation; it takes time for the new credit terms to come into general application. It should be clear, therefore, that the credit lag in question really includes two distinct types of lag, i. e. the time it takes for measures adopted by central bank to affect liquidity within the credit system, and the time it takes for changes within the credit system to have effective influence on loan conditions and liquidity with regards to trade and manufacturing.

After all of these lags comes what is perhaps the most important lag of all of them. This is concerned with how rapidly are investment and consumption activities influenced by changes in liquidity and interest rates as these affect the producer and the consumer. This could be called the activity lag. This lag, can again, from a theoretical point of view, be divided into a series of effects. It takes a certain

time for the changes on the credit market to be observed, and to be considered sufficiently significant by business enterprises immediately affected to warrant a change of investment plans. The first obvious reaction will perhaps be an increase or a decrease in orders, which may not affect actual deliveries until some time later. Increased sales can in the beginning be satisfied from stocks, while a decrease in sales can lead to a piling up of inventories. In other words, it will take some time before a changed rate of sales will have any effect on actual production. And it will take even longer for these effects to be manifested in employment and in consumer expenditure.

Finally, we should remark that the consideration of these different time lags does not in itself give us any fixed points of reference for an analysis of the effects of monetary policy. It should be kept in mind that these lags are not necessarily peculiar to the effects of monetary policy. Such lags, difficulties and complications apply equally to fiscal policy, although partially in different combinations and permutations.

It seems appropriate, at this stage, to present a table which illustrates how the different lag-components of the writers discussed fit into our recapitulation.

WRITERS	LAG COMPONENTS			
	Observation :	Decision:	Credit:	Economic Activity:
Milton FRIEDMAN Remarks:-	Recognition	Action	In Friedman's system the credit lag-component was not emphasized, for it was included into the lag between the "action" and economic "Reaction".	Effect
Thomas MAYER Remarks:-	Policy Inauguration Subdivisions:- a) delay, unavailability of information. b) evaluation of information.	Policy	Credit Market	Output
KAREKEN & SOLOW Remarks:-	INSIDE LAG a) Recognition	b) Action	Intermediate Lag	Outside Lag
JOHNSON & WINDER Remarks:-	I N S I D E L A G a) Recognition	b) Decision c) Action	d) Credit	Outside Lag

(d) Lags in Restrictive Monetary Policy Caused by an Increase in the Velocity of Circulation

It is an essential paradox of monetary policy measures that those policy actions which are intended to curtail aggregate demand by restricting the money supply provoke a simultaneous increase in velocity of circulation of money or, what is the same thing, a decline in the ratio of cash balances to turnover. Aggregate demand is in other words increased by the reactions of banks, entrepreneurs, and consumers to the restrictive monetary policy. These reactions are due to higher interest rates and the growing difficulty of obtaining additional funds from the banks.

There are various ways in which the increase in the velocity of circulation comes about. In the first place, the commercial banks, even if their liquidity position does not allow them to expand their total assets, can satisfy the growing demand for advances by shifting from government securities to loans.[15] The selling of these securities by the banks to the public leads to a rise in the long-term interest rate. Now it is reasonable to assume that the securities are largely bought by drawing on bank deposits that were previously held idle. It is presumably the rise in the rate of interest which induces the present purchasers now to prefer investments to deposits, whereas

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15. Here, we assume that the so-called "lock-in" effect of lower security prices does not discourage banks from this operation at least during the earlier stages of the game.

at the previously lower rate their preference had been the reverse. The idle deposits of these people now disappear. On the other hand, the loans which replace the securities among the assets of the banks give rise to active deposits; and the velocity of circulation of money is then increased. The same result can be reached when non-bank financial institutions sell securities to the public, always provided that the public purchases them out of formerly idle deposits which are now lent to entrepreneurs and thus begin to circulate.

Some economists put great faith into the so called "lock-in" or "pin-in" effect of rising interest rates.[16] They believe that when long-term rates are rising the banks will hold on to their securities in order to avoid realizing a capital loss. Practical experience, however, at least under normal conditions, does not seem to support this theory. This does not mean that a point will not be reached at which further sales of securities are no longer profitable, but this point may only be reached after very large sales have taken place. It is only

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16. Smith, W. L. : On the Effectiveness of Monetary Policy, American Economic Review, September 1956.

Tobin, J. : Monetary Policy and the Management of the Public Debt: The Patman Inquiry. Review of Economics and Statistics. September 1953.

Chase, S. B., Jr. : The Long-In Effect: Bank Reactions to Security Losses. Money and Economic Activity. Readings in Money and Banking. Edited by L. S. Ritter.

when the long rate has risen above the short rate on loans,[17] that the banks will finally stop selling. If, then, monetary authorities wanted to check the rise in the velocity of circulation of money which is caused by the shift out of securities into loans by the banks they would probably have to raise the long-term interest rate suddenly and sharply and, at the same time, create the expectation that the new rate was not going to last long.

The second way in which the velocity of circulation will increase is via the reactions of business firms. These too have the incentive to invest idle cash, either in real assets in order to take advantage of the rising marginal efficiency of capital, or in short-term paper, particularly treasury bills, in order to profit from the higher interest rates. In the latter case the government will need to sell fewer treasury bills than before to the banks, and the banks may be able to replace bills by loans to customers. Finally, the offer by companies of new issues of shares and debentures with favourable yield may encourage the public to draw on previously idle cash balances.

By these various routes, then, the velocity of circulation of money increases in response to the measures taken by the monetary authorities to restrict the money supply, and, thereby, the major

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17. J.A. Galbraith: The Economics of Banking Operations: A Canadian Study. McGill 1963, Page 55-75.

effect of the restrictive measures will be felt on the economy after a time delay only.

(e) The Presence of Financial Intermediaries. (A brief note as to how intermediaries may contribute to "the lag").

The widespread mistrust of measures aimed primarily at controlling the money supply is due partly to the fear that they may be frustrated by the actions of intermediaries, especially those whose activities create "near-money". In this connection there seems to be an important though rather paradoxical distinction between banks and other financial institutions. Because their deposits are generally accepted as money the banks can - provided they have the necessary cash and/or liquid assets - increase their lending by increasing the stock of money in the community. They do not, however, re-lend money deposited with them (a slight exception to this would be the deposits of notes when lending is limited by the size of the cash base).

If, for example, we withdraw our deposit from an intermediary and put it on deposit with our commercial bank, the net result is that our account is credited and that of the intermediary is debited with the sum; there is a transfer of deposits from one account to another but there is no net increase of deposits and the lending power of the banking

system is in no way enhanced. By contrast, non-bank financial intermediaries cannot increase the money supply but they do re-lend money entrusted to them, and such money is (apart from their own capital) their only source of lending power.

It follows that banks can increase their total lending only if they can add to the money supply, and they can do this only if they have the necessary backing of cash or liquid assets, depending on the prevailing method of control authorities are using. They can still increase their loans at the expense of investments, but if the central bank does not step in to buy securities sold by the banks, they will have to be bought by a private buyer who surrenders purchasing power equal to that granted by the banks in the form of increased loans. It is true, of course, that the process may transfer a bank balance from someone who has no immediate intention of spending it to someone who has; in other words, it may lead to a mobilization of idle bank balances. However, this only takes place at the cost of depressing the price of government securities and raising the rate of interest. If the central bank checks the fall in security prices, the situation is very different. The rise in interest rates will not take place, and the government will probably have to find funds for its security purchases by issuing Treasury Bills.

Other financial intermediaries can increase their lending only insofar as they can persuade members of the public to transfer bank

balances to them. In other words, their power to frustrate monetary action depends entirely on their ability to mobilize idle balances. The Radcliffe Committee seems to have realized this fact but contended that such mobilization could take place easily and with little rise in interest rates because claims on many intermediaries were close substitutes for money.

The point of the fact is, that financial institutions can frustrate monetary policy by increasing their loans, when bank lending is curtailed, only if they can mobilize idle balances or if they can sell government securities. It is theoretically possible for them to mobilize idle balances by raising their borrowing rates relatively to the banks' rate on deposits accounts, but in practice changes in the pattern of rates have not been of this kind. The danger that monetary policy will be made less effective by increased lending on the part of non-banking institutions has been widely exaggerated. [18]

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18. For elaborate analysis along the same lines see:
W. L. Smith: Financial Intermediaries and Monetary Controls. Quarterly Journal of Economics, November 1959.

D. Shelby: Some Implications of the Growth of Financial Intermediaries. Journal of Finance, December 1958.

D. A. Alhadeff: Credit Controls and Financial Intermediaries, American Economic Review, 1960.

Canadian Banker's Association: Submission to the Royal Commission on Banking & on Finance. Page 88-102.

(f) Lags Attributable to Inter-Business Financing.

An important aspect of the flow of credit in a developed economy is that made possible by the quasi-automatic grants of permission for business customers to delay payment for goods bought, i. e. "trade credit". The literature on this topic is extremely scarce, and, other than a couple of studies that were inspired by Report of the Radcliffe Committee, [19] no profound statistical investigation is available to the public.

In these articles it is being argued that with the very large amount of trade credit outstanding, it could easily have expanded further to nullify much of the customary restriction of bank credit, which an average program for tightening credit might achieve. The conclusions arrived at include that some substitution for bank credit would be created even if the companies that borrowed more via trade credit had to lend as much more to other companies.

The most convincing possibility for counteracting tight money has been that companies, possessing surplus liquid assets, are

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19. F. P. R. Brechling and R. G. Lipsey: Trade Credit and Monetary Policy. Economic Journal, December 1963. Page 618-641. In this article the authors have examined a sample of 75 companies.

A. H. Meltzer: Monetary Policy and the Trade Practices of Business Firms, in the Volume "Stabilization Policies"; study prepared for U. S. Commission on Money and Credit. Prentice-Hall 1963.

able to tap the public's idle money balances, would become net lenders through the trade credit mechanism to companies that were being affected by the restriction of bank lending. The illiquid companies could simply increase the average delay with which they pay for purchases - possibly at the cost of a penalty - and thereby could draw funds from liquid business.

These conclusions convinced the authors that intercompany trade credit contributed a great deal to the lag in restrictive monetary policy. With the evasion of the restrictions, worthwhile restrictive effects could be achieved only by the imposition of very large - larger than otherwise would be necessary - quantitative restrictions. But these would impose severe hardships upon those who did not have as much access to the trade credits, or who - as in the case of small businesses - had exploited the full possibilities for borrowing via trade credit before money was tightened.

(g) Lags in the Banking System - or, are there Any?

An important, although far from having been agreed upon as to its existence, component of "the lag" in the effect of monetary policy could be traced to the banking system. While some interested

writers in the past have thought of this problem,[20] they have not come out with an explicit affirmative or negative statement - with the exception of Horwich mentioned later on - with regard to its existence. The most likely reason for not having done so was the lack of adequate data, and the alleged poor adaptability of regression analysis to this problem.

Recently, H. G. Johnson and W. L. Winder, in their study - dealt with in the latter part of this thesis - prepared for the Royal Commission on Banking and Finance,[21] have come up with a positive statement as to the existence of the "bank-lag". As it was expected, they did encounter difficulties in devising an econometric framework appropriate to the peculiar system of reserve requirements established by the Bank Act of 1954. They solved this by formulating "the response of chartered banks to central bank cash management in terms of adjustment of actual deposits to a desired level based on an expectation of forthcoming reserves actually provided in the current month and partly from an accurate prediction of reserves actually provided in the subsequent month, the adjustment occuring with a distributed lag".[22]

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20. Kareken & Solow: Lags in the Effect of Monetary Policy for Commission on Money and Credit.

21. Johnson & Winder: Lags in the Effect of Monetary Policy in Canada.

22. H. G. Johnson: The Canadian Quandary: Problems and Policies. McGraw Hill 1963. Page 179.

Regression technique was used, but, because of the high autocorrelation among some of the independent variables, the results turned out to be unreliable - regression coefficients were unreasonably too high. The results did turn out to be acceptable, however, when the regression was "re-run" by using the first difference form of the data.

After this troublesome procedure, the results indicated that the weighted average of the distributed lag in the adjustment of bank deposits to their determining variables was about half-a-month. Although this lag is not terribly serious, in the opinion of the authors, even this should not be permitted, for it is a product of human behaviour and attitude within the banking system. Johnson and Winder also found, by the way, that the Treasury Bill lag and its explanatory variables by three months - which, in the opinion of the writer of this thesis, is too long - and, further, the long-term rate lags on the short-term rate by seven to eighteen months.

Before I continue the discussion of the Canadian scene, I wish to remark that studies were conducted in the U. S., far before that of Johnson and Winder. George Horwich found that in 1953-55 "the response of bankers to changes in effective reserves was fairly immediate; it usually occurred in an interval which is no greater than a month and

probably much less."[23] According to E. Sherman Adams,[24] while lags in the banking system are negligible, this lag for non-bank lenders may be substantial.

"The Canadian Quandary" was published in the second half of 1963, and the interested readers did not have to wait for long for a reaction, from the part of the banking community, to Johnson's allegations concerning the existence of the "bank-lag".

In a very interesting review article[25] Dr. D. B. Marsh seriously questioned Professor Johnson's conclusions and denies the existence of any significant "bank-lag". Dr. Marsh emphasizes that it is not only that the "bank-lag" does not exist to any significant extent, but also that it is almost impossible to measure it in any reliable way. The essence of Dr. Marsh's answer is that, due to the profit motive for the operation of chartered banks, if they can help it at all, they will not hesitate to react to the presence of excess cash. This, of

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23. G. Horwich: "Elements of Timing and Response" in Balance Sheet of Banking 1953-55. Journal of Finance. May 1957.

24. E. Sherman Adams: Credit Policies and Economic Stability. American Economic Association Papers and Proceedings, 1957.

25. D. B. Marsh: Johnson's Tour of the Northern Dominion. The Canadian Journal of Economics and Political Science. Volume 30, May 1964, Page 258.

course, sounds perfectly acceptable for "excess" cash, or any type of cash, held by the banks, or at the central bank, is a non-income earning asset; consequently, banks are expected, and do, shift from any excess cash into income earning securities or loans - the latter preferred. So, in view of these, what we may be looking for, in the shape and form of a "lag" is not the time period elapsed between the action of the central bank and the change in the deposits on the books of chartered banks, but between the "changes in cash and changes in cash adjustment assets (securities, day-loans) held by the banks."

It is quite possible that a lag could be found in the reaction of some of the chartered banks, says Dr. Marsh, to having found themselves with excess cash, for it is inherently necessary due to the presently prevailing method of reserve calculations whereby banks are allowed to average over a month to the required amount, but it would be very difficult if not impossible to measure and uniformly interpret these delays.

Professor Johnson did not delay for long to make his reply.[27] The essence of his article, written in a typical "Johnsonian style",

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27. H. G. Johnson: Johnson's Northern Tour: A Traveller's Guide Past the Marshes. Canadian Journal of Economics and Political Science. August 1964, Page 4535.

is that banks do not necessarily try to reduce the level of their excess cash to new level. Cash reserve ratios are influenced, states Professor Johnson, by interest rates and other discretionary factors, although he does concede to the presence of the elements of uncertainty in this respect.

CHAPTER III

THE FRIEDMAN APPROACH

Professor Milton Friedman was one of the first persons who has drawn the attention of economists to specifically the existence of a time lag in the effects of monetary policy. He introduced the idea in an article written almost two decades ago.[1] He brought up the problem again in the Millar Lectures No. 3,[2] and dealt with at length in a series of two articles.[3]

Before embarking upon a detailed analysis of Friedman's lag doctrine, I intend to mention the gist of his conclusions by presenting two quotations from his research materials: "There is much evidence that monetary changes have their effect only after a considerably lag and over a long period and that the lag is rather variable. In the National Bureau study .... (it was) found that, on the average of 18 cycles, peaks in the rate of change in the stock of money tend to precede peaks in general business by about sixteen months and troughs

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1. M. Friedman: A Monetary and Fiscal Framework for Economic Stability. American Economic Review, June 1948.

2. M. Friedman: A Program in Monetary Stability. Fordham University Press. 1959.

3. M. Friedman: "The Effects of a Full Employment Policy on Economic Stability: A Formal Analysis," in Essays in Positive Economics. Chicago 1952.

   The Lag in Effect of Monetary Policy. Journal of Political Economy. October 1951.

in the rate of change in the stock of money to precede troughs in general business by about twelve months .... For individual cycles, the recorded lead has varied between six and twenty-nine months at peaks and between four and twenty-two months at troughs."[4] In other words, monetary policy operates with so long and variable a lag that the active employment of this policy may aggravate rather than reduce economic fluctuations. It is also evident from this quotation that Friedman measures "the lag", i. e. the sum of the lag - components discussed in the previous chapter, by looking at the time period between the peak in the series of the rates of change in the money stock, and the absolute - presumably consequent - peak in economic activity.

His statements before the congress reflect his views further: "Monetary policy is rather like a water tap that you turn on now and that then only starts to run six, nine, twelve or even sixteen months from now. It is because of this long lag in the reaction to policy that you have this tendency for policy in fact to have an effect opposite to that intended .... Thus you have a situation, when the Federal Reserve System takes action today, the effect of that action may on some occasions be felt five months from now and on other occasions ten months from now, or still other occasions two years from now. That is the major reason why it is so difficult as

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4. M. Friedman: "A Program .....". Page 87.

a technical matter in the present state of our knowledge to know what measures we ought to take at any given time."[5]

To restate this, monetary policy, as defined in Chapter I of this thesis, affects economic conditions only after a lag. This "lag" should be thought of as the average of distributed lags, as described earlier in this thesis, for each and every policy action. In other words, translated into my model, in Friedman's world, every time the central bank takes a policy action, the effects of each of these actions is felt on the general economic activity after some average delay, called the lag.

But it is not sufficient to state that there is a lag, it should also be realized, that this lag is a long one and a variable one. This has serious implications. If the latter two characteristics would not exist, it would still be possible to implement monetary policy successfully; in fact, a lag of some size is necessary for it is practically unfeasible to think of any policy action that would have its complete effects instantaneously. What I wish to point out is that the presence either of a very long, say ten to fifteen months, or a variable lag could inhibit the effectiveness of the policy action. This means that we can have a type of policy-campaign, taken several times with a very low average lag, but with lags displaying a high degree of variation, (this variation could be expressed by a co-efficient of

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5. U. S. Congress: Joint Economic Committee; Hearings; Employment Growth and Price Levels, Part 4, 1959, p. 615-6.

variation); despite the fact that the average lag is very low, the high variation can cause disturbances in the economic conditions. We can also think of several policy-campaigns with an average lag of one year or more, but in this case we might assume the presence of low variations; here, if our forecast of economic variables, for a period of at least as long as the lag, is accurate then monetary policy should turn out stabilizing. These are the implications of Friedman's assertion that the lag is not only long but variable as well.

I wish to remark at this stage, for the sake of clarity, that, in contrast to other writers with whom we will be dealing in subsequent chapters, Friedman's primary concern was with an overall lag, that is, with the time between a "cut-off point" (as defined earlier) in policy action and that in the distributed effects on real variables. This does not mean that he did not mention, or he was not aware of the existence of, what we could call the "preliminary lags," i. e. the "recognition" and "decision" lags. As we can see from our table in Chapter II, he was quite aware of the existence of these lags, however, his theoretical framework and method of analysis was such that, primary importance was given to the overall lag in which the dominant role of the time delay before "real" variables were affected was made obvious. It was necessary to make this remark here, for as we will see in subsequent chapters, Mayer, as well as Kareken and Solow, have examined "the lag" by economic sectors, and for each sector

all the lag-components were carefully analysed.

At this stage it seems appropriate to mention the statistical evidence found by Friedman for his assertions. The measurements were conducted by taking the time period between turning points in a series depicting the rates of change in money stock and a general business activity series dated by the National Bureau of Economic Research. In other words, the technique involved the measurements of time between two numerical series.[6] These series were examined by Friedman as far back as 1870, with emphasis on non-war cycles which numbered about eighteen. Further statistical background for his conclusions on lags was provided by the material used by him in a study which he conducted with David Meiselman for a purpose different from lags.[7] This study provided Friedman with data on the money supply and on national income and its components along with various transformations of these data. Results from these investigations permitted Friedman to conclude that peaks in the rate of change in money stock precede reference cycle peaks by sixteen months, and troughs in the rate of change of the stock of money precede reference cycle troughs by twelve months.

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6. As we shall see in the subsequent chapters, Mayer conducted his research by interviews and questionnaires, while both of the studies, for the Porter Commission and for the C.M.C. were econometric research projects.

7. M. Friedman and D. Mieselman: The Relative Stability of Monetary Velocity and the Investment Multiplier in the U.S. 1897-1958 in "Stabilization Policy" Volume prepared for the U.S. Commission on Money and Credit, Prentice-Hall, 1963.

There are two main questions that need to be answered in connection with Friedman's conclusions regarding the lag: "What are the reasons for the presence of such a long lag?" and "Why should these lags be variable?"

An answer to the first question can best be given by having a brief look at the channels whereby monetary policy affects economic activity. The process whereby additional money filters through different sectors of the economy has been well described by Friedman,[8] and the following few sentences are based on his analysis. We assume initially an increase in the money stock due to open-market purchases by monetary authorities. The first effect of this is to change the structure of the balance-sheet of those who sold securities for cash. After the transaction the balance-sheet may still be in balance, assuming that it was in balance before the transactions, but in the long-run sense it will not be in equilibrium because these people will not find themselves with cash in excess of what they had before when, it is assumed, their balance-sheet was also in equilibrium. Since these are rational people, we assume, they want to maximize their utilities, therefore, will attempt to readjust their portfolios accordingly. Demand for securities, like government bonds and commercial papers,

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8. M. Friedman and Anna J. Schwartz, Money and Business Cycles. Review of Economics and Statistics. Feb. 1963. Supplement page 59-72.

will increase and this will bid up their prices; in the same time the cash flows into this area of the economy. From here, it is reasonable to assume, says Friedman, that funds will flow into the consumer goods, service, and consumers' durables sectors, in each case raising their relative prices. The final result will be a rise in expenditures in all directions, and a spreading of funds into these areas.

There are two reasons, why this analysis of Friedman is relevant from our point of view, i. e. for determining and judging the length of lags: (a) the time elements that is involved in the adjustment process that takes place in the balance sheets, that is, the length of time that individuals may take to readjust their portfolios to their initial or new equilibrium level, and (b) the time that is required for the wave of expenditures to reach the entire range of assets.

I would also like to point out that the period of time over which the effects spread is lengthened still further by the so called "feed-back effects" of changes in the financial markets and in expenditures on the stock of money itself. To illustrate what this means, let me take a tight money policy as an example. As the tightness is imposed upon the banks they will try to make up for lost reserves by selling off part of their short-term security holdings. This will, along with the immediate effects of open market sales by the central bank, exert upward pressure upon the interest rate structure. Assuming that

investment is interest elastic, this will tend to reduce fixed investment activity. Furthermore, and this is the point at issue, as interest rates rise, those cash balances which have been inactive now become activated and lent; i. e. there will be a shift from equities to debentures, and from hoarding to lending. In other words, since the opportunity cost of holding money in cash, or other fixed low income earning form rose, alternative uses of cash will become more profitable. This process increases velocity which finances expenditures, and which in turn offsets some of the aims which the tight money policy makers had in mind in the first place. This feed-back effect from business conditions to money means further indirect effects as the induced changes in money velocity exert their influence in turn; this process could be thought of as a continuous one with diminishing amplitude. The longer and stronger are these feed-back effects, the longer will be the average lag between a monetary policy action and the average of its distributed effects. So, the lag is long also because the effects are distributed over an extended period of time.

The second question which I posed a few pages back refers to the variability of Friedman's lag. The statistical evidence of Friedman for this characteristic of the lag is the variety of time intervals which he found between the points compared in the monetary

series and in the "real" series.[9] After having made a series of measurements he found an approximate figure of 6 or 7 months for the standard deviation of the distribution of intervals. Since this standard deviation figure, however, includes a large element of errors due to measurements, Friedman admits that these figures do not really provide as good an estimate of the variability of lags as does the mean of this distribution of the length of the lag.

Friedman did not go through the laborious, but at the same time, rewarding process of proving the existence and the length as well as variability of lag for the sake of doing just that. By establishing that there is a long and variable lag he attempted to discredit discretionary monetary policy on account of the fact that these lags make stabilization policy actions destabilizing. Furthermore, he used the results of his research to support his almost two decades old assertion[10] that the only useful role for the monetary authority, in stabilizing economic activity, is to supervise or direct an automatic mechanism whereby the money stock would be increased by a certain amount each year; this amount of increase would be just enough to accommodate a normal stable growth of the economy. I feel that this motive of Friedman is

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9. M. Friedman and Anna J. Schwartz, Money & Business Cycles. Review of Economics & Statistics, February 1963.

10. M. Friedman, Monetary and Fiscal Framework for Economic Stability. American Economic Review. June 1948.

A Program for Monetary Stability. Fordham University Press 1959.

an important factor to consider when one analyzes his results. In other words, the study and the results are directed against discretionary monetary policy and in favour of a passive non-anticyclical role for the monetary authority as the only acceptable alternative. This is contrary to the other studies on lags, which we will discuss in this thesis, for they, in the most part, point out the existence of the lags in monetary policy only to draw the attention of authorities to them so that they, i. e. the authorities can time their policy actions more appropriately; in other words, it is not the intention of researchers, other than Friedman, to discredit discretionary monetary policy actions but to draw attention to their shortcomings and thereby increase their effectiveness. While Friedman's study was the first significant attempt in this line of research, and his conclusions were, and are, the most radical and interesting so far, his work in the field of lags was subjected to one of the most fierce criticisms in the economic literature and although he introduced the idea of lags in monetary policy as early as 1948, we find him answering to criticisms as recently as late 1964.[11]

Reference to Friedman's conclusions has been made in most of the literature which I mentioned in this thesis, however, I feel that two of the critics should merit special attention. One of them

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11. M. Friedman: Lags in Monetary Policy: A Note. American Economic Review, September 1964.

was Professor J. M. Culbertson, [12] the others were Kareken and Solow. [13]

Culbertson questions Friedman's ultimate suggestion as to following a "neutral" monetary policy whereby money supply would grow by a constant rate; he feels that more typical characteristics of a neutral monetary policy would be some constant level of interest rates or of bank cash position. My comment on this is that, the principal idea behind Friedman's suggestion is quite clear: he does not want actively anticyclical monetary policy, i. e. he does not want the actions of the central bank to be influenced by the business cycle at all. What he wants is a money supply growing at a constant rate over time without regard to the movements of economic indicators. Now, whether we call this "neutral" monetary policy or use some other term for it is a question of semantics rather than of principle. Since interest rates can change for reasons other than changes in the money supply, that is, for reasons which are not necessarily connected with monetary policy as per our definition, I do not agree with Culbertson's contention that constant rates of interest represent a "neutral" monetary policy.

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12. J. M. Culbertson: Friedman on the Lag in Effect of Monetary Policy. Journal of Political Economy, December 1960.

13. Ando, Brown, Kareken and Solow: Lags in the Effect of Monetary and Fiscal Policy; in "Stabilization Policy" volume of studies for U. S. Commission on Money and Credit. Prentice-Hall, 1963.

As far as bank-cash is concerned, its constant level could indeed be taken as a sign of prevailing "neutral" policy.

Culbertson also asserts that the main reason for the existence of Friedman's long lag is "a misleading comparison of time series."[14] He refers here to the fact that Friedman compares peaks and troughs in the rate of change series in the money stock with the absolute level of business activity. The essence of his criticism is that in a smooth cyclical series - as dated by N. B. E. R. - the peak rate of change occurs before the absolute peak, consequently when one compares two smooth cycles he will inevitably find a time lag between the peak rate of change and the absolute rate. "This consideration," says Culbertson, "suffices to invalidate his data as evidence for the existence of such a lag."[15]

He also questions Friedman's assumption that the relationship between money and general economic activity is unidirectional. "Not only has money growth caused business expansion, but business expansion has caused money growth. This means that a simple reading of lag on the assumption of one-directional causation will not do. This is a part of the picture of intercorrelation among variables

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14. J.M. Culbertson: "Friedman on the Lag....", page 620.

15. Op. cit. page 620.

that makes it difficult to gain reliable knowledge about lags."[16] Our earlier discussion of the so called "feed-back effect" may have planted some doubts in the mind of the reader as to the existence of this unidirectional feature of the money-economy causal relationship. It is needless to say, therefore, that I agree with Culbertson in this respect.

Another, rather extensive, criticism of Friedman's lag doctrine originates from Kareken and Solow.[17] First of all, on logical grounds, they object to Friedman's assumption whereby he unconditionally assumes that a peak (trough) in general economic activity has been, without any doubt, caused by a previously occurred peak (trough) in the rate of change series of the money supply. The critics feel that this is an oversimplification of the case, for it seems, according to them, that the lag may reflect not a simple time delay between a money change and its effects but that the effect of a monetary policy action is overcome by other forces for the time period of the lag. These "other forces," although not specified can be thought of as operating in such a systematic way whereby they present an appearance of the lag. While, in my opinion, this criticism seems to point out indeed the possible

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16. Op. cit. page 621.

17. A. Ando, E.C. Brown, R.M. Solow and J. Kareken: Lags in Fiscal and Monetary Policy, in "Stabilization Policies" volume of research studies for Commission on Money and Credit. Prentice-Hall, 1963.

unrealistic feature of Friedman's assumption, it does not convince us, or even indicate, that "the lag" does not exist. In other words, we may conclude from this criticism that while Friedman's conclusions about the lag may be correct, he has arrived to these - possibly right - conclusions for the wrong reasons.

The second, significant, criticism of Kareken and Solow is of an empirical nature and, while it reminds us very much of J. M. Culbertson's objection, dealt with a few pages back, there is no mention of the latter. The criticism in question refers to the comparison that Friedman made between the rate of change in money and the absolute level in general economic activity. The objection is the same as that of Culbertson, i. e. why compare rates of change with absolute levels when it seems that this particular comparison in itself produces a lead of money before general business, for - and this is what was said precisely by Culbertson - in any smooth cycle the peak rate of change is bound to precede the absolute peak. It seems to me that this is a legitimate criticism as long as the cycles with which we are dealing are regular (i. e. the intervals between peaks and troughs in each cycle are the same over time) and smooth (i. e. that on each phase of the cycle the rate of change changes from increasing to decreasing magnitudes - as it would be the case on the upswing - and from decreasing to increasing magnitude - as it would be the case on the

downswing). In these cases I can indeed support a lag argument if we compare peak-rates of change with absolute peaks, but if we have no legitimate reasons for making this particular comparison, that is instead of comparing absolute peaks in both cycles, then it seems that our lag is merely a product of our methodology and would disappear if we used another method of comparison; in this case a lag doctrine of this type would be very difficult to maintain. Furthermore, to add to the Kareken and Solow criticism, we can question the comparison between peak rates of change in money and absolute peaks on purely practical grounds as well. I think that businessmen in general, and bankers in particular, concern themselves with maintaining their cash balance in some consistent and meaningful relation to their expenditures, or expected expenditures, and they do not care to match their expenditures to some rate of change in their cash position. In general one does not benefit directly from a certain rate of increase in the cash available to him, but rather from the amount of that cash.

To conclude the discussion of Friedman, I wish to point out that while his methodology is far from being free from defects, as we may have gathered from what the critics had to say, his work and conclusions on lags in monetary policy carry tremendous importance. Professor Friedman's theoretical and empiral approach, and

provocative conclusions have given rise to a very productive controversy, and the transmitting mechanism as suggested by him does, no doubt, contribute to the understanding of the labyrinth that exists in the relationships between monetary and real variables.

CHAPTER IV

MAYER'S STUDY OF SOME INVESTMENT SECTORS IN THE U.S.[1]

Mayer's study was conducted on a questionnaire and interview basis, therefore, its nature and structure is substantially different from that of Friedman. The sectors dealt with in the model accounted for about 72% of the U.S. economy. (This percentage is measured in terms of gross investment projects in the economy for sectors examined). Other sectors were excluded either because of complete lack of information or lack of reliable information.

According to the unpublished appendices to the article[2] several large sectors had to be excluded. One of the most important of these was the electric power investment sector. Another significant sector excluded was transportation. In both cases the information obtained could not have supported any reliable estimation with respect to the manner whereby monetary policy affects these sectors. The information that was available for the excluded sectors as a whole, however, lead Mayer to believe that the possible results for

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1. T. Mayer: The Inflexibility of Monetary Policy. Review of Economics and Statistics. November 1958. Page 358-74.

2. I was fortunate enough to be able to obtain copies of these supporting documents from Professor Mayer.

these investment projects are unlikely to differ enough to upset the conclusions reached on the basis of sectors that were examined. The more significant sectors that were examined included non-farm residential construction, industrial plant construction and equipment purchases, state and government construction, the farming sector, non-residential construction, consumer credit sector and inventories.

His output-lag-component for each of these sectors was split up into sub-lag-components and these were examined, or as in most cases, only estimated. These sub-lag-components in each sector were (a) the time period that elapsed from the change in monetary conditions to effects on investment decisions, (b) the time from investment decision to start of investment project, (c) the time from start of projects to completion, and (d) the time delay in working out the multiplier effects of investment changes. Preceding these sub-lag-components for each sector, Mayer considered the usual preliminary lag-components, i. e. recognition, decision, credit-market lags.

The gist of Mayer's findings is that the effects of a monetary policy on the current level of income would require eleven months to grow to the point where they could outweigh the persisting opposite effects of the previous monetary action applied in the preceding cycle phase. This finding led Mayer to conclude that only five to ten per cent of the cycle amplitude could have been expected to be cancelled

by anticyclical monetary policy.

Before we have a more detailed look at the study, a quotation from the article is in order: "Much of the information used in this study consists of approximations. For some sectors of the economy .....it was not possible to obtain reliable estimates".[3] I feel that this quotation is a true reflection of the nature and structure of the study. Nevertheless, while the results themselves may not be perfectly reliable, the work of Professor Mayer uncovers a large amount of information, quantitative and qualitative, on the U. S. economy which will be of very much use to those who wish to continue further along the same lines.

The period which Mayer considered was 1953-55.[4] Monetary policy action as such has not been defined by him but from the tone of the study, and from occasional references to monetary policy it can safely be concluded that what he meant by a monetary policy action is a purposeful change in the money supply and in the availability of credit. His implicit definition of money supply can,

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3. T. Mayer: The Inflexibility of Monetary Policy. Review of Economics and Statistics. November 1958. Page 359.

4. In 1953 a reduction in Federal Reserve Member Bank Reserve Requirements took place. Its quantitative impact as to extent to which money supply has increased has not been looked at by Mayer.

therefore, be thought of as the same as mine presented in Chapter I.

Mayer pointed out, in a manner similar to that of Friedman, that the time period between the monetary action and its effects on economic activity can be split up into several components. In Chapter II, I looked at his method of dividing up total lags in conjunction with the division of other writers. Therefore, here I will only mention them: (a) the policy inauguration lag - the time between the occurrence of the need and the adoption of policy; (b) policy period - the time it takes to apply the policy; (c) credit market lag - the time period that needs to elapse before the credit market is affected; and (d) the output lag - the time between change in credit availability as a result of the new policy action and the resulting change in economic activity.[5] It should be noted that he concentrated almost entirely on the fourth lag.

After having looked at, in the subsequent paragraphs, the methodology which was used by Mayer, I will attempt to interpret his study in terms of my conceptual analysis of the lag set forth in Chapter II. I feel that it is appropriate to look at Mayer's approach in some detail at this stage, in order to get some insight into his method of estimating the lags for different sectors.

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5. T. Mayer: The Inflexibility of Monetary Policy. Review of Economics and Statistics. November 1958.

As I mentioned a few pages back, Mayer considered, among other sectors, the non-farm residential construction. In considering the time lag for this sector, he concentrated on the period which followed the change in the availability of credit. For this sector, even the output-lag itself was sub-divided into further components: (a) the period between the increased availability of funds and the commencement of construction; (b) the time between the lender's committment of funds and the commencement of construction; (c) the time-span over which expenditures were spread. The lag between the easing of credit and start of construction was estimated to be about six months. Concerning the time delay between the lender's commitments of funds and the commencement of construction Mayer found, or rather estimated a two and-a-half months lag. (The lag before repair and maintenance was considered insignificant). A detailed information, regarding time pattern of expenditures after the start of construction, was put forth by Mayer in a table called the "Value Put in Place During Each Month of Construction."[6] The table indicates that within three months, 67.5% of the total construction projects, in the non-farm residential construction sector, was completed, or, putting it another way, 67.5% of any single project has been put in place. (These percentages relate to the total dollar value of projects). On the

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6. Op. cit. Page 362.

average it takes close to one year to complete the projects under consideration.

The analysis of the sector of Industrial Plant and Equipment merits special attention in Mayer's study, for it has a particularly significant influence on his final results. This sector includes new residential plant or plant additions only. Since monetary policy can affect these projects at any stage prior to completion, Mayer established a "cut-off point" after which monetary policy was not assumed to have any effect. As it may already be evident to the reader this cut-off point is conceptually different from the cut-off points at which I arrived in Chapter II of this thesis. Mayer felt that this cut-off point in this sector should be set at the point of time when the final approval of the project was made. This cut-off point applied to easy money policy. For tight money policy this point was set half-way between the decision date to undertake the project and the point at which the external financing is completed. In measuring the lag, in this sector, Mayer looked at the time that elapsed between the final decision and the commencement of the construction, and the time delay between external financing and the start of construction. In addition to these he added the length of construction period information on which was obtained by questionnaires.

Mayer's findings in this sector are incorporated in the following table:[7]

TIMING OF INDUSTRIAL PLANT, INVESTMENT-WEIGHTED MEANS

Time From:	No. of Months	No. of Cases
Start of consideration to start of construction:	23	64
Start of drawing of Plans to start of construction:	7	61
Final decision to build to start of construction:	6	36
Placing of first significant orders to start of construction:	2	70
Starting of financing to start of construction:	4	19
Completion of financing to start of construction:	3	12
Start of construction to completion:	15	77

On the basis of the decision and financing date indicated in this table, Mayer used a six months lag for an easy money policy and a four months lag for a tight money policy, and a rather long fifteen months lag for the construction period itself.

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7. Op. cit. Page 364

Mayer's findings in this respect were confirmed by Gershels and Wiggins who claim that, although with a time lag, the interest-investment relationship does exist. The lags were found to be great enough to imply a difficult timing problem for monetary measures. They use the multiple-regression technique for fixed investment for the post-war period. Their findings include an approximately one year lag in the effect of variations in the interest rate structure as expressed by the yields of industrial and government securities. They felt that the reason for the existence of this lag is primarily the time period which elapsed between initial planning and executing of investment, also that businessmen seem to look at interest rates mainly as an index of credit availability only. They also found that the prices of capital goods were significant in determining the rate of fixed investment although they did not find the value of the price elasticity of investment much greater than one. In contrast to Mayer's finding, the availability of funds themselves was not found to be too significant by Gershels and Wiggins.[8]

By looking back at Mayer's findings in this sector of the economy, the fifteen months construction period seems to be rather

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8. Gershels and Wiggins: Interest Rates and Manufacturers' Fixed Investment. American Economic Review, 1957. Page 79-92.

long, and it is quite evident that this long lag-component was one of the main contributing factors to a substantially long lag which was found by Mayer and stated in the final conclusions to his study. (This will be dealt with a few pages later).

In examining the state and local government construction sector, Mayer employed an approach which was different from those used in other sectors. This difference in approach was due to the different way in which this sector, he thought, reacts to monetary policy action, for Mayer considered it unlikely that a tight money policy affects legislative considerations or the approval of projects. He assumed that policy affects these projects at the financing date only, consequently, the lag which he considered was the time between the security sale and the start of construction. A lag of about five months was estimated for both kinds of policy actions.

For the farming sector, Mayer estimated no lag for tight money policy because he did not think that there was any significant time delay between financing and purchase of equipment. He did assume, however, a lag for easy money policy because of the time delay which most likely takes place before the information about the easier credit conditions reaches the farmer. This lag was estimated at one month.

Further two sectors which were examined by Mayer were non-residential construction and consumer credit. Due to lack of reliable information, he could make no estimate of the lag for the first sector. Sales finance companies and commercial banks provided some information to Mayer for the consumer credit sector. These institutions also accounted for over half of total consumer credit outstanding. The interviews and questionnaires pointed to the possibility that when credit is tightened, sales finance companies need about two months until they can reduce credit extension, while banks can do it immediately. For easy money policy the time delay was there for both types of institutions and its length was estimated to be two months by Mayer.

Concerning inventories, Mayer found that a tight money policy can affect it several ways: it can prevent banks from renewing new lines of credit and from granting different types of inventory loans, and furthermore, Mayer found that it can reduce the entrepreneur's incentive to borrow. In connection with the line of credit, the lag can be assumed substantial, for lines of credit usually run for longer periods of time, and there may be several months left at the time when restrictive policy is implemented. Since inventory budgets are reviewed quite frequently, as often as three months according to Mayer, the effects on the entrepreneurs' investment

decisions may take place quite rapidly. Lags of an easy money policy should have the same governing factors.

As the next step of his study, Mayer combined the results of those sectors which he discussed.[9] Before combining them, however, each sector was given a weight. For each sector four types of weights were determined: proportional, intermediate, short and long. The proportional weights were arrived at by arbitrarily allocating 70% of the total weight to the six fixed investment sectors, and allocating these weights among them in proportion to their relative size. The proportional weights provided the basis for determining a set of intermediate weights which, in turn, were used to prepare a set of short weights and long weights for the sectors. Short weights and long weights depicted fast and slow reaction to monetary policy actions respectively. After each sector was given one of each type of weights, the results of all sectors were combined. The outcome of this combination was incorporated into a table and it indicated "the percentage of full effectiveness reached by monetary policy at different times".[10]

On the basis of this table it is evident that using intermediate weights, which depicted a sort of medium speed for monetary policy, a restrictive policy reaches only half of its effectiveness after five

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9. Op. cit. Page 369.

10. Op. cit. Page 370.

months and three quarters of its effectiveness after nine months, and, as the table indicates it, an expansionary policy takes even longer. Even with the short weights we see a substantial lag; it takes four months for a restrictive policy to reach half the effect and a half a year to reach three quarters of the way. These time lags apply only to the period between the monetary change and the effects on investment. To get the final lag, a period for the multiplier needs also to be added.

The inflexibility of monetary policy, as displayed by Mayer's results, poses the question regarding the speed with which a policy action can be reversed, that is, how fast can authorities implement an effective restrictive policy when it is replacing an expansionary policy, or vice-versa. In order to answer this question, Mayer devised a framework of analysis where he assumed two stages in measuring the reversibility of the policy action. First, taking an easy money policy as an example, is the time period required for the increase in G. N. P. caused each month by that policy to equal the income reduction caused in that particular month by the former tight money policy. Mayer found that during the early months the easy money policy has little effect on income, for the prevailing influence is still that of the previous tight money policy. Secondly, the time period required for the presently prevailing easy money to raise G. N. P.

by the amount by which the previous tight money policy was reducing G. N. P. over the period during which the current easy policy has been in effect.

In Mayer's terminology, the "balance point" is reached when in a particular month the easy money policy raises income by as much as the previous tight money policy is still reducing it in that month. Once the change caused by the previous tight money policy is completely offset by the effect of the current easy money policy then we reached the so called "compensation point". In other words, at the compensation point the current easy money policy has raised income by as much as the previous tight money policy has reduced it over the whole period after the policy was changed.

This table indicates Mayer's findings concerning the time required to reverse the effects of monetary policy actions.[11]

Multiplier Lag (No. of Months)	No. of months after Change in Credit Availability					
	Balance Point			Compensation Point		
	% of full effectiveness reached by previous policy					
	100	75	50	100	75	50
Intermediate Weights:						
0	6	4	4	12	9	6
2	9	7	6	17	13	9
4	11	8	7	22	16	11
6	13	10	7	26	19	13

11. Op. cit. Page 371.

	100	75	50	100	75	50
Short Weights:						
0	4	4	3	9	6	4
2	7	6	4	14	10	7
4	9	7	5	18	13	9
6	10	8	5	22	15	10
Long Weights:						
0	8	7	5	16	12	9
2	11	9	7	21	16	12
4	13	10	8	26	19	14
6	15	11	9	30	22	16

It is evident from the table that even with intermediate weights and an estimated period of four months for multiplier period, the effects of a tight money policy, after it has reached full effectiveness can be reversed only after twenty-two months. Mayer points out that this is only one month less than the average length of the expansionary or contractionary phase of the inter-war N. B. E. R. cycles, meaning that by the time the new policy reaches its full effectiveness, general economic activity will have taken a turn anyway, and stabilization policy becomes destabilizing.

As we may remember, the ultimate message of Friedman is the very same, i. e. that monetary policy is destabilizing because of the lag. But it should be evident that Mayer and Friedman have arrived to the same conclusion by different routes and for different motivations. Friedman measured the lag for the economy as a whole

by comparing two aggregate economic indicators, namely, the peak rate of change in the stock of money and reference cycle peaks dated by N. B. E. R. He did not examine the problem by sectors, and while he did refer to the existence of the preliminary lags - i. e. recognition, decision - in his measurements he concentrated solely on the effect lag as a whole, that is, on the time delay between the policy action and its effects on general economic activity. Mayer did not pay much attention to the preliminary lags - i. e. those which precede the policy action - either, but when examining the lag between the policy action itself and its effect on general economic activity, that is, his output lag, he did so by sectors (in contrast to Friedman who did this for the economy as a whole) and for each sector he split up this lag-component into sub-lag-components. I mentioned these earlier in my discussion of Mayer.

As to their motives, I mentioned in the previous chapter that Friedman used his conclusions not only to point out the shortcomings of monetary policy, but with his conclusions he supported his unique doctrine whereby he advocated the elimination of active discretionary anticyclical monetary policy and suggested its replacement by a passive monetary policy whereby the central bank would increase the money supply yearly by a constant amount. Mayer's intentions were far less ambitious. He merely wanted to draw the attention of

authorities to the fact that monetary policy may be destabilizing because of the existence of an estimated fairly large lag. Once having made his conclusions he had nothing significant to say as to how these lags can be eliminated or overcome, or as to what alternative policy action should be implemented by the central bank. I feel that in addition to differences in procedure and methodology, the difference in motives is of great importance when one compares Friedman with others in this line of discussion.

A criticism of Mayer's study would include the fact that it carries the shadow of extreme uncertainty caused by the arbitrary estimation whereby lags were assumed to exist in several sectors. Many of his conclusions are mere guesses, not based on quantitative information. Furthermore, even where the data is available, it suffers from a variety of weaknesses; some of these include seasonal adjustments made arbitrarily, personal biases embodied in the information given by individuals who provided the data, in several sectors a large proportion of questionnaires were not returned and therefore the sample can be considered too small for drawing any reliable conclusions from it regarding its population.

Mr. W. H. White has pointed out that Mayer's evaluation of the inventory sector is suffering from a defect the presence of which tends

to lengthen the lag in that sector. [12] White indicates that Mayer looks at inventory investment as if it was a flow variable, like any other type of fixed investment, on which monetary policy has continuous influence. However, that portion of inventory stock which is most often subject to monetary influences, says White, is mainly a stock variable which undergoes rapid and once-and-for-all changes and adjustments early in the life of the new monetary policy. This concentration of the inventory reactions during the beginning stages of monetary policy serves as an important shock-absorbent which can rapidly cancel the persisting effects of the old policy and can make the new policy more effective.

Because of the very important role that estimations and arbitrary decisions play in Mayer's study, its adaptation to a systematic theoretical framework is very difficult. Nevertheless, in the following I will attempt to evaluate Mayer's effects in the light of the theoretical basis on which the concept, meaning and measurement of the lag can be achieved meaningfully, and which was put forth by me in Chapter II, Section "B".

With regards to the cut-off points, Mayer did mention the necessity of these, however, according to him the need for these

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12. W. H. White: The Flexibility of Anticyclical Monetary Policy. Review of Economics and Statistics. May 1961, Page 142-147.

points was there only when he was dealing with those sectors of the economy where monetary policy could be felt at any stage prior to completion of projects. A good example of this is provided by his analysis of the Industrial Plant and Equipment Sector. This is not the type of cut-off point that I had in mind when I was trying to establish the meaning and length of the lag. The cut-off points, according to my definition, are two points of time, between which the time period depicts the length of lag that is inherent in monetary policy when looking at its effectiveness on the economy as a whole. This means that we ought to have two cut-off points at the two ends of the delay in the effects of the monetary action.

Mayer did not provide us with a precise, scientific definition of monetary policy, but since whenever he does refer to monetary policy he seems to associate it with the availability of credit, or the change in the availability of credit, it seems perfectly acceptable to me to assume that my definition in Chapter I is adaptable to Mayer's model. It should also be noted that, while Mayer did not define monetary policy, he did imply - in the course of the analysis of the sectors - that monetary policy action, as reflected in a change in the availability of credit, is an instantaneous and a once-and-for-all phenomena. I emphasize that in the analysis of sectors Mayer assumed monetary policy to be instantaneous. This, however,

does not mean that he was not aware of the fact that the monetary policy action was a gradual spread-out process. On the contrary, in Section III of his article he does point out that "monetary policy generally proceeds by small steps spread over several months", [13] but when it comes to analysing the lags for each sector studied by him, he merely looks at the time delay between the point when the availability of credit has changed (not defined by how much) and the impact of this change on the particular investment sector which he happened to consider (assuming that the change in the sector was attributable to the preceding change in the monetary scene). A good illustration of the fact that he does so, is "Table 8", where he presents us with the delays in the effectiveness of both types of policy actions labelled with three kinds of "weights". Here he measures the time delay by the "number of months after change in credit availability." [14]

It is evident therefore, that an imprecision is introduced by him into this aspect of the analysis, by not specifying which change in the availability of credit did he mean. Did he consider the very first step taken by the central bank, or, did he consider

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13. T. Mayer: Inflexibility of Monetary Policy. Review of Economics and Statistics. November 1958, page 359.

14. Op. cit. Page 370.

the point of time when the policy campaign is completed? The number of these questions can be as large as the number of possibilities available to us in this respect.

Friedman, by denoting the peak rate of change in the money supply series as the starting point in measuring his lags, has made this aspect of his analysis clear and left us without any doubt as to the conceptual precision of the idea. It seems to me that Mayer's analysis is suffering from a theoretical and operational inadequacy from this point of view, and therefore is inferior to that of Friedman in this respect. I do not mean to say that Friedman's approach to this problem is the only one, and is perfectly accurate; as I showed it , in the previous chapter Friedman's approach has also been subject to fierce criticism. All I am asserting is that while Friedman's analysis in this respect is operational and theoretically precise, although may not be correct, Mayer's approach to this problem is not clear-cut from a conceptual and operational point of view.

Regarding the cut-off point at the other end of the lag, Mayer's study is not quite adaptable to my conceptual framework, as put forward in Chapter II, Section "B". He attempted to trace the effects of monetary policy to individual sectors in the economy, and once he established the responsiveness of these sectors he combined them together to get some sort of picture of the economy as a whole.

How the whole economy reacted to monetary policy action, he illustrated by the percentage of "full-effectiveness" achieved by the policy after some number of months. What this full-effectiveness means is indicated rather inadequately and it seems to be some sort of illustrative - and imaginary - concept without any theoretically or operationally supportable precise meaning. No definition is given of the term "full-effectiveness" within the context of the analysis, and it is up to the reader to speculate whether it is reached when the first effect of the new policy can be felt on G. N. P., or is it reached when the so called "balance point" is reached - as defined by Mayer and dealt with earlier - or is it when the so called "compensation point" is reached - also defined and dealt with earlier. The concepts of the "balance points" and the "compensation points" are dealt with by Mayer after the discussion and the presentation of the table when the concept of "full-effectiveness" is given vital importance.

So, the question which I asked earlier still remains unanswered: "What point should be taken in Mayer's model as a cut-off point on the 'real' side of the economy, which would be consistent with my conceptual framework, presented in this thesis, so that we may make that model operational?" It cannot be the "compensation point" for by the time that stage is reached, G. N. P. has been influenced by the policy action for several months, or even for over a year. (We

should remember that Mayer defined this as the point of time by which the new policy has completely reversed the effects of the old policy). Consequently, this point of time does not represent the first significant impact of the policy action; we must look for a point of time which is far before this one.

I also have doubts as to the correctness of choosing the so called "balance point", defined as the point of time (or some period which can be thought of as being infinitely small - Mayer chose a month) when the new policy, changes income by as much as the previous policy action changed income, presumably in the opposite direction. The reason for my skepticism in this case is the same as it was in connection with the compensation point, that is by the time we reach this point the new monetary policy action has already been affecting G. N. P., although not to the same extent as the previous policy action did. Therefore, my cut-off point at this end of the lag period has to be some time before the balance point is reached. Since Mayer offered no further terminology for a point of time before the balance point, and since my suggested cut-off point can easily be applied to Mayer's model, I am taking as the cut-off point, the point of time at which G. N. P. is changed by 0. 25%, or $150 million, whichever comes first.

By using the cut-off point suggested in the previous paragraph,

the lag will be much shorter than the one found by Mayer. He concluded that a twenty-two months period is required for reaching the compensation point, and since this is the point at which the new policy has completely offset the effects of the old policy, I take that Mayer considers the lag twenty-two months long. By taking a point before even the balance point was reached, I estimate the lag, in the sense of my conceptual framework in Chapter II, in Mayer's model as not longer than about ten months - using a six months multiplier lag. In other words, if Mayer had conducted his analysis in terms of the concepts and definitions as put forward in Chapter II, Section "B" of this thesis, the lag, defined as the period of time between a point of start (cut-off point) in the monetary scene and the point of termination (or cut-off point) in the scene of general economic activity, would not have been found to be longer than about ten months. This period would change, of course, as the strength of the policy action itself changes.

Another, and in this thesis the final, question that occurs to me in connection with Mayer's model, is regarding the manner whereby his method of analysis can be reconciled with the fact that, the lags in the effect of monetary policy on general economic activity are not single and instantaneous, but several and distributed. In other words, did Mayer cope with the distributed characteristics of

the lag, and if so, how?

He did recognize that the effects of monetary policy cannot be looked upon as a single event. This is indicated by the way he treated those sectors which he considered in the study. In most of these he has shown that the effects of monetary policy can be traced to different stages of the operation; but, instead of pointing to several lags, i. e. periods of time delay from the monetary action to different points to which the effects can be traced, he has taken one lag-component (namely the "output lag") and examined the components - or sub-lag-components - of this period. To present a general illustration, he split up the time period from the monetary policy action to the effect on the general economic activity into small parts namely (a) the time between the policy action to investment decision, (b) from investment decisions to start of projects, (c) from the start to completion of projects, (d) from completion of project, through the multiplier period, to the change in general economic activity.

An alternative, consistent with my conceptual framework, could be to consider a series of time periods each taken from the cut-off point in the monetary policy action to the points to which the effects can be traced and average these periods, and obtain the lag in this way rather than by adding up smaller periods and arrive to the

total output-lag in that manner. The reason why I prefer the averaging method is that it is very difficult to determine, in most cases, the precise sequence in which the effects follow each other, therefore, it is also difficult to determine accurately those two points between which one of the several sub-lag-components (i. e. any of (a) or (b), etc.) may be. In other words, when Mayer split up the over-all lag into components, and, furthermore, when he split up the "output-lag-component" into further sub-components he had to assume, although he did not do this explicitly, that in all cases the points between which these periods were taken must follow one after the other and never change place, for if they did the first set of small periods would not be acceptable any more. If we were to average out the time lags, from the monetary action, as represented by the cut-off point to different points in general economic activity where the effects can be traced, we would not have to be concerned with the sequence in which these points occur for a change in that sequence would not affect our average. Furthermore, this method would provide us with a tool for double-checking our results, because if our averaging was correct, the average period of lag received in this manner should be equal to the period which lies between the monetary and "real" cut-off points.

CHAPTER V

STUDIES PREPARED FOR THE U.S. COMMISSION ON MONEY AND CREDIT[1] AND FOR THE CANADIAN ROYAL COMMISSION ON BANKING AND FINANCE.[2]

I chose to deal with these two studies simultaneously because of the similarity in methods that exists between them. The methodology of the Canadian study follows fairly closely that of the American study; the latter was prepared about one year earlier. While in method and approach they are similar, in their conclusions they are not. The final result of the U.S. study can best be illustrated by a quotation: "The conclusion seems inevitable to us that the supply of money and the level of economic activity move approximately simultaneously. The most that we can squeeze out, by way of a lead, for the money supply in three months."[3] In other words, the lag is not an important factor to consider when we are evaluating the effectiveness of monetary policy, for even if it does exist its length is insignificant.

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1. Ando, Brown, Kareken & Solow: Lags in the Effects of Monetary and Fiscal Policy in "Stabilization Policy," Volume of C.M.C. Publications. Prentice Hall, 1962.

2. H.G. Johnson & W.L. Winder: Lags in the Effect of Monetary Policy in Canada. Working Paper prepared for Royal Commission on Banking and Finance, 1962.

3. Kareken and Solow: "Lags....." Page 24.

On the other hand, the conclusions of the Johnson and Winder study are less determinate and more cautious. The following quotation should illustrate to the reader that while it was thought by the authors that the monetary series were leading the general economic activity, the measurements and exact characteristics of this lead were far from known because the results of this particular study did not provide adequate information: "The results of ..... our research may be summarized in the statement that while we have been moderately successful in verifying the influence of monetary policy on the banking system and on interest rates, we had little success - more accurately, no greater success than the vast majority of previous econometric research on the effects of monetary policy - in detecting any influence of monetary policy on the variables important for economic policy, those that determine the level of employment and activity." A few lines later: "Apart from the fact that our research produced virtually no evidence of a significant effect of monetary policy on the economy.... it has produced evidence that the adjustment of the Canadian Economy to other kinds of changes takes place with substantial lags. If this is true of the effects of other kinds of changes, it is also likely to be true of whatever effects are induced by monetary policy - especially as one of the functions of the financial side of business management is to manage finance so as to avoid the disruption of business planning by financial difficulties".[4]

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4. Johnson & Winder: "Lags ..... ". Page 241-242.

As I noted before, the conclusions of the Canadian study are less certain than that of the American study; its main grounds for stating that monetary management does affect general business are: (a) because other policy measures affect it also, and affect it with a lag, and (b) monetary affairs in the life of business carry a vital importance, and therefore, any change in the national monetary scene, which in turn affects the general business life, will be reflected in an adjustment in general economic activity as well. So, in effect, to some extent, Johnson and Winder deduce their conclusions from the results of other studies rather than relying completely on their own. It can be noted, therefore, that a certain amount of uncertainty is present in the results and conclusions of the Canadian study.

After these few comments on the conclusions, I shall, in the following, discuss the method of approach which was employed in these two studies. It will be noted by the reader that I will have elaborated somewhat more on the Johnson and Winder (J-W) study than on the Kareken-Solow (K-S) work. The reasons for this are, first of all, that the Johnson study deals with Canadian problems and uses Canadian data; secondly, its approach to the problem seems to me as more comprehensive than the U. S. study, for it presents us with not only its own results but also with the analysis of Reuber and Rhomberg, both on Canadian monetary policy problems; and finally, but not least,

the results at which the Canadian study arrived seems to me as more correct and theoretically more acceptable than the conclusions reached by Kareken and Solow, for Johnson and Winder have generally seemed to have attacked each problem from two angles - theoretical and practical. (This is particularly evident in their discussion of the "inside-lag").[5]

As the first step in discussing the methods involved in these two studies, I would like to consider the so called "inside lag". Following the discussion of the inside lag, I will discuss the "outside lag" in both studies. In my terminology, the inside lag represents a lag-component of the overall lag. In the K-S study we find that this lag component incorporates two sub-lag-components, namely the Recognition and the Action periods, that is, it designates the time-delay which is found between the point of time the need for the policy action was recognized up to and including the point of time at which the action was taken. In the K-S study the inside-lag-component does not include the time delay with which the financial community - including the banks - react to the policy action. This latter time delay was classified by K-S separately as the "Intermediate Lag". After the recognition was made by the authorities, the time delay before the

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5. Op. cit. Page 7.

action is taken is rather small, say K-S. Consequently, they concentrated on the time delay that is present before the need for the action is recognized. Before this recognition lag could be arrived to, it was realized by K-S that an adequate definition of the "need" for a policy action was necessary. The definition which they offered for the point of time when the need appeared was the "month in which turning points - either N. B. E. R. turning points, or those in individual timing series - occur. Peaks signal the need for a switch to easy money policy, and troughs the need for a switch to tight money". [6] So, the recognition lag is the time that elapses between the date of the peak and the point of time the easy money policy action is taken, or it can also be the time that elapses between troughs and the date at which the tight money policy action is taken.

I see two shortcomings of this approach. First, what K-S call the recognition lag, or at least part of it, is nothing more than a time delay due to the manner whereby the collection and presentation of statistical information takes place. Since in many series information lags by at least one-quarter, and in some cases even more, the economy may very well have reached a peak at some point of time immediately, let us say a week, after the publication of the statistical material, but this situation will not be seen and quantified until after the next series

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6. Op. cit. Page 4.

of statistics are published about three months hence, or even later for it also takes some time before the new statistics are evaluated and final conclusions are drawn. Consequently, I feel that it is more than just the question of semantics whether we call the time-delay under consideration as the "recognition lag" or something else like "administrative "lag.

The second shortcoming can be considered in connection with their tendency to ignore the time-delay between the point of time when the lag was recognized and when the action was taken: ".... the lapse of time between the recognition of the need for change and the taking of action is pretty nearly zero,,...". [7] I feel that, this is an oversimplification of the problem for it assumes that the best representative point of time for the monetary policy action is the first moment when the policy-campaign commences. I have elaborated on this aspect of the problem several times earlier in the thesis, and at this stage I feel reasonably certain that the first moment when monetary policy action is beginning to take place is not to be taken as the representative point for the policy action. It must be remembered that if we take the the first moment of the policy action as its representative - and termination - point of time for determining the decision lag - as apparently K-S did, and, therefore, concluded that it was

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7. Op. cit. Page 4.

nearly zero - then for the sake of consistency we must also take this point as our point of origin for determining the next lag-component which in the case of K-S is the so called intermediate-lag. In view of the fact that a policy-action is not instantaneous but is spread over several months, this intermediate lag will, no doubt, be over-estimated, for it will include the policy period itself which, I think, in most cases is probably longer than the intermediate lag itself would be. These two points should be borne in mind for a proper appreciation of the K-S "inside lag".

Since in the J-W study the inside lag includes the time delay what is called the intermediate lag by K-S, and, therefore, will be dealt with when considering J-W's inside lag, here when looking at K-S's inside lag I feel that I should discuss their so called intermediate lag as well. The intermediate lag in the K-S model is "between Federal Reserve action and response within the banking system."[8] Their conclusion is that the Federal Reserve System's operations, in any form or shape, have quick "within a month or so" effect on the banking system.

It is interesting to note how differences in attitudes can give different appearances to the same problem. As mentioned above, K-S

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8. Op. cit. Page 4 and page 47.

consider the one-month or so lag as insignificant, and, therefore, in their model as a whole, they seem to keep the spot-light off this problem. In Chapter II, Section "G", I discussed briefly the bank-lag concentrating primarily on the Johnson-Marsh controversy, which centered around Johnson's proposition that there is approximately a two-week lag before banks react to the central bank's policy actions. Johnson has attached more importance to this problem which sparked off some exchange of ideas through the medium of published articles.

In the J-W model the inside lag has also been given some serious thought. (We may notice at this stage that neither Friedman nor Mayer have attempted to subject these preliminary lags - i. e. those that precede the policy action and, which are in effect the same as the inside lags of the two studies under consideration - to a thorough examination. Friedman as well as Mayer have merely mentioned that these lags exist and that they carry some importance, but their main interest and their entire analyses have been primarily devoted to the effect-lag in Friedman's case, and to the output-lag in Mayer's case, both of these lags being the same as the outside lag in the K-S and the J-W models).

It appears to me that the J-W approach to studying the inside lag is more scientific and precise than that of the K-S model and, therefore, it should merit some detailed discussion of the methods used in determining the inside lag particularly since such a discussion is lacking in the models discussed previously. The authors made several

simplifying assumptions in order to study the length of time required by the monetary authorities to recognize the need for changes in policy and to carry out their policy action. First, they assumed that the objectives of monetary policy are few and simple, namely, to stabilize prices, to maintain high employment and to promote economic growth. Secondly, it is assumed by J-W that the relative importance of these goals is given over time. Third, they assumed that monetary policy variables and each of the objectives can be effectively summarized by a representative series such as the money supply, the consumer price index, on the percent of labour force unemployed. These series were thought of by the authors as representing the developments that influence policy makers and to identify actual changes of policy over the course of time.

While these assumptions are considered as simplifying by J-W, I feel that the last one gives the model a tool for measuring the inside lag quantitatively instead of subjectively, as it has been done by writers considered earlier in the thesis. This introduces, I think, further complexities and precision into the model rather than simplifying it.

The determination of the date and nature of monetary policy changes was attempted by looking at the Bank of Canada's Annual Reports; the authors did realize, however, that the dates and timing available from this source were too vague. As an alternative they used

the volume of money in the hands of the public, i. e. currency plus chartered bank deposits (excluding government deposits) and, also the series on net cash reserves held by chartered banks. (Net cash reserves meaning the exclusion of that portion of reserves which represents borrowed funds from the central bank).

Actual changes in the money supply were classified as follows: "extremely expansionary", meaning that the annual rate of increase in the money supply is 11. 4% and over; "expansionary", meaning that the annual rate of increase of the money supply is between 7. 6% and 11. 4%; "mildly expansionary", implying an annual rate of increase in the money supply from 3. 8% to 7. 6%; "mildly contractionary" where the annual rate of increase in the money supply is between 0. 0% and 3. 8%; "contractionary" implying an annual rate of decrease of the money supply is between 0. 0% and 3. 8%; and finally, "extremely contractionary" implying an annual decrease in the money supply of greater than 3. 8%.[9]

In order to put this classification into work, J-W constructed a table - based on information provided by the Bank of Canada - where they indicated different changes, measured in annual

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9. Johnson and Winder: "Lags ..... " Page 13.

percentage rates, in the money supply between January 1950 and May 1962.[10]

Period	Annual Rate of change percentage	Classification as per criterion above.
1950 Jan. -Oct.	+6.03	Mild. Exp.
1950 Oct. -1951 Oct.	-0.014	Contr.
1951 Oct. -1953 June	+6.69	Mild Exp.
1953 June-Dec.	-3.09	Contr.
1953 Dec. -1954 June	+6.41	Mild. Exp.
1954 June-1955 Aug.	+12.52	Extr. Exp.
1955 Aug. -1957 Aug.	+.952	Mild Contr.
1957 Aug. -1958 Oct.	+12.12	Extr. Exp.
1958 Oct. -1959 July	+1.65	Mild Contr.
1959 July-Dec.	-4.21	Extr. Contr.
1959 Dec. -1960 Aug.	+2.91	Mild Contr.
1960 Aug. -1961 Aug.	+8.94	Exp.
1961 Aug. -1962 May	+5.96	Mild. Exp.

As an alternative, another table was also constructed using the Reserves Provided to Chartered Banks series and classifying it according to the same criterion for the same period.[11]

With these explicit labelling of monetary policy actions and dates, J-W proceed to study the so called "conditional-lag-component"

10. Op. cit. Page 16.

11. Op. cit. Page 17.

of the overall lag in monetary policy action. This lag-component represents the time-delay between changes in the economic indicators which reflect the objectives which monetary policy is supposed to promote and the monetary policy action itself. (This is very similar to what K-S called the recognition lag). The consideration of this time-delay excludes, of course, those cases where policy makers anticipated economic developments and changed the money supply in advance of the demonstrated need for it; this applies to the K-S study as well.

I indicated above how J-W identified monetary policy actions and, furthermore, how they classified them. Identification is also necessary for each of the goals at which monetary policy actions are aimed. For an indication of how overall economic activity was moving the dates of reference cycle turning points were used. As an indicator of the need for policy actions to maintain low unemployment J-W used the dates of successive minimum and maximum rates of unemployment, and to indicate the need for a policy action to achieve price stability the Consumer Price Index was used. In counting the number of months that policy actions lagged behind the various indicators of the need for new policy actions J-W have merely used two turning points in the two sets of series.

The overall results of this aspect of the J-W study shows

that on the average cyclical upswings lead the response of monetary authorities by six to seven months; the time delay, after an increase in the unemployment rate from its minimum and until the monetary authorities have responded, was estimated around seven to nine months. These results vary somewhat depending upon whether they were taking expansionary or contractionary policy actions, and whether the monetary series were represented by the money supply or by net cash reserves provided to chartered banks.

It is evident from this description of the studies that both seem to concentrate on the recognition aspect of the inside lag. In the K-S study, it is explicitly stated and the lag between the recognition and the policy action is thought of as zero. In the J-W study, the significance of the decision lag relative to that of the recognition lag is not underemphasized explicitly, however, by looking at the proportion of space denoted to the recognition lag it becomes quite evident that the importance of the decision lag is not considered great. A few pages back I have already expressed my opinion as to the importance of the decision lag; the essence of this was that due to the time required to analyse the statistical data, which by the way is available only after a time delay, and due to the fact that monetary policy actions are spread over some period of time, it is

possible to argue that (a) a part of the recognition lag is due more to reasons which are administrative rather than recognition in nature, and (b) that it is incorrect to state that the decision lag, i. e. the time delay between the recognition and the action, is zero or even insignificant.

In examining the "Outside Lag", the K-S model looked at - among others - two significant sectors: Fixed Investment and Inventory. In connection with the fixed investment sector, they split up the analysis into two parts, (a) the relationship between investment decisions and production of capital goods, and (b) the effect of policy action on the decisions of investors.

In the regression analysis, for a variable of investment decisions, K-S used the monthly series of New Orders for Non-electrical Machinery. As a measure of the output of investment goods they used Business Equipment which happened to be a component of the Index of Industrial Production, a published series by the Federal Reserve Board.

In order to estimate the infinite distributed lag relationships in general, the main tool of the K-S study was to regress a dependent variable, i. e. the monthly index of production of business equipment, on an independent variable, in our case new orders for non-electrical machinery. The period for which the data was taken down was from

April 1947 to April 1960. The results indicated around six months lag before changes in the monetary scene have any effect on the equipment component of the fixed investment sector.[12]

Looking briefly at the inventory sector, there are a couple of propositions put forward by K-S in support of the theory that interest rates do affect inventory investment. (a) Decisions to change inventory stocks, or part of them, are usually quick in nature and the execution of these decisions are not likely to take too long a period of time either; consequently, since the period of time involved is short, the rate of interest rates will be more important relative to the rate of risk consideration. (b) Since inventory stocks are financed by bank loans, the interest rate on these loans represents an important element in the total cash of handling inventories.[13] (c) If the high or low cost of money does not have a strong enough effect, the availability of credit can still influence inventory accumulation.[14]

The most valuable and interesting contribution of this section of the K-S study was the calculation of a coefficient of elasticity relating desired inventories to interest rates. The conclusions

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12. Kareken-Solow: "Lags in . . . . . " Page 30.

13. This proposition was also put forward by R. G. Hawtrey, several decades ago, in his essay on the Pure Monetary Theory of the Business Cycle.

14. Kareken-Solow: "Lags in . . . . . " Page 39.

in this respect indicate that if the rate of interest on bank loans falls by 1%, the desired level of inventories will rise by $4.86 billion. This has implications from time-delay point of view for after a change in interest rate the consequent change in the level of inventories does not come about instantaneously, but after a substantial time delay.

In their study J-W present a brief review of two studies that were made on Canadian monetary problems. One of these studies was that of Reuber who attempted to evaluate the relative weights attached to different objectives of monetary policy by using the same series as did J-W to indicate monetary policy changes. From fitted equations, which contained lagged values of explanatory variables, Reuber calculated the equilibrium relationship between the dependent and the independent variables, assuming the presence of sufficient time for all the lagged variables to have their full effect. For instance, if the change in the money supply in a certain month is assumed to depend on price changes in the preceding month and also on price changes two months earlier, then the equilibrium relationship, says Reuber, summarizes the total effect of a price increase in a given month on the money supply whenever that effect occurs. When this equilibrium relationship includes all the objectives the authorities are assumed to be pursuing, it is possible to

calculate the so called "trade-off coefficients" between the separate objectives. These coefficients, by indicating the relative weights attached to separate objectives can be thought of as indicating the willingness of the monetary authority to sacrifice one goal to attain another.[15] The difficulty with this method, as J-W have pointed out, is that it assumes a stable structure of weights over the entire period studied, and also that it is statistically difficult to investigate alternative lag structures.

An extremely interesting and a very useful part of the J-W study is in their Chapter Four where they present a statistical measurement of the performance of the Canadian monetary policy in the period 1950-61, and compare it with the hypothetical performance of various possible non-discretionary rules of monetary policy something like the type proposed by M. Friedman.[16] Their test of performance consists of comparing the actual and the non-discretionary policy to an "ideal" monetary policy, defined as one which resists price changes while they are occurring but accepts the new level of prices once it has been established, and which policy is designed to supply the quantity of money required to finance a full-

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15. Johnson and Winder: "Lags in the Effects...." Page 86.

16. Op. cit. Page 96.
For Friedman's suggestions, see Chapter III of this thesis.

employment level of G. N. P. The conclusions in this respect indicate that actual monetary policy fell short of the ideal in the period 1957-1961 but J-W also remark that "a non-discretionary policy would have been unlikely to do much better, furthermore, it might have done much worse."[17]

Based on the above conclusions J-W put forward some recommendations concerning present monetary management whereby they suggest (a) an improvement in the present quality of discretionary monetary management, (b) that discretionary policy be guided by scientific economic analysis rather than the mixture of morality and experience on which central bankers are by nature inclined to rely, (c) professional economists should have greater influence on the Bank's policy, (d) the Bank should be obliged to publish comprehensive explanation of its policies which could be subjected to public discussion.[18]

In their discussion of the outside lag, they define this as a period of time which elapses between the monetary action and their effects on the real variables of the economy.

In part their main technique of analysis is multiple regression in order to see if the available data reveal any consistent influence of

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17. Op. cit. Page 99.

18. These recommendations are very much along the same line as those made by Johnson in his Canadian Quandary: Problems and Policies.

financial variables on real variables. For most of J-W regressions the actual coefficients are given for all variables whose standard error indicates that they significantly contributed to the relationship. When lagged variables were included the equilibrium relationship has also been calculated. In several cases a table of the distribution through time of the total impact of strategic variables was presented as well. It was indicated which series were taken as dependent variables and which were included as independent variables and also which of the explanatory variables were estimated to be statistically significant. In most of the cases the regressions were based on monthly and quarterly seasonably adjusted data.

At this point, as a digression, I would like to reflect for a moment on Rhomberg's study which was reviewed by J-W.[19] This model was designed to compare the impact of monetary policy, and fiscal policy, on economic activity in Canada under fixed and fluctuating exchange rates, and therefore contain a number of financial variables. It appears, that the J-W study was unable to reproduce Rhomberg's statistical results by using almost the same series and techniques, and furthermore J-W were not able to reconcile these discrepancies

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19. R. Rhomberg: A Model of the Canadian Economy under Fixed and Fluctuating Exchange Rates. Journal of Political Economy, February 1964, pages 1-34.

either. One of the most essential findings of the Rhomberg study is that long-term interest rates in Canada influence all types of private fixed investment expenditures with lags of from one to four quarters. Rhomberg also found that long-term rates influence capital inflows and the short-term interest rates influenced short-term capital flows.

The second part of the J-W study - where the center of attention is the outside lag - is divided into four sections: (a) the control of chartered bank deposits by the Bank of Canada and the behaviour of bank assets, with special reference to loans; (b) the factors governing the demand for money in Canada and the determinants of interest rates; (c) the determinants of investment expenditures, i.e. residential construction, non-residential construction, machinery and equipment purchases, and inventory changes with particular emphasis on the influence of interest rates and the real money supply; (d) an investigation of the direct effect of the quantity of money on consumption and income.

A significant point that was brought out in the first section was a criticism of the present method of calculating the minimum cash reserve which each chartered bank must hold. J-W's criticism extends beyond the usually argued point that the period of calculation is too long and permits slippages. They argued that the traditional

theory of central bank control envisages a ratio between cash and deposits and that control is excercised by changing chartered bank holdings to which they must respond by changing deposits through adjusting the amounts of other assets held. The implicit assumption in this explanation is that the cash and deposits which happen to be used as numerator and denominator of the cash ratio are measured simultaneously. In Canada chartered banks are required to maintain a fixed quantity of cash in any one month. The fixed amount is defined as a ratio of predetermined quantities. Nothing that a chartered bank does to its deposits changes in any way the absolute amount of reserve it must hold during the current month. From the point of view of the central bank during any given month, say J-W, a given amount of central bank deposits must be made available to the banking system. These deposits may be made available freely or on very rigid terms -but they must be provided. In this sense, the Bank controls directly not the amount of chartered bank deposits but rather the terms on which the banks hold a predetermined amount of deposits - i. e. the short-term rate of interest. Despite this criticism, however, it appears to me that J-W do not indicate whether or not they would accept a shortening of the time periods involved in the reserve calculations as a step in the right direction.

Using the regression technique, J-W investigated the relationship between chartered bank deposits and cash reserves, borrowed reserves and the treasury bill rate. It appears that this investigation does not reveal any determinate conclusions, although they did indicate with some uncertainty that deposits do react rather quickly to changes in reserves. In trying to determine how monetary policy influenced the relative distribution of assets of the chartered banks, in particular their loans, J-W used the ratio of specific types of assets to total chartered bank assets. This procedure, of course, required the assumption that the composition of the banks' assets remains the same regardless of the scale of their operations. J-W found that the ratio of the so called "More Liquid Assets" - which includes Bank of Canada notes and deposits, day-to-day loans, Treasury bills, call loans, government of Canada Bonds and Net Foreign assets - to total or "Mayer" assets - which includes the so called less liquid assets, i. e. loans to finance companies, provinces, municipalities, loans secured by Canada Savings Bonds, loans to grain dealers and for insured residential mortgages, and which also includes the more liquid assets themselves - varies inversely to an index of industrial bond yields.

The investigation of J-W with respect to the demand for money in Canada is of significant importance in my opinion.[20] The essence

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20. Johnson & Winder: "Lags ....." Page 163.

of their findings is that it is of crucial importance for monetary policy to know whether or not the demand for money depends on a few key variables such as interest rates and the level of income or transactions. If this is the case, velocity is a stable function depending on these key variables mentioned above, and money plays a very important role in the economy. This would mean that monetary policy, by affecting the supply of money, has an important direct influence on economic activity. But if velocity is a complex function of many interacting variables, then we cannot separate monetary theory from the general theory of assets and markets, and an examination of monetary policy would require a knowledge of its impact on the whole complex of assets and markets, that is, the effects of monetary policy would have to be examined within the framework of a general equilibrium model.

J-W make a direct reference to a research study by G. Macesich concerning the determinants of velocity in Canada.[21] This study attempted to relate velocity to income per capita; the cost of holding money and the cost of money substitutes. Macesich found that interest rates and particularly long-term bond yields are significant determinants of velocity and that income per capita is not significant.

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21. George Macesich: Determinants of Monetary Velocity in Canada, 1926-1958. The Canadian Journal of Economics and Political Science, May 1962.

J-W also investigated the determinants of the Treasury bill rate. Their findings suggest that the Treasury bill rate depends on the quantities of those securities held by the general public, other government debt up to two years' maturity, the quantity of debt between two and five years' maturity and the amount of long-term government debt. The money supply, the net reserves of the chartered banks, the level of current dollar G.N.P. and the average term to maturity of government debt turned out not to be significant explanatory variables in this statistical relation. The implication of these estimated relationships is that the size and composition of the government debt held by the public have a substantial influence on the Treasury bill rate.

At this stage I wish to draw the attention of the reader to the fact that, during the summer of 1964, I have conducted a regression analysis of the determinants of the Treasury bill rate in Canada. Although, due to lack of time and adequate facilities, the data suffers from some deficiencies, my findings, in principle, are very much the same as those of J-W. My study has not been published and copies of it are available from me.[22]

Of some importance is that section of the J-W study which deals with the determinants of investment expenditures. When analysing the

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22. Leslie Szeplaki: Treasury Bill Rate. 1964. An unpublished research paper on the determinants of the Treasury Bill Rate in Canada. The results suggested that the three most important determinants of the Canadian Treasury bill rate were: chartered banks' share of total government debt, general public's holdings of short-term (2 years or less) debt, and the ratio of short-term to total government debt outstanding.

new residential construction the role of the National Housing Act has been given recognition. The assumption that the supply of N. H. A. mortgage loans from approved institutional lenders is governed by the differential between the N. H. A. maximum rate and market yields or alternative investment has been confirmed by J-W. In investigating demand for housing, N. H. A. approvals, disposable real income and the existing stock of housing variables turned out insignificant. From the results it appeared that the lag structure for machinery and equipment purchases is shorter than the lags for non-residential construction expenditures.

In the last part of the J-W study the direct influence of the quantity of money on economic activity was dealt with. A reference is made again to Macesich who found that income and consumption expenditures are influenced by the money stock with a lag of five to seven quarters.

The final conclusions of the J-W have already been illustrated, in the first part of this discussion, by a quotation. Here I am giving another quotation from the J-W study which illustrates further the authors' feelings about their results, and about the implication of these results: "If it is true, as the available evidence suggests, that the effects of monetary policy are imprecise and variable, and operate with a lengthy and probably variable lag, this has important implic-

ations for the use of monetary policy. . . . For it implies that monetary policy as traditionally conducted, with its heavy emphasis on short-run adjustments, is likely both to be effective in achieving short-run objectives and to have disturbing effects of an incalculable kind on the performance of the economy."[23] When reading this quotation one cannot help thinking automatically of Friedman (see Chapter III) who has concluded the same thing but whose conclusions were based on results in which he had full confidence in contrast to J-W who display some uncertainty concerning the outcome of their study.

At this stage, it should be evident to the reader that the two studies, i. e. the K-S and the J-W are extremely similar. They were both econometric studies with similar assumptions and variables. Conceptually, however, there does appear to be some difference. It seems that the K-S study has, almost without exception, considered monetary policy from the point of view of the cost of money, especially when they were looking at some of the sectors of the economy. This approach has made it possible for them to develop the elasticity coefficient for the inventory-interest rate relationship, i. e. the elasticity of inventory with respect to changes in the rate of interest.

When examining time delays, K-S did not consider the time period which the monetary policy action took, (see discussion of this

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23. Op. cit. Page 242-243.

problem early in this chapter). Neither did J-W give any thought to this problem. Both studies assumed that policy actions were instantaneous and of once-and-for-all in nature. In this respect the discussion of the lag seems somewhat imprecise. With respect to the distributed lag in the effect of a policy action, this problem was recognized and dealt with effectively in both studies.

The main tool of analysis of the K-S study was multiple regression (as was that of the J-W study) in which prior values of the dependent variable enter as independent variables along with the current value of the particular variable(s) thought of as having a lagged effect. (This latter variable they called the "operational variable"). The coefficients of the previous values of the dependent variables were used to estimate the distributed lag effect of the so called operational variable.

The J-W study used only measurable time series in their regression equations. It may be thought, as it was by J-W, that this represents an oversimplification, for the quantitative series do not show clearly qualitative information. It seems to me that imperfections in quantitative series do not necessarily justify their omission from an analysis. It may be true that we need more information but whatever information we have, if relevant, should be considered acceptable, possibly with qualifications.

In the J-W study some problems, it seems to me, may originate from the assumptions taken. In Chapter II of the study, for example, the assumption that the objectives of the policy can be represented by a few time series does not take into consideration the possibility that different objectives may conflict with each other. Furthermore, it seems possible to me that monetary authorities may appear not to recognize a change in the trend of prices simply because the prevailing level of unemployment precludes a change in the quantity of money to promote price stability. This means that the Bank of Canada may fail to react quickly to any one stimulus coming from any of the indicators of the objectives not necessarily because it fails to see the signal, but because it is watching the entire family of signals coming from all indicators.

As I indicated earlier, the J-W study deals also with Reuber's approach to the problem of the money-economy relationship. I find it difficult to interpret, however, the statistical methods of Reuber, because - as it appears to me - he makes the assumption that there is a one-way cause - effect relationship between the objectives series and the policy series. It seems to me incorrect, and irrealistic, to assume that the central bank would react to the same set of indicators to promote the same objectives all the time. If we look at this problem slightly more realistically, it should become obvious that the environ-

ment of fiscal measures, capital flows, and the expectations of private businessmen do change over time. Furthermore, if we would assume a strict consistency of behaviour of the monetary authority over time, it would prevent us from maintaining the hope that it may learn and benefit from its past errors and experience, and change to new policy tools and methods accordingly.

Regarding J-W's indicators which represent policy decisions and objectives, the use of rates of change in the index of industrial production to measure the rate of growth appears to me somewhat questionable. The index of industrial production includes a limited number of sectors only, and, therefore, it would reflect only some of the shifts of demand from one sector to another. (A possible example for this could be the rapid increase in the output of service industries relative to the output of the manufacturing industries). Since it is recognized as responding slowly to demand pressures, and reflecting food-price fluctuations due to temporary changes in supply conditions, the Consumer Price Index does not appear to me as an ideal choice either for an objective indicator of price stability. It seems to me that, from the point of view of monetary policy decisions, which is known to be concerned with aggregate economic activity and aggregate demand, prices of domestic manufactured goods, of investment goods, domestic wage levels and even export prices, would serve as a better indicator of the price stability objective than the

Consumer Price Index.

By looking at the estimated regression equations of the J-W study, a number of alternative formulations and variables may occur to us. Actually, J-W have also pointed out that, had time permitted them, they would have used some more and different variables, and tested other hypotheses as well. Since there has been long-standing interest statistical characteristics of distributed lag estimates, the value of J-W's contribution would have been raised substantially had they provided us with independent and more detailed information about time lags which may be associated with the changes of bank-deposits in response to changes in cash reserves, or about the loan policies of chartered banks, or even on the time required to execute various types of particular capital expenditures. A last word of criticism is aimed at using seasonally adjusted data in a study where lagged values of some of the variables are included with the current values of the same variable. It appears to me correct to assume that, the smoothing and averaging effect which is involved in the process of adjusting seasonally, can influence the statistical estimates of relationship. (J-W remarked several times that it would have probably been useful to repeat their work using unadjusted data).

To conclude this discussion, I wish to emphasize that while the J-W study did not come up with revolutionary results, as it did

not, for we knew before that a lag did exist in the effect of monetary policy, it has contributed a great deal to our understanding of the working of the Canadian monetary system. It has put to work and tested some of the theories which have existed only in a qualitative form before. The size of the work, and the number of theoretical and empirical tools employed in it, could very well qualify it for an excellent reference in any course in monetary theory. It is regretable that the authors did not have more time at their disposal to develop their ideas and to employ their skill to the limits of their full potentials.

CHAPTER VI

AN APPRAISAL OF THE RECORD

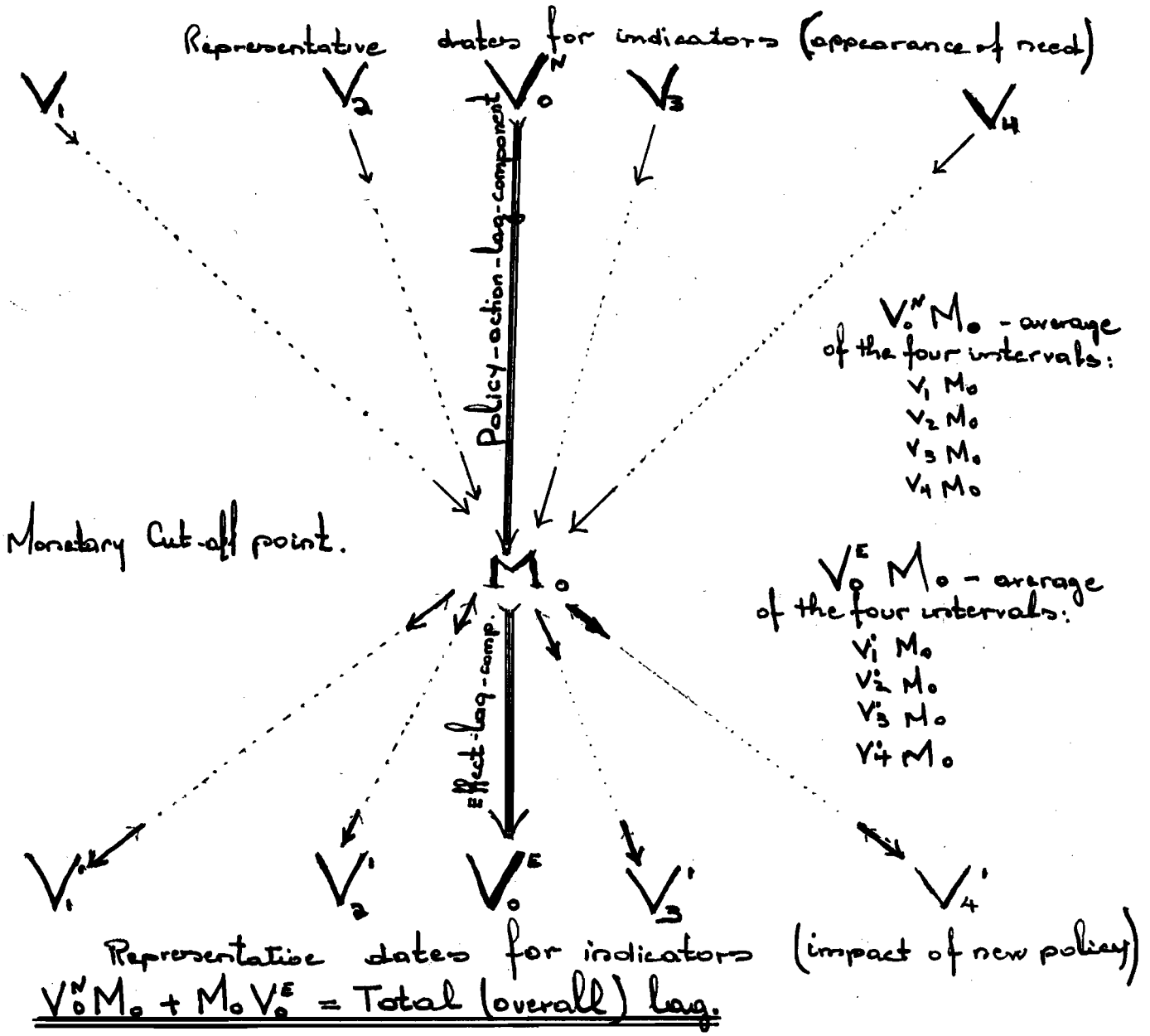
In the preceding chapters I attempted to provide a comparative analysis, and some criticism, of a few models which were aimed at determining the existence, length and characteristics of lags in the effects of monetary policy. I presented a conceptual framework which, I thought, could also be used to investigate these lags. In this chapter I intend to examine some of Canada's monetary and "real" variables and, in the light of what has been said in the preceding chapters, will try to draw some tentative conclusions regarding the lag which may have been present in the effects of monetary policy during a period of about fifteen years, from 1947 to 1962. (The analysis will, admittedly, be a brief and a rather simplified one, and all information and conclusions presented here are based on the available statistical and other published information as indicated in the "Statistical References" section of my bibliography.)

The precedure which I am to follow in this brief treatment of the lag is described in the following. Four variables will be examined which represent some of the real sectors of the economy. From the movements of these indicators I will attempt to establish dates at which,

we may assume, the need appeared for a new monetary policy. This will be done for three selected periods in Canada's post-war economic experience. In each period the monetary policy will be examined and a cut-off date will be established. The approximate time-delay, estimated between the appearance of the need for the new policy--as suggested by the dates selected for the four indicators--and the monetary cut-off point will be averaged out for each period. This average time-delay will be called the "policy-action-lag-component" for each of the three periods in Canada's post-war economic experience.

The next step will be to estimate the delay between the monetary policy cut-off point and the turning points--which follow the monetary policy--of the four indicators under examination, with the implicit assumption that these turning points are attributable to the monetary policy under consideration in the particular period. Since I am looking at four indicators I will have four turning points (i.e. four dates which represent these turning points) and, therefore, four time-delays. These will be averaged again to obtain the second component of my over-all lag; this second component I call the "effect-lag-component." Evidently, my over-all lag, in each period, and in general, will be divided into two components: the "policy-action-lag-component" and the "effect-lag-component." An illustration of the plan of my brief study

is presented by the following model:



The three periods which I will look at are as follows: June 1952 - March 1955, June 1955 - September 1958, and January 1959 -

September 1961. These periods are selected on the basis of the movements of the Index of Industrial Production (1949 = 100). The theoretical basis for choosing the starting and termination points for my periods is that provided by Schumpeter.[1] The dates represent the approximate mid-points in the up-swings and down-swings of these three cycle periods. In other words, the basis for selecting the cycle periods (or reference cycle dates) was provided by the Index of Industrial Production and the dates represent the approximate mid-points in the up-swing and down-swing for these cycle periods. Consequently, each cycle-period includes a cycle-peak and the persuing cycle-trough.

In view of the fact that, in accordance with my definition, a new monetary policy can be identified with a significant change in the availability or cost of money, with the purpose of achieving some economic goal (since we talk about anti-cyclical economic policy this goal is considered to be price and production stability), monetary policy will be looked at as a change in the money supply; information regarding this aspect of the chapter will be based on the annual reports of the Bank of Canada and on the money supply series.

The four indicators which I will be looking at both for the purpose of examining the "policy-action-lag-component" and the "effect-lag-component" are as follows: Index of Industrial Production (seasonally adjusted, 1949 = 100), investment as a percent of G.N.P. (in current

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1. J.A. Schumpeter. Business Cycles. McGraw-Hill Book Company. New York 1939.

dollars), the rate of change in consumption of goods and services, as indicators of general economic activity, and the rate of change in the consumer price index (excluding food) as an indicator of price stability.

Considering the first period, by June 1952 the Index of Industrial Production was on the increase and we were in the middle of an expansion. The Index was around the 119.6 mark in June 1952, 127.9 by December 1952 and reached the peak of around 130.5 in March 1953, after which it declined. The rate of change in consumption expenditure--on personal durables and non-durables and services--seems to have been heading to a peak in July 1953 which was also followed by a decline. Investment activity--as measured by capital expenditures in percentages of G.N.P. (current dollars)--can be estimated to have reached a peak in July 1953. The consumer price index has been rising at an increasing rate since February 1951 and the peak rate of positive change appears to have taken place in December 1952. Based on Bank of Canada reports and the money supply series, a representative date for an expansionary monetary policy may be put on November 1953. From this information, using the criterion put forth earlier in the chapter we may derive an average delay of 6.8 months between the representative dates of the four indicators, designating peaks in the period, and the date of the change to an expansionary monetary policy. This time-delay should be considered as the policy-action-lag-component, i.e. the first component of the overall lag, in the first period.

In order to calculate the second, or, effect-lag-component of this period, I will take the average time-delay between the date of change in monetary policy to expansion and the persuing dates of troughs and upturns in the four indicators.[2] The date for the change in monetary policy, in the first period, was November 1953. The estimated dates for troughs and upturns in the four indicators are as follows: Investment activity gained new momentum around June 1954; rate of change in consumption expenditures suggests a revival around November 1954; the upturn in the Index of Industrial Production may be put on July 1954; the revival in the rate of change in the Consumer Price Index can be estimated in June 1955. The results of this information is a 7.5 month-long effect-lag-component for the first period. Taking the 6.8 months for the policy-action-lag-component and 7.5 months for the effect-lag-component, we get 14.3 months as the length of the overall lag in the first period.

The next step is to estimate a lag in the second period, i.e. between 1955 June and 1958 September. For this period, on the basis of information obtained from sources already mentioned, the representative date for monetary policy change to expansion may be put on September 1957. The Index of Industrial Production reached a peak in December 1956, after which it declined gradually; the rate of change in consumption

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2. I am aware of the fact that changes in the four variables considered could be caused by factors which are other than monetary in nature, and, therefore, my estimates may be biased.

expenditures on goods and services seems to have reached a peak around the third week of February 1957. The series of capital expenditures, expressed as a percent of G.N.P. (current dollars) may be estimated to have reached the peak during this period in April 1957. The positive rate of change in the Consumer Price Index (excluding food) has reached a peak in November 1957, after this the series declined, although not consistently. From this information, we can arrive at an average delay of 7.7 months between the peaks of the four indicators and the representative date when monetary policy turned expansionary. This 7.7 months delay represents the policy-action-lag-component of the over-all lag in the second period.

In order to determine the "effect-lag-component" of the over-all lag in the second period I will choose four representative dates when the four indicators could be assumed to have responded to the new expansionary monetary policy of September 1957. These dates can be found at or around the time when the trough and the upturn took place and could be estimated as follows: Index of Industrial Production, September 1958; Consumption, December 1958; Investment activity, November 1958; Consumer Price Index, September 1958. From this information the effect-lag-component can be estimated at 13.8 months. We can obtain the length of the overall lag by adding the two lag-components together; since the policy-action-lag-component was 7.7 months, the effect-lag-

component was 13.8 months, the over-all lag for the second period could be estimated at 21.5 months.

My third period extends from January 1959 to about September 1961. On the basis of available information I estimate the date of the change in monetary policy to expansion, in this period, as August 1960. In order to estimate the "policy-action-lag-component" we must again choose four representative dates which provide us with the starting points. The rate of increase in consumption expenditure reached a peak in March 1960; the investment indicator suggests a peak in May 1960; the Index of Industrial Production seems to have attained a peak in January 1960; and the rate of change in the consumer price index (excluding food) indicates an unusually high (0.7) in November 1959. From this information I can obtain a 6.5-month delay for the first-lag-component in the third period.

In order to calculate the effect-lag-component we must now consider the average of four time-delays between the date of change in monetary policy and the representative dates of the resulting change in the four indicators, i.e. when the troughs in these indicators occur. As mentioned above, the date of change in monetary policy can be put on August 1960. The trough rate of increase in consumption expenditure may be estimated to have taken place in September 1960; the investment indicator suggests a trough and upturn in March 1961; the Index of Industrial Production upturn can be put around July 1961; and the rate of change in

the consumer price index suggests a trough in July 1961. From this information we may calculate a 7.5-month delay for the policy-lag-component.

Taking the 6.5 months for the, first, policy-lag-component, and the 7.5 months for the, second, effect-lag-component, we get a 14-month over-all lag in the effect of an expansionary policy during the third period.

We are now in the position to make an estimate of the average lag in the effect of an expansionary monetary policy during the post-war period. On the basis of the results obtained for the over-all lags in the three periods examined, we may tentatively state that during the post-war period, on the average based on the three periods examined, an over-all lag of 16.6 months was present in the effect of an expansionary monetary policy. The length of the policy-action-lag-component may be estimated at 7.0 months and that of the effect-lag-component at 9.6 months.

As I pointed out at the beginning of this chapter, I did not intend to present an elaborate analysis of lags in the effects of monetary policy in Canada during the post-war period. It would not be relevant to the main topic of this thesis which happens to be a survey and comparison of the literature on lags. All I wished to accomplish was to present some estimates of time-delays--based on available statistics--in a manner which was consistent with my model presented earlier in this

chapter. Furthermore, only the effects of the expansionary monetary policies were examined. (Results for restrictive monetary policy could be obtained in a similar manner and, while it has not been done here, we can safely assume that the lag would be somewhat shorter.) While the conclusions and results are tentative, I trust that some contribution to methodology has been made, and this was the primary aim of this chapter.

CHAPTER VII

SUMMARY AND CONCLUSIONS

My principal aim in writing the preceding chapters was to put forth a critical, and in the same time, a comparative survey of the literature on the lags in the effects of monetary policy. In my first chapter a definition of monetary policy was given, and I attempted to conduct the pursuing analyses in a manner which was consistent with this definition; in this chapter some of the characteristics and problems related to monetary policy were also dealt with, and the problem of time lags has gradually been introduced in the course of the discussion in such a manner whereby toward the end of the chapter it has become the main issue and the centre of attention. Some of the other problems which I mentioned in connection with the application and effectiveness of monetary policy were: the conflict among the purposes of the policy, the possible lack of harmony between a central bank and the government, obstacles associated with the particular financial system itself, wage rigidity downwards, the consequences of heavy dependence on foreign trade, possible divergence in the interests of politicians and economists, and, finally but not least, possible misapplication--in terms of timing, intensity and adequate knowledge of the consequences--of monetary policy.

Chapter II is one of the most important chapters from the point of view of theory. In this chapter I presented a general

theoretical framework which could be applied to identifying and measuring lags. In trying to establish an operational method for measuring lags, several problems came to my attention. A recognition and understanding of these problems, I think, are already steps in the right direction as far as ensuring the precision of our measurements is concerned, and furthermore, an insight into these problems--since it necessitates some understanding of the processes involved--enables us to envisage or, possibly, even bring about accurate solutions to the problems involved. Consequently, I am providing a rather detailed, but still somewhat condensed, summary of the issues involved in this chapter.

First of all, it may be observed from Chapter II that the time-lag problem is not a question of simple delays between a single cause and a single effect. Instead, the cause--a new monetary policy--is likely to have spread over some period of time, and the effects appear at different times in different sectors of the economy. To this problem I suggested a solution whereby cut-off points were chosen in both the monetary and, the affected, real series. This enabled me to envisage a certain single date for the monetary change and in the same time a point of origin for my measurements, and a single date in the real series providing the point of termination for my measurements. (The very important assumption, of course, here was that the two points were causally related.)

Another, related and important, problem that came to attention is that the effects of economic actions are distributed over a considerable period of time, perhaps over 2 - 3 years. It is often troublesome to study the relations of cause and effects when the

effects have had time to influence the causes within the period under consideration. In other words, changes in investment expenditures, caused by a new monetary policy may produce changes in demand, in profits, and also may bring about a significant change in the liquidity situation--affecting interest rates--which may in turn have new effects on investments; the new effects on investment very secondarily and indirectly but still are connected with the original monetary measure introduced. This should illustrate the difficulties in isolating simple relationships of cause and effect in a model where mutual interdependence exists among the variables. To this extent, modern monetary theory has to be considered as an integrated component of a general production, demand and business cycle theory. In Chapter II, I also provided a table which illustrates the manner whereby different writers have dealt with the overall lag by breaking it down into lag-components; in addition to this a brief discussion of the effects of an increase in the velocity of circulation of money, the effects of the presence of financial intermediaries and time-delays attributable to inter-business financing have also been provided within the context of lags in the effects of monetary policy.

Professor M. Friedman's contributions were dealt with in Chapter III. I pointed out that Friedman's role in the development of lag-theory has been and is an extremely important one. While his methodology has been subjected to some harsh criticisms, his contribution to theory, and his conclusions, in my opinion, have proved to be an indispensible stimulant and starting point for further research on this subject.

Friedman believed in and attempted to prove the existence of a long and variable lag in the effect of monetary policy. Because of the fact that the accurate length of the lag is not known, and even if it were calculated from some past historical statistics it might not be the same in the future because it varies, he concluded that the accurate timing of monetary policy is very difficult if not impossible; consequently, whenever a new monetary policy is applied it is very likely to overshoot or fall short of the target, and, therefore, turn out to be destabilizing, i.e. giving the effect opposite to what was expected from it.

This argument against discretionary monetary policy is a very serious one and implies that it is not only useless but worse than that, according to Friedman, it is detrimental to stabilizing economic activity. Friedman has indeed been convinced of the correctness of his argument for he advocated the complete discontinuation of discretionary monetary policy, and suggested the reduction of the function of the central bank, at least in this respect, to merely ensuring that the money supply is rising at a constant rate per year, a rate which is high enough to accommodate a desired growth of the economy.

Professor John Mayer's contribution to the lag literature was discussed in Chapter IV. Mayer's approach to the problem of identifying and measuring lags was somewhat different from that of Friedman; he examined lags by using empirical information obtained--through interviews and questionnaires--from different investment sectors of the economy. His conclusions were similar to those of Friedman in that he found the overall lag in the effects of monetary policy too long to be stabilizing; the average length of the lag in the effect of a tight money policy was found to be about twenty-two months just one

month shorter than the average (N.B.E.R.) length of either the contractionary or expansionary phase of the cycle. The variability of the lag has not been dealt with by Mayer. Too many estimations, some lack of theoretical clarity and the absence of a clear and operational definition of the lag and of monetary policy were pointed out to be the main short-comings of Mayer's analysis.

The Johnson and Winder study of the lags in Canada--prepared for the Porter Commission--was discussed along with the Kareken-Solow study prepared for the U. S. Commission on Money and Credit. While in methodology they were similar their conclusions were different. Kareken and Solow concluded that the movements in the two series, i.e. the monetary and the real, are almost simultaneous, and even if there was some lead of the monetary series it would not be longer than about three months. The Johnson and Winder study produced no evidence to the effect that there was a direct causal relationship between the monetary variables and the "real" variables in the Canadian economy; the authors did suggest, however, that in view of the fact that, the adjustment of the economy to "other kinds of changes" took place with a "substantial" lag, it would be reasonable to assume that the reaction of the economy to monetary changes also takes place after some delay. Both the Kareken-Solow and Johnson-Winder studies used multiple repression as their main tool of analysis.

My suggested methodology was attempted to be put to work, to some extent, in Chapter VI. Here, I examined three periods in Canada's post-war economic experience and attempted to estimate two lag-components and the overall lag for each period; after having obtained these lags for the periods, I arrived at an estimated lag in the effect

of post-war expansionary monetary policies merely by taking the average of the results obtained for the three periods examined. My results were a 7.0-months delay before the need for an expansionary policy was recognized, a 9.6-months delay before the effects of the new policy could be felt, giving an overall lag of about sixteen-and-a-half months.

These are the more important conclusions which emerge from the literature on lags and from my preceding chapters. While this survey of the lag-literature was meant to be an exhaustive one, no doubt, that some of the problems and issues could be examined in possibly still much finer detail than I have done so. Yet, I trust that, by collecting and systematically presenting the literature on this rather complex and controversial issue, and by drawing the readers' attention to the most vital and difficult problems related to the identification and measurement of lags, a modest contribution has been made to the understanding of the process whereby monetary policy affects general economic activity.

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