To the Graduate Council:

I am submitting herewith a dissertation written by George P. Lephardt entitled "A Six Country Comparison of Money Supply Changes and Fiscal Expenditures on GNP." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Economics.

Keith E. Phillips, Major Professor

We have read this dissertation
and recommend its acceptance:

Accepted for the Council:

Vice Chancellor
Graduate Studies and Research

A SIX COUNTRY COMPARISON OF MONEY SUPPLY CHANGES AND FISCAL EXPENDITURES ON GNP

A Dissertation

Presented for the

Doctor of Philosophy

Degree

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ABSTRACT

A major and continuing controversy in Macroeconomics concerns the relative strength of changes in the money supply versus changes in fiscal expenditures as a prime cause of changes in GNP. In April, 1970, L. C. Andersen and K. M. Carlson presented an eight equation macroeconomic model, The St. Louis Model, which incorporated monetarist arguments, but was simultaneously considered "open" enough to allow Keynesian fiscal expenditure arguments to be evaluated.

The original study, using data on the U. S. from the period 1953 to 1969, evaluated whether the fiscal or the monetary coefficients were statistically significant in determining changes in GNP and other important macrovariables such as interest rates, inflation, unemployment, and real output rates. The Andersen-Carlson study, using ordinary least squares and the Almon Distributed Lag Technique, found the monetary variables to be significant while fiscal expenditures appeared insignificant. The model also performed well in simulations and has been accepted as a major and important model.

This study uses a 2SLS format to estimate the model for the time period 1959I to 1974IV on the U.S., Australia, Canada, Japan, Germany, and the U.K. The hypothesis of this study is: Given that the model accurately represents the monetarists theory and the theory is "general," the model should develop coefficients which are consistently significant for each country.

A number of minor differences from the Andersen-Carlson study did occur. It was initially thought that the Almon process might be too restrictive and force the estimated coefficients to conform to a particular pattern. This appears to be the case as the lag structure of the equations and coefficients developed varied somewhat from the original work, though this may be due to the particular time period covered as well as the statistical process used.

Results indicate (1) the model performs equally well on countries other than the U.S. (using the criteria outlined above) and are similar to the original results, and (2) the coefficients of the monetary variables are statistically significant while those of the fiscal variables are not. Thus the results of this study tend to reaffirm the model's usefulness, substantiates the monetarist position, and implies the model represents a general theory.

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CHAPTER 1

INTRODUCTION

During the past fifteen years one of the major points of contention in the field of macroeconomics has been the importance of money as a stabilizing (or destabilizing) influence and its significance as a macroeconomic policy tool. The "Monetarist" view, based on the Modern Quantity Theory of Money, is that money is important, specifically the most important variable determining the nominal level of GNP. "Keynesians," basing their arguments on their interpretation of J. M. Keynes [51], generally argue that money is relatively unimportant in determining any of the critical economic variables, and place a heavy reliance on the impact of government expenditures in determining GNP, employment levels and stimulating economic growth.

The differing views has evolved into a debate between those considering themselves Monetarists versus those considering themselves Keynesians. The debate exists at both the theoretical and empirical level. At the theoretical level Keynesians argue that monetary policy, if used as a stabilization tool, works, if at all, via the interest rate and its impact on investment. But, Keynesians argue, the impact of monetary policy is not consistent because the expectations of potential investors can dominate the interest rate effect and the demand for money may not be stable. This, they believe, makes reliance on monetary policy risky. At the theoretical level Monetarists argue that if wealth maximizing

principles are used to analyze the impact of monetary changes, then money's impact will be more direct and consistent than proposed by the Keynesians.

There has also been a great deal of empirical work by both Keynesians and Monetarists in an attempt to corroborate their theoretical claims. According to which study you read, the results range from indicating that fiscal expenditures have a consistent, substantial, and lasting effect on GNP and employment; that relative to monetary changes fiscal expenditures have a stronger and more consistent impact upon economic activity; that monetary changes have a substantial and consistent impact upon GNP; that relative to changed fiscal policy monetary changes have a stronger more consistent impact upon economic activity.

In 1968 Leonall Andersen and Jerry Jordan of the St. Louis Federal Reserve Bank published a controversial empirical study [5] that included variables reflecting both changes in the money stock and high employment fiscal expenditures. The results of the Andersen and Jordan work, based on U. S. data from 1952 to 1968, indicated that fiscal expenditures were relatively insignificant and after three quarters even had opposite effects than were theoretically justified. Simultaneously, the Andersen and Jordan research indicated that changes in the money stock has a persistent and positive impact upon changes in GNP, as thought, and the impact was fairly even and strong for three to four quarters after the changed money supply. In 1970 Andersen and Keith C. Carlson presented a further model [7], reflecting the influence of high employment fiscal expenditures and money changes on nominal income, prices, employment,

and real output. This model generally substantiated the results of the earlier Monetarist work. The authors concluded that "The pattern of coefficients indicates a large and rapid influence of monetary actions on total spending relative to that of fiscal actions" [7, p. 11]. Of prime interest in the two studies mentioned is that both changes in high employment fiscal expenditures and changes in the money supply are included in the models in a manner that allows the parameter estimates themselves to indicate the relative strengths of impact and the leg structure. Further, the models are relatively simple and use a minimum of behavioral equations that need to be estimated. This is in contrast to many of the larger econometric models such as the FRB-MIT, Wharton, or Chase Econometric models. As Andersen and Carlson note, their model ". . . is designed to provide information on the most likely course of movement of certain strategic economic variables in response to monetary and fiscal actions" [7, p. 7]. In addition, they point out that the basic quation of their model is so specified that "[i]n this form the total spending equation remains uncommitted as to structure, it is potentially consistent with both Keynesian and quantity theory models. (The magnitude and significance of the estimated parameters determine whether the data conform more closely to a Keynesian or a quantity theory)" [7, p. 9].

A major contention of both Keynesians and Monetarists is that the theories espoused and models developed are based on general principles applicable to "open market" oriented economies. Yet, with the single exception reported in [49], a review of the literature in the area

indicates the models developed and reported are estimated for a specific country. Therefore, though claiming the models are based on general theories, no one has attempted to evaluate the generalness of the theories and models.

This study is organized to develop and report estimates of the St. Louis Model (SLM) for six countries--Australia, Canada, Germany, Japan, the U. K. and the U. S.--in an attempt to evaluate the generality of (1) Keynesian and/or Monetarist arguments and (2) of the SLM itself. The criteria used to evaluate the generality of Keynesian versus Monetarist arguments, as presented in the SLM, is to develop estimates of the Total Spending Equation (1) (see Figure 1, Chapter 2 for an algebraic presentation of the SLM); testing the significance of the estimated coefficients developed and the similarity of the estimated coefficients of the equations for each country via a "Chow Pooled 'F' Test" procedure. Further, Monetarist arguments concerning the movement of other strategic economic variables are evaluated by comparing the lag structure and significance of the estimated coefficients developed in the remaining equations of the model, a procedure which will simultaneously provide an evaluation of the generality of the SLM itself, and its underlying answer.

A review of the controversy itself, the SLM, and theoretical considerations are presented in Chapter 2. In Chapter 3 the statistical procedures used and results of the empirical work are presented. Chapter 4 contains a summary of the results, conclusions, and policy considerations.

CHAPTER 2

THEORETICAL CONSIDERATIONS

Section 2.1 Introduction

This chapter presents (1) the hypotheses of the study, (2) the model and analytical considerations, and (3) the criticisms of the model.

Section 2.2 Hypotheses of the Study

This study uses quarterly data from 1959-1974 for six countries to solve simultaneously and estimate coefficients of the SLM. The SLM is chosen as a vehicle to evaluate the relative strengths of fiscal and monetary variables and quantity theory arguments in counties with similar economies. Statistical methods, data considerations, and evaluation of the statistical results are presented in the following chapter. This study evaluates the consistency of the estimated coefficients of the model across all six countries proposing that: (1) the impact pattern and significance of the estimated coefficients should be similar across countries if the theory and the model are accurate and general; and (2) the estimated coefficients of the monetary or fiscal variables should consistently be more powerful if either the Monetarist or Keynesian position is substantiated.

The choice of the SLM is based on the fact that it contains both Keynesian and Monetarist variables as arguments. Specifically, the standard Keynesian policy prescription of fiscal expenditures are included in the model as well as Monetarist variables, permitting an evaluation

of the two theories and a determination as to which of the two theories is generally more accurate in predicting the movement over time of key economic variables.

Section 2.3 The SLM and Theoretical Considerations

A summary of the SLM[1] in algebraic form is presented in Figure 2.1 along with definitions of the variables. Equation (1), the Total Spending Equation, specifies changes in nominal GNP as a function of changes in the money stock and high employment fiscal expenditures (HEFE). The lag structures and significance of the impact of the assumed exogenous variables will be determined by regression analysis.

The Price Equation (2) specifies the change in the price level as a function of past demand pressures (D_t) and anticipated price changes (ΔP_t^A). Demand pressure is defined as the difference between the change in nominal GNP and potential real output minus actual real output in the preceeding quarter ($X_t^F - X_{t-1}$). Anticipated price changes, developed in Equation (6), are a function of past price changes and unemployment levels. This price equation is an attempt to develop a Phillips Curve relationship, which incorporates recent arguments explaining the relationship as short run rather than long run [2, p. 64].

The Total Spending Identity (4) is solved by assuming the change in real output (ΔX_t) is a residual of the change in nominal GNP minus the price level change from Equation (2).

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[1]This figure and summary essentially follows the authors' outline as presented in their original article [21].

(1) Total Spending Equation:

$$Y_t = f_1 (\Delta M_t \ldots \Delta M_{t-n}, \Delta E_t \ldots \Delta E_{t-n})$$

(2) Price Equation:

$$P_t = f_2 (D_t \ldots D_{t-n}, \Delta P_t^A)$$

(3) Demand Pressure Identity:

$$D_t = \Delta Y_t - (X_t^F - X_{t-1})$$

(4) Total Spending Identity:

$$\Delta Y_t = \Delta P_t + \Delta X_t$$

(5) Interest Rate Equation:

$$R_t = f_3 (\Delta M_t, \Delta X_t \ldots \Delta X_{t-n}, \Delta P_t, \Delta P_t^A)$$

(6) Anticipated Price Equation:

$$\Delta P_t^A = f_4 (\Delta P_{t-1} \ldots \Delta P_{t-n})$$

(7) Unemployment Rate Equation:

$$U_t = f_5 (G_t, G_{t-1})$$

(8) GNP Gap Identity:

$$G_t = \frac{(X_t^F - X_t)}{X_t^F}$$

Exogenous Variables (Other than Lagged Variables)

ΔM_t = change in money stock

ΔE_t = change in high employment Federal Expenditures

X_t^F = potential (full employment) output

Figure 2.1. Model in Algebraic Form

Endogenous Variables

ΔY_t = change in total spending (nominal GNP)

ΔP_t = change in price level (GNP price deflator)

D_t = demand pressure

ΔX_t = change in output (real GNP)

R_t = market Interest Rate

ΔP_t^A = anticipated change in price level

G_t = GNP Gap

U_t = unemployment rate

Figure 2.1 (continued)

The Interest Rate Equation (5) is specified as a function of past changes in money stock, output, and anticipated prices, incorporating a "Fisher Effect" to predict the nominal interest rate. The Unemployment Equation (7) is a function of past GNP Gaps, developed in Equation (8) as a function of the systems' capacity to produce.

As initially developed by the authors, the SLM was:

> . . . designed to analyze economic stabilization issues within a framework which focuses on the influence of monetary expansion on total spending. Most of the major econometric models have not assigned an important role to the money stock or to any other monetary aggregate. Furthermore, most econometric models contain a large number of behavioral hypotheses to be empirically estimated and integrated with each other, because they are designed to aid in understanding the determination of many economic magnitudes. By comparison, the model presented is quite small. It is designed to provide information on the most likely course of movement of certain strategic economic variables in response to monetary and fiscal actions [7, p. 7].

The above outline and comment of the authors explicitly acknowledges the monetarist character of the model. Monetarists view the economy as being essentially stable tending toward a full employment level of output while on a "natural" growth path. Within this framework, monetarists argue that monetary impulses have significant effects on the level of economic activity and on real variables such as unemployment and output in the short run. The monetary impulses eventually affect prices, after a moderate lag, as economic units adjust to the changing environment. Changes in the growth of the money supply will initially cause a change in output, prices, and employment. This is a short run adjustment response. The economy eventually moves back toward its long run growth

path. The monetary impulses primarily affecting the absolute price level and other nominal magnitudes, interest rates moving in the same direction as the monetary impulses.

The fundamental relationship in the model, however, is the Total Spending Equation (1), and as the authors argue:

> In this form the total spending equation remains uncommitted as to structure; it is potentially consistent with both Keynesian and quantity theory models. (The magnitude and significance of the estimated parameters determine whether the data conform more closely to a Keynesian or a quantity theory) [7, p. 9].

Therefore, although the models' overall structure incorporates quantity theory arguments, the fundamental equation of the model is designed to include a "Keynesian: fiscal policy variable in order to evaluate its relative significance. Since a key issue in macroeconomics is the relative importance of monetary and fiscal impacts on GNP, the estimates of Equation (1) will provide information as to which policy variable is dominant.

Section 2.4 Theoretical Considerations

Recent General Equilibrium analysis suggests that an economy is never in a state we can validly call equilibrium. Instead, it is a moving disequilibrium system continuously adjusting to past disturbances, searching for the equilibrium vector sets and differing from static theory due to the lack of a Walrasian auctioneer. The lack of perfect information in a system means that "false trading" occurs as units search for the correct information sets. From this perspective monetary and fiscal policy changes are exogenous shocks voiding the originally

correct vector sets which were unknown. The absence of an auctioneer induces further activity which may not, in the aggregate, be attainable. As economic units become aware of their inability to realize their expected outcomes they begin readjusting market activities.

It is apparent in analyzing the disequilibrium process that prices, both relative and absolute, are the information vectors of an open market system that determines market activities. The search for the disequilibrium path in general and the policy disturbed path should center on those markets where information transferral is incomplete and false trading is most likely to occur.

Arrow, Hahn, Clower, Patinkin and others have discussed this problem from a "dual decision hypotheses" framework, arguing that the problem of disequilibrium occurs because imperfect information implies a divergence between notional and effective demands and supplies of goods and services. In this system, households establish a notional demand based on the past history of the array of prices of the goods they desire in relationship to their expectation of selling services and generating the income necessary to satisfy their notional demands. Firms, knowing their production function, etc., use the past and present demand for their products to establish a notional demand for resources and notional supplier of goods. Only if the notional supply and demand characteristics of both groups are coincident will equilibrium occur, and effective demand and supply will be equal. This analysis suggests investigating the labor market for analysis of the disequilibrium process.

Alchian, Friedman, Phelps, and others have discussed the labor market from an information perspective as the basis for positive levels

of unemployment. In their view, positive and varying levels of unemployment occur as workers review job offers in an attempt to maximize their expected future income streams given expectations of future prices and wages.

A key problem for macro theorists and model builders is to evaluate how policy changes can be expected to affect the labor market and delineate the adjustment path of key economic variables as markets adjust to the changing information sets. If the firm is viewed under the assumption of perfect information, it is simply involved in the process of organizing resources at known costs with known demand characteristics at given prices. In this situation, and assuming the firm has no "batch" requirements in the production process, the firm has no need for inventories since we assume it to know all its technical requirements with perfect certainty.

Without perfect information the firms' situations are considerably altered, as they must view their sales potential at any point in time as a probability distribution around an expected mean sales rate based on past experiences. Firms hold inventories because a sales rate above the expected mean sales rate implies potentially lost sales and profits. The desired level of inventories held will be a function of the expected sales rate and the variance of past sales in relation to the cost of carrying and inventories and the ability of the firm to alter prices. The probability distribution of expected future sales will also determine the firms' rate of demand for resources.

In Figure 2.2, sales probability distributions (SPD) A and B are presented with expected sales rates $E(S_t)a$ and $E(S_t)b$. If we assume

the firm believes SPD_A to define its distribution of sales per time period, an actual sales rate such as $E(S_t)b$ would not be considered, a priori, abnormal or cause a change in expectations. Obviously, any sales rate other than $E(S_t)a$ will be associated with a probability of occurrence if the SPD is in fact valid. But, given realized sales rates greater than $E(S_t)a$ over several consecutive periods, the firm can be expected to reevaluate its expectations.

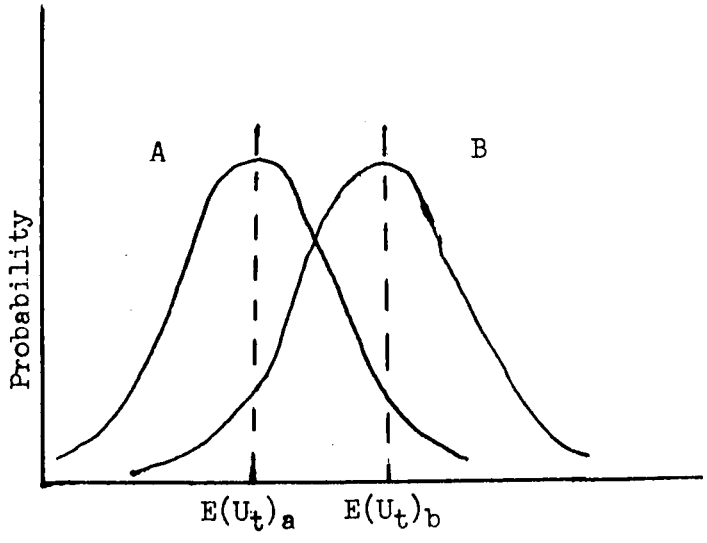

Figure 2.2. Sales Probability Function.

Prior to a definitive determination of a new SPD, the firm faces a number of short run adjustment problems. As actual sales exceed expected sales, inventories decrease and the probability of lost sales increases, while a decision to hire additional productive factors means increased cost/unit of output, but does not commit the firm to long term

contractual arrangements which are not as variable as the more intensive use of factors. Once the new SPD can be verified we can expect an increased rate of demand for semifixed factors (labor and capital), continued increased demand for raw materials, and a recognized pressure on production costs and future sales prices.

On the individual level, the firm is not concerned with differentiating in the short run whether the increased demand is for the firm, the industry, or an increase in aggregate demand. It does matter in the long run, however, as it may well affect future expected price and wage adjustments.

Labor can be viewed in a context similar to the firm. Given imperfect information vectors about present conditions and their effects on future prices, workers can be expected to depend on past prices and wages to develop expectations about the future. During any time period both employed and unemployed labor will be sampling and evaluating wage offers in terms of a distribution around some expected value of real wage offers. A positive rate of measured unemployment is an indication of job search with workers attempting to verify the expected mean and distribution of offers.

Figure 2.3 outlines a probability distribution of wage offers that workers can expect based upon the minimum acceptable or perceived conditions where $E(\frac{W}{P})^a$ is the expected real wage rate (P is the expected price level based on past measured nominal wages and prices; W is nominal wages). In a situation where prices and wages have been constant for some prior time period unemployed workers will still expect some

"unacceptable" wage offers less than $E(\frac{W}{P})^a$ as well as some fortuitous offers above $E(\frac{W}{P})^a$.

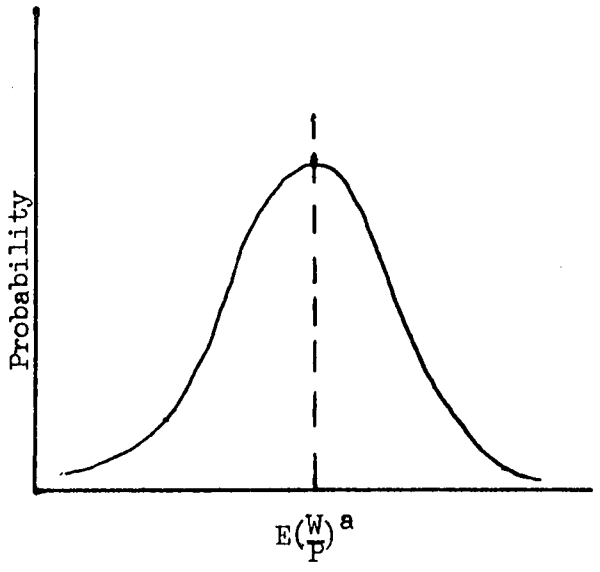

Figure 2.3. Wage Probability Function.

Figure 2.4 further delineates the search process by regarding search as a problem of optimization over time. The marginal cost of search is depicted as upward sloping because (1) the amount of foregone wages increases as search time is extended and (2), as search time is extended the direct costs of search will also increase as the geographic area of search is extended.

The marginal benefit of search is the expectation of an offer better than that which was previously "best." Marginal benefits are

depicted downward sloping because at any point in time if the search is extended, the probability of receiving an offer better than the last "best" offer decreases. The optimum search period t* occurs when the MB = MC or search. The optimum time period of search is sensitive to factors which affect the costs or benefits of search. For instance, an increase in unemployment benefits will reduce the costs of search by lowering foregone wages and extend the job search period; an increase in the rate of job offers or the level of any particular offer will increase the costs of search and reduce the optimum search period.

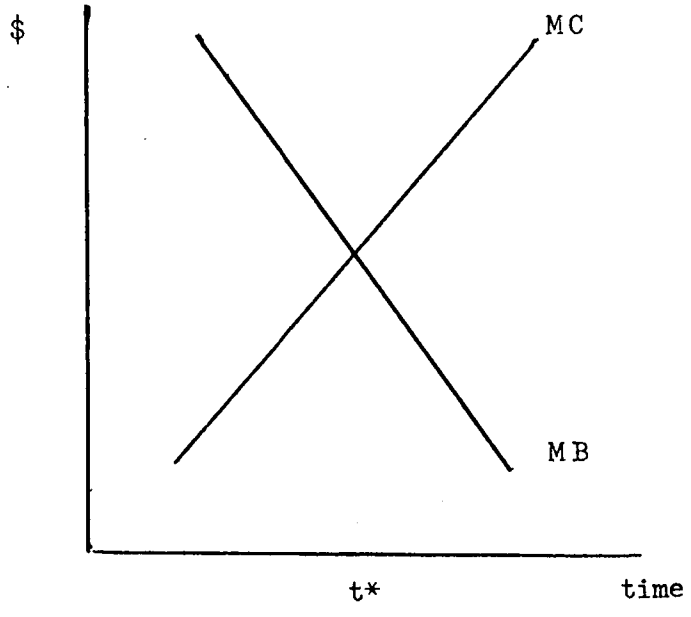

Figure 2.4. Costs, Benefits of Search.

The employer has a derived demand for the "best" employee which also entails search and information costs. The analysis of the employer side

of the market is similar to the above in that the MC of search increases with search time due to foregone output. Marginal benefits decrease with time because the longer the period spent in search the lower the probability of finding a "best" worker willing to accept a wage offer lower than a wage previously accepted. The optimum search time for employers also occurs where MC = MB. Any event which increases the cost of search to the employer will cause the MC curve to shift leftward and reduce optimum search time, and the converse.

Ultimately, the interaction of the decision making process of each participant in this market determines the aggregate search time t*. As this optimum search period is lengthened or shortened, the rate of "frictional" unemployment (U*) increases or decreases.

As outlined above, potential employers and employees do not make decisions using the same information vectors. The firm bases wage offers on expected future sales rates and selling prices while labor bases its decision making upon its knowledge of past wages and price movements. Define:

1. Anticipated inflation (P^a) as a rate of price change fully anticipated by all parties . . . $P^a \gtrless 0$.

2. The actual inflation rate (P^u) as a rate of price change that is not expected and therefore surprises everyone. $P^u \gtrless P^a$ implies that past decisions were erroneous. Different decisions would have been made if correct inflation rates had been known.

3. Ex-ante real wage $(\frac{W}{P}_a)$, the money wage rate W divided by the anticipated price level P_a, is the real wage rate <u>at the time</u> a wage

bargain is made. $P_a = P + P^a$, P being the price level when the wage bargain is made.

4. Ex-post real wage $(\frac{W}{P^u})$ is the real wage rate that evolves after wage offers have been accepted, $P_u = P + P^u$.

The above implies that if inflation rates are correctly anticipated the ex-ante and ex-post wage rates are known and presumably equal. If $P^a \gtrless P^u$ then ex-ante and ex-post wages are not equal and "false trading" has occurred, implying decisions were made which would not have been made if both parties had correctly anticipated the rate of price change.

Suppose a situation exists where the flow of aggregate demand (and the rate of change of aggregate demand) has been such that both parties correctly anticipate changes in prices, i.e., $P^a = P^u$. If the aggregate sales rates and distribution can be accurately assessed by the firm, then wage offers can be made such that the optimum search period t* of firms and labor coincides. This gives us a frictional or natural unemployment rate U*.

If the rate of change of aggregate demand rises or falls, firms will notice a change in their inventory stock in the opposite direction. As outlined above, firms cannot be certain whether the probability distribution of sales has shifted or if the changed rate of sales is simply a random selection from an unchanged probability distribution.

Assume for the moment that there has in fact been an increase in the rate of change of aggregate demand following a period of zero rate of change. If the periods with zero rate of change existed long enough for price changes to be fully anticipated then ex-ante and ex-post wages

are identical. The increase in the rate of change of aggregate demand, once incorporated into the firms SPD, provides the firm with information about future sales rates, costs of production, and selling prices. In this case, P^a will be increased on the part of employers implying that employees (existing and potential) are now incorporating price changes less than P^a. This means that ex-ante real wage offers will exceed ex-post real wages.

As firms begin to bid wages up, with the knowledge of the effect on future prices, the MC of search for labor increases and the optimum search time decreases. Aggregate real output will increase and the unemployment rate will fall due to $P^u > P^a$ on the workers side of wage negotiations. If the rate of change of aggregate demand was a once-and-for-all increase (i.e., the rate of change returns to zero but the level of aggregate demand is now greater than the original level), the new actual rate of price increase (P^u) will be incorporated into the worker decision making process and lengthen t* causing the actual unemployment rate (U^a) to increase back toward the natural rate (U*). Further, while the above should cause a once-and-for-all "jump" in the price level, workers will be overanticipating price changes ($P^a > P^u$). This will cause search time to be extended above the original level and measured unemployment will be greater than initially, until the new prices are accurately assessed.

Interestingly enough, if the rate of change of aggregate demand were to continue at its initially increased rate, implying that aggregate demand increases at a constant rate putting a constant pressure on

output conditions (prices), the unanticipated inflation rates will become anticipated (on the part of labor) and the optimum search period will return to its original t*, as will the unemployment rate. This implies that an increase in the rate of aggregate demand, even if sustained, will only have a short run effect upon employment and output.

The hypothesis outlined above focuses on the labor market as the market where changing information vectors create the potential disequilibrium to continue or be exacerbated. The primary cause of the slowness to adjust to true market clearing vectors is the lack of complete information for correct decision making.

On the demand side of the market, firms can relatively quickly incorporate changes in demand for their output into changed expectations about future prices, etc., but labor does not receive these signals as rapidly and must rely on past trends as decision-making criteria. Effectively, it can appear to workers that they will be able to fulfill their notional demands when they may not be able to do so.

Accepting that the cost of additional information increases, it is reasonable to expect both labor supply and demand to vary as the differences between expected and actual outcomes vary. That is, an increase in job offers, following a period of relatively stable prices, will cause acceptance rates and measured employment rates to increase. If prices then begin to increase, labor is constrained from accomplishing their notional demands and will increase search time, and measured unemployment will rise unless nominal (and real) wages are increased.

Given the above analytical framework, an increase in the rate of monetary growth will lead to an increase in nominal aggregate demand,

causing the actual rate of sales to exceed the expected rate. Firms will note decreased inventories and simultaneously increased level of cash balances. In the immediate short run, firms will be uncertain of how to interpret this phenomenon and move towards more intensive use of existing facilities. The persistence of actual sales rates above those expected will continue to cause inventory levels to decline, and eventually increased job offers and acceptances, as well as an increased rate of output.

Walter Oi [61] has argued that a firm's work force can be viewed as a quasi-fixed factor of production, whose use rate can be varied. This is in part reinforced due to "specific" human investment via a formal or informal process whereby workers learn specific methods used by the firm. This makes the MRP of the existing workers greater than that of newly hired workers.

Donald F. Gordon [40] has also argued that there is an implied contract between the firm and its workers. This implied contract is an attempt on the part of workers to minimize the prospect of unemployment, whereby they accept wages below their MRP during "boom" periods and are not immediately laid off as the demand for the firm's product diminishes during recessions.

Both Oi's and Gordon's arguments tend to reinforce each other and suggest that unemployment rates will tend to lag behind changes in demand and output, because existing labor can be viewed as a quasi-fixed factor whose rate of use can be varied. The costs of overtime will be weighed against the costs of hiring added factors. Since there are costs of

hiring and layoffs, if the decision to hire is wrong, the crucial question for the firm is the correct mean and variance of expected future sales. (If the variance of sales is underestimated, but the mean is valid, then the level of inventory stock must be increased to provide the same level of protection as initially.) If the expected mean is below the actual mean, higher production rates are required. Both the above imply increased costs, given existing facilities, as a larger variance implies larger carrying costs (and/or larger production facilities) while greater production rates imply greater material resource needs.

Given the arguments above, we can state:

1. The increased rate of demand will eventually cause the firm to adjust production rates, and an increase in the rate of demand for raw materials reinforces the initial impact across firms and industries.

2. The increase in demand and its persistence will eventually cause a revision of the firm's sales distribution and expected future sale price, though these signals are not passed along to the other market participants.

3. This impact will eventually spill over into the labor market causing a short run increase in employment levels, output, and money wages.

4. As price increases appear at rates faster than anticipated by labor, effective demand is thwarted and labor will begin revising expected wage rates upward. The choking off of effective demand will cause job offer rates to fall and unemployment to rise as participants are reevaluating conditions.

As postulated elsewhere by others, the process of continued higher output and employment rates can only be sustained by continued increasing

rates of monetary growth which will continue to stimulate demand, forcing expectations to be continuously underestimated, and allow firms to validate expected future sales levels, prices, and labor wage demands.

A vital question for this study is whether the SLM variables accurately represents the potential adjustment process outlined. The SLM is estimated via a simultaneous solution process (see Chapter 3) and, as noted, the Total Spending Equation (1) specifies changes in GNP as a function of past changes in the money stock and HEFE, a generalized and uncommitted relationship. The proposed transmission process suggests that policy impulses would affect inventory levels and be transmitted to material and labor markets. The size and persistence of the monetary impulses will vary the degree of impact upon employment, output, and prices as the system adjusts over time and reapproaches its long run path.

The SLM does not incorporate an explicit inventory adjustment variable to develop demand pressures, but remains within a general monetarist framework by indirectly attempting to evaluate the adjustment process via the GNP Gap Identity (8). The Demand Pressure Identity (3) is a function of the change in GNP minus the difference between potential real output in quarter (t) minus actual real output in quarter (t-1). Given any change in GNP, the smaller the difference between actual and potential output the greater are demand pressures. This difference then determines changes in prices in equation (2).

The outline above indicates that anticipated price changes enter into the decision making process, but the information used to determine anticipations is not uniformly known by all participants, causing the

price effect of demand pressures to be initially underestimated, particularly in the case of labor. Therefore, past price changes will cause anticipated price changes to be unrelated to the changing level of activity being generated by the monetary impulses and induce job offers and acceptances which cause a short run increase in employment and real output.

Equation (6) of the model, the Anticipated Price Equation, postulates (P^A_t) based on past observed changes in the price level which reflect past demand pressures. Over time, unemployment rates are expected to be inversely related to antitipated price changes. The Price Anticipation Equation is:

$$P^A_t = Y_{t-2}\left\{\left[\left(\sum_{i=1}^{n} P_i \frac{P_{t-1}}{U_{t-1}/U^*}\right) .01 + 1\right]^{1/4}\right\}$$

The term $\sum_{i=1}^{n} P_i \frac{P_{t-1}}{U_{t-1}/U^*}$ is estimated in the Long Term Interest Rate Equation (5), a function of the natural interest rate modified by price level and output trends. This incorporates a "Fisherian" notion of the nominal versus real interest rate, a difference caused by expected price changes. This estimated impact upon interest rates is also incorporated into Equation (6) to estimate total anticipated price changes which, with the demand pressure estimate, is used to develop the total money change in prices. The change in real output is estimated indirectly as the residual of the change in nominal GNP minus the change in prices.

The present unemployment rate, Equation (6), is a function of the GNP Gap Identity (8). The rate of unemployment is hypothesized to be

inversely related to demand pressure spilling over into the labor market. In the SLM, the GNP Gap is used to define demand pressure and estimate employment. As the GNP Gap decreases, demand pressure increases, spilling over into the labor market and unemployment decreases.

The SLM, like most econometric models, differs from a strict interpretation of theoretical constructs. This occurs due to the divergence between available data and theoretical definitions; and because of the lack of knowledge about the properties of the estimators of non-linear functions. The SLM, though, essentially includes a transmission process of monetary impulses that approximates the theoretical outline, enabling estimation and prediction of the key economic variables.

Section 2.5 Criticism of the SLM

As noted in Chapter 1, the debate between the Monetarists and Keynesians evolved from the pioneering work of Friedman and Schwartz, and Friedman and Meiselman in the late 1950's and early 1960's. The early Monetarist models, generally single equation, were criticized on a number of points: (1) lack of theoretical underpinning [12, 47, 68, 76], (2) misspecification of exogenous variables [13, 14, 20, 21, 60, 75], and (3) criteria used to determine acceptable data [14, 20, 21, 60].

Since the early 60's, criticisms of the theoretical foundations of Monetarist work has largely been overcome. More recently the foundations of both Keynesian and neoclassical models have been challenged via a reconsideration of Keynes' work and the integration of more sophisticated mathematical techniques. For the present, it is generally acknowledged that empirical verification of theory is necessary.

The question of correct specification of exogenous variables and acceptable data has also undergone extensive discussion, particularly since the 1968 Andersen-Jordan (A-J) article [5], the forerunner of the SLM [3, 4, 5, 6, 13, 20, 21, 41, 60, 66, 72, 75]. As noted above, the initial question of determining autonomous variables was extensively analyzed and discussed by Friedman and Meiselman. Their major concern was isolating from national income accounts those expenditures representing autonomous spending conceptually acceptable for use in a simple Keynesian multiplier system. Their choices were severely criticized by Ando and Modigliani and Donald Hester.

In the 1968 Anderson-Jordan single equation model, changes in the monetary base and in fiscal revenues and expenditures were used as exogenous variables affecting changes in GNP. This was a major step toward isolating truly exogenous government expenditures (which are further refined and incorporated in the SLM) by use of the HEFE and receipt concept, eliminating changes in fiscal expenditures and revenue caused by fluctuating economic activity. Unemployment benefit expenditures which fluctuate with economic activity are eliminated from fiscal expenditure patterns to produce an exogenous fiscal variable to use as an indicator of fiscal policy and develop a government multiplier.

The A-J use of the monetary base as an exogenous variable indicating monetary policy was questioned by a number of writers, especially DeLeeuw and Kalchbrenner (D-K) [21]. D-K argue that the monetary base is not a policy variable of the FED, since the pattern within the base of borrowed and unborrowed reserves, and currency in commercial banks or in the hands

of the general public, is a variable jointly affected by the interaction of the banks and public. Accordingly, since the pattern within the base varies with the level of economic activity, it is not a valid exogenous variable.

D-K adjusted the monetary base figures used by A-J, eliminating borrowed reserves, currency, or both, from the base, made some minor adjustments to the A-J fiscal expenditure figures and reestimated the A-J equation. This process substantially reduced the estimated impact of the monetary variables and increased the estimated impact of fiscal expenditures. In a reply, A-J [6] point out that D-K misused the monetary base figures, confusing uses and sources, and generally argued that changes in the base come about either because of explicit decisions by the FED or could be offset if the FED so desired. A-J thereby rejected the assertions of D-K that the FED does not have control or does not attempt to control the monetary base and monetary magnitudes.

Thomas Saving [69] also discussed the question of the exogeniety of the money stock and its relationship to the base suggesting that empirical studies could settle the issue. Cagan and Gandolfi [14] posited that due to the time pattern of lag effects on interest rates, there may be a feedback of changes in GNP on changes in the money stock. Burger, Kalish, and Babb (B-K-B) [13] and C. A. Sims [71] investigated the relationship between the money stock and the monetary base, and between the money stock and economic activity respectively. B-K-B estimated the relationship between the monetary base and the money stock in order to test the stability of the relationship. They concluded that the FOMC

trade desk could predict the money stock based on the monetary base, using their relatively simple formulation, at a 93 percent level of confidence. Sims tested for unidirection casuality of M to Y and Y to M. By testing the hypothesis that M_{t-1} affects Y_t, and Y_{t-1} affects M_t, he found he could accept the former hypothesis but not the latter hypothesis. Noting that this does not allow one to reject absolutely the argument of a dual impact of M and Y, it does support the position of A-J. J. E. Tanner also evaluated the lag effects of monetary policy, discussed the question of exogeneity of the money stock and stated, ". . . since our purpose is not to build a model determining the supply of money, such an assumption is convenient if not entirely correct" [75, p. 707ff].

T. O. Nitsch [60] presented another concern about the A-J use of the HEFE concept. He pointed out that actual federal expenditures for durable goods, particularly for military goods, are preceded by contractual obligations between the private and public sectors inducing private sector expenditures prior to any recorded change in government expenditures. He noted a lag of up to a year before 15 percent of a contract is paid by the government and that only 30 percent of the contract is paid by the end of the second year. Therefore, expenditures may be induced in the private sector prior to a change in recorded government expenditures. If so, recorded government expenditures are not good indicators of the time of impact and are effectively introduced into models in a spurious manner that misinterprets their real impact. Nitsch reestimated the A-J equation in an attempt to assess the importance

of this consideration. The results of his study indicated the monetary impact is less than proposed by A-J, but left the estimated impact of the fiscal variables substantially unaltered. He concluded:

> Generally speaking, the results of the present study served more to uphold than to refute the original A-J conclusions that, as defined and measured, the monetary policy actions are both more powerful and more reliable than those of fiscal policy [60,p. 22].

The SLM was developed primarily to evaluate the effectiveness of stabilization policies over a short run period. A number of simulations and comparisons have been made between the SLM and other models [9, 16, 30, 46, and 71]. All found the SLM results acceptable and no particular model performed best. Generally, errors accumulated in all models as the projection period was extended. From the point of efficiency of output based on input, the SLM is extremely attractive when compared with larger models with up to 400 equations and the requisite data needs.

Many of the large scale models also have theoretical peculiarities, incorporating price theoretic formulations of the absolute price level, only recently attempting to incorporate price anticipation functions, and have financial sector analysis rather than a monetary variable analysis [16, 23, 26, 43, 53, and 68].

Advantages of the SLM are apparent from the above criticisms. For, while the model itself is appropriately considered "monetarist" (one might ask if it would be considered "monetarist" if the fiscal coefficients turned out significant rather than the monetary coefficients) the dominant equation (1) is open enough to allow the two variables to be evaluated, and both the variables are included in the subsidiary equations in order

to estimate accurately their impact. Ultimately, the question of which of the two important variables dominates or is relatively stronger is answered empirically.

The SLM is now six years old and component equations have not needed revisions. The price equations have a strong theoretic foundation, a macromonetary theory of the absolute price level rather than a price theoretic formulation. Robert H. Rasche in commenting on this, the SLM in general, and its critics stated, "In general it would appear that the equation has withstood these attacks surprisingly (or disturbingly) well" [67, p. 31].

It therefore appears the SLM, when compared with other models, is sufficiently general, has valid theoretic foundations, relatively accurate record of forecasting, is recognized as a major contending model, and is formulated in a manner allowing the estimates derived to give an indication as to which contending theory is more viable. Therefore, application of the model to other nations should provide an indication of which theory is in fact "general."

CHAPTER 3

PROCEDURES AND EMPIRICAL RESULTS

This chapter is concerned with the estimation of the SLM, presentation and analysis of the results. There is no formal presentation of the statistical methods used as they are readily available in standard reference sources. The four equations of the model were estimated using unconstrained Two Stage Least Squares (2SLS). The results were statistically evaluated by "F" tests on entire equations and "t" tests on the individual and summed coefficients. Durbin-Watson statistics are presented even though their exact properties in 2SLS regressions are not fully known.

3.1 Estimation Procedure

Equation (1) was estimated separately for each country using lagged first difference changes in the money stock and high employment government expenditures, lagged four, five, and six quarters. This equation was also run with pooled data for four, five, and six lagged periods. (Results are shown in Table 3.1 and 3.2.)

Equation (2) was estimated using the estimates generated from Equation (5) (Long Term Interest Rate Equation) incorporated into Identity (6). The results of the estimated Equation (2) are presented in Table 3.3.

Equation (5) was also run separately for each country, with the lag periods finally chosen via adding lagged variables, evaluating their

Table 3.1

Total Spending Equation

$$\Delta Y_t = a_o + \sum_{i=o}^{n} m_i \Delta M_{t-1} + \sum_{i=o}^{n} e_i \Delta E_{t-1}$$

Country	Time Period	n	Constant Term	Monetary Influences (Sum)	Fiscal Influences (Sum)	$\bar{R}^2$ D-W S.E.
Australia	62:3 - 74:3	5	.06 (2.97)	1.6 (7.48)	.19 (.79)	.6937 1.56 .052
m_0 = .36(1.93)	m_3 = .30(1.66)		e_0 = .01(0.11)	e_3 = .04(0.69)		
m_1 = .21(1.12)	m_4 = .55(2.60)		e_1 = .05(0.74)	e_4 = .04(1.10)		
m_2 = .19(0.96)			e_2 = .05(0.91)			
Australia	63:1 - 74:3	6	.04 (2.20)	1.82 (7.68)	.45 (1.51)	.7722 1.71 .048
m_0 = .47(2.68)	m_3 = .01(0.04)		e_0 = .01(0.18)	e_3 = .10(1.43)		
m_1 = .35(1.83)	m_4 = .51(2.55)		e_1 = .06(0.92)	e_4 = .10(1.75)		
m_2 = -.06(-.29)	m_5 = .54(2.64)		e_2 = .12(1.67)	e_5 = .06(1.64)		
Australia	63:2 - 74:3	7	.04 (1.69)	1.88 (6.59)	.62 (1.69)	.7752 1.72 .048
m_0 = .42(2.41)	m_4 = .38(1.77)		e_0 = -.02(-.35)	e_4 = .16(2.11)		
m_1 = .41(2.11)	m_5 = .53(2.60)		e_1 = .06(0.84)	e_5 = .10(1.75)		
m_2 = -.0.1(-.04)	m_6 = .24(1.12)		e_2 = .12(1.53)	e_6 = .05(1.46)		
m_3 = -.09(-.46)			e_3 = .15(1.65)			
Canada	60:4 - 74:3	5	.08 (1.16)	.84 (1.92)	1.92 (3.15)	.5519 1.97 .218
m_0 = .39(2.48)	m_3 = .36(1.84)		e_0 = .39(2.64)	e_3 = .49(2.92)		
m_1 = -.05(-0.28)	m_4 = .20(1.27)		e_1 = .39(2.26)	e_4 = .17(1.18)		
m_2 = -.06(-0.30)			e_2 = .48(2.96)			

Table 3.1 (Continued)

Country	Time Period	n	Constant Term	Monetary Influences (Sum)	Fiscal Influences (Sum)	$\bar{R}^2$ D-W S.E.
Canada	61:1 - 74:3	6	.07 (1.07)	.84 (4.64)	2.13 (3.17)	.6070 1.83 .221
m_0 = .27(1.45)	m_3 = .37(1.82)		e_0 = .36(2.39)	e_3 = .52(2.99)		
m_1 = .07(0.32)	m_4 = -.04(-0.19)		e_1 = .34(1.99)	e_4 = .24(1.45)		
m_2 = -.09(-0.46)	m_5 = .26(1.26)		e_2 = .53(3.05)	e_5 = .14(0.94)		
Canada	61:2 - 74:3	7	.02 (.348)	.87 (4.79)	2.70 (3.61)	.6751 1.99 .203
m_0 = .15(0.83)	m_4 = -.11(-0.49)		e_0 = .40(2.84)	e_4 = .27(1.55)		
m_1 = .01(0.03)	m_5 = .04(0.18)		e_1 = .33(1.99)	e_5 = .28(1.69)		
m_2 = .04(0.20)	m_6 = .35(1.84)		e_2 = .50(2.95)	e_6 = .25(1.71)		
m_3 = .39(2.07)			e_3 = .67(3.60)			
Germany	61:4 - 74:3	5	.62 (.81)	.95 (1.81)	3.42 (1.86)	.4090 2.49 2.534
m_0 = 1.17(2.50)	m_3 = 1.14(1.97)		e_0 = .68(1.63)	e_3 = .83(1.78)		
m_1 = -.42(-0.76)	m_4 = .02(0.03)		e_1 = .97(2.12)	e_4 = .10(0.22)		
m_2 = -.96(-1.70)			e_2 = .84(1.81)			
Germany	62:1 - 74:3	6	1.00 (1.21)	1.13 (1.93)	1.99 (.91)	.4333 2.41 2.564
m_0 = 1.09(2.13)	m_3 = 1.02(1.61)		e_0 = .71(1.63)	e_3 = .48(0.88)		
m_1 = -.43(-0.67)	m_4 = -.20(-0.31)		e_1 = 1.16(2.21)	e_4 = -.28(-0.50)		
m_2 = -.78(-1.30)	m_5 = .43(0.73)		e_2 = .50(0.92)	e_5 = -.58(-1.20)		
Germany	62:2 - 74:3	7	.66 (0.74)	1.14 (2.96)	2.74 (.98)	.4577 2.48 2.610

Table 3.1 (Continued)

Country	Time Period	n	Constant Term	Monetary Influences (Sum)	Fiscal Influences (Sum)	$\bar{R}^2$ D-W S.E.
m_0 = 1.13(1.97)		m_4 = -.22(-0.32)		e_0 = .50(0.97)	e_4 = .12(0.17)	
m_1 = -.42(-0.54)		m_5 = .55(0.73)		e_1 = .96(1.58)	e_5 = -.20(-0.31)	
m_2 = -.67(-1.00)		m_6 = -.18(-0.26)		e_2 = .17(0.25)	e_6 = .55(1.05)	
m_3 = .95(1.31)				e_3 = .64(0.98)		
Japan	60:4 - 74:3	5	3.95 (1.03)	.80 (7.10)	-.82 (-2.87)	.8234 1.86 12.87
m_0 = .48(4.44)		m_3 = -.02(-.15)		e_0 = -.08(-2.17)	e_3 = -.23(-2.99)	
m_1 = -.03(-0.24)		m_4 = .84(6.28)		e_1 = -.18(-2.37)	e_4 = -.16(-4.06)	
m_2 = -.47(-3.45)				e_2 = -.17(-1.86)		
Japan	61:1 - 74:3	6	.30 (.78)	.83 (7.18)	.78 (1.16)	.8450 1.84 11.89
m_0 = .27(2.22)		m_3 = .14(0.98)		e_0 = -.00(-0.07)	e_3 = .15(0.88)	
m_1 = -.06(-0.50)		m_4 = .55(3.59)		e_1 = .02(0.13)	e_4 = .20(1.45)	
m_2 = -.30(-2.24)		m_5 = .23(1.40)		e_2 = .20(1.11)	e_5 = .21(3.05)	
Japan	61:2 - 74:3	7	6.09 (.71)	.85 (5.22)	-.47 (-.56)	.8505 1.77 10.89
m_0 = .16(1.37)		m_4 = .20(1.05)		e_0 = .06(1.29)	e_4 = -.17(1.10)	
m_1 = .18(1.38)		m_5 = .34(2.02)		e_1 = .04(0.43)	e_5 = -.12(-1.06)	
m_2 = -.23(-1.79)		m_6 = .13(0.97)		e_2 = .08(0.56)	e_6 = -.21(-3.22)	
m_3 = .07(0.53)				e_3 = -.15(-0.89)		
United Kingdom	60:4 - 74:3	5	.09 (4.40)	.75 (6.00)	.66 (3.16)	.6885 1.50 .096

Table 3.1 (Continued)

Country	Time Period	n	Constant Term	Monetary Influences (Sum)	Fiscal Influences (Sum)	$\bar{R}^2$ D-W S.E.
m_0 = .15(0.73)	m_3 = .18(0.76)		e_0 = .08(1.10)	e_3 = .23(3.58)		
m_1 = .11(0.36)	m_4 = .00(0.06)		e_1 = .09(1.28)	e_4 = .09(1.02)		
m_2 = .31(1.00)			e_2 = .17(2.82)			
United Kingdom	61:1 - 74:3	6	.09 (4.47)	.92 (2.75)	.54 (2.67)	.7502 1.60 .088
m_0 = .38(1.88)	m_3 = -.31(-1.09)		e_0 = .03(0.40)	e_3 = .20(3.25)		
m_1 = -.09(-0.32)	m_4 = .72(3.01)		e_1 = .02(0.24)	e_4 = .15(1.78)		
m_2 = .24(0.83)	m_5 = -.02(-0.36)		e_2 = .09(1.39)	e_5 = .05(0.62)		
United Kingdom	61:2 - 74:3	7	.08 (4.02)	.87 (6.43)	.75 (3.25)	.7839 1.56 .084
m_0 = .35(1.81)	m_4 = .84(2.79)		E_0 = .02(0.23)	e_4 = .19(2.42)		
m_1 = .02(0.81)	m_5 = .02(0.10)		e_1 = .03(0.34)	e_5 = .10(1.33)		
m_2 = .23(0.82)	m_6 = -.05(-0.94)		e_2 = -.00(-0.05)	e_6 = .18(2.37)		
m_3 = -.54(-1.85)			e_3 = .23(3.40)			
United States	60:4 - 74:3	5	1.11 (1.84)	1.05 (4.54)	.96 (1.30)	.5425 1.91 1.570
m_0 = .74(3.30)	m_3 = .37(1.54)		e_0 = .17(1.42)	e_3 = .30(1.52)		
m_1 = -.14(-0.57)	m_4 = .08(0.59)		e_1 = .11(0.55)	e_4 = .13(1.01)		
m_2 = .00(0.02)			e_2 = .25(1.15)			
United States	61:1 - 74:3	6	1.41 (2.10)	1.12 (3.09)	.36 (.364)	.5425 1.94 1.587
m_0 = .75(3.15)	m_3 = .39(1.52)		e_0 = .21(1.68)	e_3 = .13(0.53)		
m_1 = -.13(-0.50)	m_4 = .06(0.25)		e_1 = .14(0.68)	e_4 = -.10(-0.46)		
m_2 = .05(0.18)	m_5 = .00(0.02)		e_2 = .17(0.70)	e_5 = -.19(-1.40)		

Table 3.1 (Continued)

Country	Time Period	n	Constant Term	Monetary Influences (Sum)	Fiscal Influences (Sum)	$\bar{R}^2$ D-W S.E.
United States	61:2 - 74:3	7	1.27 (2.39)	1.51 (5.98)	.25 (.300)	.6423 1.52 1.663
m_0 = .74(2.79)	m_4 = -.00(-0.00)		e_0 = .19(1.38)		e_4 = -.10(-0.49)	
m_1 = -.08(-0.29)	m_5 = .19(0.71)		e_1 = .06(0.34)		e_5 = -.13(-0.67)	
m_2 = .08(0.26)	m_6 = .28(0.53)		e_2 = .09(0.41)		e_6 = .06(0.47)	
m_3 = .30(0.96)			e_3 = .08(0.37)			

ΔY_t = money change in total spending (GNP in current prices) in quarter t.

ΔM_{t-1} = change in the money stock in quarter t-1.

ΔE_{t-1} = money change in high employment Federal expenditures in quarter t-1.

Note: "t" statistics appear in parenthesis with each regression coefficient.

Note: $\bar{R}^2$ is the percent variation in the dependent variable which is explained by the independent variables.

Note: S. E. is the standard error of the estimate.

Note: D-W is the Durbin-Watson statistic.

All equations passed a standard "F" test at the 5 percent level of significance.

Table 3.2

Total Spending Equation (Pooled)

$$\Delta Y_t = a_o + \sum_{i=o}^{n} m_i \Delta M_{t-1} + \sum_{i=o}^{n} e_i \Delta E_{t-1}$$

n	Constant Term	Monetary Influences (Sum)	Fiscal Influences (Sum)	$\bar{R}^2$ D-W* S.E.
n = 5	1.18 (2.59)	0.77 (2.18)	-0.04 (-0.03)	.9031 0.825 7.73
m_0 = .26(4.11)	m_3 = -.00(-0.02)	e_0 = .04(1.78)	e_3 = -.08(-2.01)	
m_1 = .18(2.14)	M_4 = .52(8.80)	e_1 = .06(1.53)	e_4 = -.12(-4.41)	
m_2 = -.19(2.45)		e_2 = .06(1.36)		
n = 6	1.07 (2.32)	0.78 (5.44)	0.12 (0.07)	.9036 0.791 7.73
m_0 = .21(2.78)	m_3 = .01(0.06)	e_0 = .05(2.01)	e_3 = -.05(-0.93)	
m_1 = .22(2.36)	m_4 = .47(5.48)	e_1 = .08(1.76)	e_4 = -.07(-1.46)	
m_2 = -.19(-2.34)	m_5 = .06(0.87)	e_2 = .09(1.67)	e_5 = .04(1.14)	
n = 7	1.17 (2.80)	0.83 (6.74)	-0.38 (-0.24)	.9234 0.503 6.91
m_0 = .03(0.45)	m_4 = .14(1.60)	e_0 = .12(5.11)	e_4 = -.22(-4.43)	
m_1 = .36(4.18)	m_5 = .17(2.18)	e_1 = .16(3.89)	e_5 = -.22(-5.03)	
m_2 = -.11(-1.41)	m_6 = .13(2.15)	e_2 = .18(3.52)	e_6 = -.28(-8.52)	
m_3 = .11(1.52)		e_3 = -.12(-2.36)		

*This equation has not been adjusted for auto-correlation of residual terms.

Table 3.3

Price Equation

$$\Delta P_t = a_o + \sum_{i=o}^{n} d_i D_{t-1} + p_i \Delta P_t^a$$

Country	Time Period	Constant	Demand Pressures (Sum)	Anticipated Price Change	$\bar{R}^2$ D-W S.E.
Australia	4/62 = 4/74	-.08 (-3.589)	1.76 (3.98)	3.83 (3.98)	.8351 1.66 .06
d_0 = .65(3.83)		d_2 = -.02(-0.14)		d_4 = .45(2.87)	
d_1 = -.03(0.16)		d_3 = .09(0.57)		d_5 = .63(3.05)	
Canada	3/62 - 4/74	-.203 (-8.60)	-.201 (-5.46)	5.05 (25.72)	.9571 2.364 .093
d_0 = .36(5.18)		d_2 = -.08(-2.14)		d_4 = -.41(-6.06)	
d_1 = -.12(1.72)		d_3 = .02(0.54)		d_5 = .04(0.59)	
Germany	2/63 - 4/74	-.46 (-0.87)	-.173 (-0.34)	4.97 (4.88)	.5454 1.611 1.65
d_0 = .03(0.16)		d_2 = .03(0.17)		d_4 = -.17(-0.64)	
d_1 = -.19(-0.99)		d_3 = .41(1.68)		d_5 = -.28(-1.25)	
Japan	1/62 - 4/74	-15.13 (-3.46)	2.20 (9.28)	6.89 (1.00)	.9011 1.306 12.70
d_0 = 1.72(1401)		d_2 = .13(0.75)		d_4 = -.18(-1.10)	
d_1 = .28(1.90)		d_3 = .25(1.55)			
United Kingdom	3/62 - 4/74	----	.74 (2.13)	2.23 (2.74)	.7963 1.93 .19

Table 3.3 (Continued)

Country	Time Period	Constant	Demand Pressures (Sum)	Anticipated Price Change	$\bar{R}^2$ D-W S.E.
d_0 = 1.22(6.27)		d_2 = -.05(-0.23)		d_4 = -.06(-0.25)	
d_1 = -.38(-1.90)		d_3 = -.10(-0.48)			
United States	2/62 - 4/74	-1.99	-0.01	5.32	.6256
		(-1.65)	(-0.13)	(7.63)	2.14
					.27
d_0 = .19(2.89)		d_2 = -.02(-0.53)		d_4 = -.19(-2.47)	
d_1 = -.05(-1.04)		d_3 = .06(1.28)			

Symbols are defined as follows:

ΔP_t = money change in total spending due to price change in quarter t.

$D_t = Y_t - (X_t^f - X_{t-1})$

X_t^f = potential output in period t.

X_{t-1} = output in period t-1, 1963 prices.

P_t^a = anticipated price change (money units) in quarter t, where

$$\Delta P_t^a = Y_{t-2}\left\{\left|\left(\sum_{i=o}^{n} pi \frac{P_{t-1}}{U_{t-1/U^*}}\right) .01 + 1.0\right|^{1/4} - 1.0\right\}$$

P_{t-i} = annual rate of change of CPI (1963 = 100) in quarter t-i.

U_{t-i/U^*} = index of unemployment as a percent of labor force in quarter t-i.
U* is frictional unemployment.

Y_{t-i} = total spending (GNP) in quarter t-i.

Table 3.3 (Continued)

Note:

"t" statistics appear in parenthesis with each regression coefficient.

$\bar{R}^2$ is the percent variation in the dependent variable which is explained by the independent variables, adjusted for d.f.

SE is the standard error of the estimate.

D-W is the Durbin-Watson statistic.

All equations passed a standard "F" test at the 5 percent level of significance.

impact upon the $\bar{R}^2$ value, and minimizing the standard error of the equation. Results are shown in Tables 3.4 and 3.5.

Equation (7) was similarly estimated with lags of one and two periods (only the two period equations are presented in Table 3.6).

The purpose of this work is to test the hypothesis that the SLM is a "general" model using the criteria that the estimated equations will be "similar" across countries. Primary reliance for testing this hypothesis makes use of the "Chow Pooled "F" test procedure on Equation (1) and comparing the estimated results of the other equations for similarity of patterns of coefficients as well as the normal statistical tests for acceptance of individual estimated equations.

3.2 Results and Analysis

As can be seen in Table 3.1, p. 32, and Table 3.2, p. 37, (Total Spending Equation) and estimated equations are all statistically significant. The pattern of the monetary variable coefficients indicate a generally positive and significant impact for contemporary and one quarter lagged changes diminishing and/or becoming negative, then returning to positive. Coefficients vary in size and significance within each country as well as across countries. The strength of the individual coefficients generally diminish with the length of lag; a pattern of diminishing oscillation. All summed coefficients are positive and significant at a 5 percent probability level with the exception of the four- and five-quarter estimates for Germany.

The summed fiscal expenditure coefficients are generally not as strong as the monetary coefficients, but this result is not universal.

Table 3.4

Long Term Interest Rate Equation

$$RLT = a_o + a_1 M_{t-i} + \sum_{i=o}^{n} x_i X_{t-i} + \sum_{i=o}^{n} P_i \frac{P_{t-i}}{U_{t-i/U^*}}$$

Country	Time Period	Constant	Monetary Influence	Output Influence (Sum)	Price Influence (Sum)	$\bar{R}^2$ D-W S.E.
Australia	2/64 - 4/74	.45	-.01	.42	.74	.9763
		(0.85)	(-0.81)	(2.32)	(3.40)	1.72
			M_{t-1}	1-9	0-12	0.24
Canada	3/62 - 4/74	1.02	-0.11	-0.02	.57	.8918
		(3.13)	(-1.06)	(-0.09)	(2.56)	1.67
			M_{t-0}	1-9	0-10	0.32
Germany	4/63 - 4/74	1.13	-0.03	.09	.49	.8846
		(7.18)	(-2.53)	(0.76)	(2.53)	1.86
			M_{t-0}	1-9	1-8	0.36
Japan	1/62 - 4/74	1.28	-0.00	.01	.29	.9646
		(9.51)	(-0.02)	(0.39)	(4.28)	1.79
			M_{t-i}	1-4	0-8	0.15
United Kingdom	3/62 - 4/74	.04	.01	-0.00	.69	.5779
		(3.25)	(0.37)	(-0.03)	(2.70)	1.67
			M_{t-1}	1-5	0-8	0.32
United States	1/62 - 4/74	1.25	.02	.06	.58	.9743
		(5.55)	(1.01)	(1.13)	(3.25)	1.95
			M_{t-1}	1-7	0-9	0.22

Symbols are defined as follows:

RLT = long term interest rate in quarter t.

M_{t-i} = annual rate of change in money stock in quarter t-i.

X_{t-i} = annual rate of change of output in quarter t-i (GNP in 1963 prices).

Table 3.4 (Continued)

P_{t-i} = annual rate of change in CPI (1963 = 100) in quarter t-i.

U_{t-i/U^*} = index of unemployment as a percent of labor force in quarter t-i. U* = frictional unemployment.

Note: "t" statistics appear in parenthesis with each regression coefficient.

$\bar{R}^2$ is the percent variation in the dependent variable which is explained by the independent variables, adjusted for d.f.

SE is the standard error of the estimate.

D-W is the Durbin Watson statistic.

All equations passed a standard 'F' test at the 5 percent level of significance.

Table 3.5

Short Term Interest Rate Equation

$$RST = a_o + a_1 M_{t-i} + \sum_{i=o}^{n} x_i X_{t-i} + \sum_{i=o}^{n} p_i \frac{P_{t-1}}{U_{t-i}/U^*}$$

Country	Time Period	Constant	Monetary Influence	Output Influence (Sum)	Price Influence (Sum)	$\bar{R}^2$ D-W S.E.
Australia	2/62 - 4/74	.32	-0.006	.11	.67	.6610
		(2.50)	(-0.53)	(1.94)	(6.22)	1.72
			M_0	1-6	0-6	0.34
Canada	2/61 - 4/74	.52	-0.02	-0.07	.45	.5184
		(3.27)	(-2.03)	(-0.13)	(2.68)	2.00
			M_0	1-6	0-6	0.41
Germany	1/61 - 4/73	.70	-.06	.27	.72	.4884*
		(1.27)	(-1.65)	(1.58)	(1.64)	1.86
			M_0	0-6	0-6	1.20
Japan	3/63 - 4/74	.01	-0.06	.37	.94	.8442
		(0.01)	(-3.90)	(3.99)	(3.46)	1.58
			M_0	0-5	0-7	0.38
United Kingdom	3/63 - 4/74	.41	-0.02	.40	.47	.6953
		(2.92)	(-1.21)	(1.16)	(2.05)	1.76
			M_0	0-4	0-7	0.38
United States	4/62 - 4/74	2.11	-0.02	.11	.74	.8468
		(2.49)	(-0.43)	(0.82)	(5.72)	1.70
			M_0	0-7	0-7	0.44

Symbols are defined as follows:

RST = short term interest rate in quarter t.

M_{t-i} = annual rate of change in money stock in quarter t-i.

X_{t-i} = annual rate of change of output in quarter t-i (GNP in 1963 prices).

Table 3.5 (Continued)

P_{t-i} = annual rate of change in CPI (1963 = 100) in quarter t-i.

U_{t-i/U^*} = index of unemployment as a percent of labor force in quarter t-i. U* = frictional unemployment.

Note: "t" statistics appear in parenthesis with each regression coefficient.

$\bar{R}^2$ is the percent variation in the dependent variable which is explained by the independent variables, adjusted for d.f.

SE is the standard error of the estimate.

D-W is the Durbin Watson statistic.

All equations passed a standard 'F' test at the 5 percent level of significance.

*Significant at the 10 percent level of significance.

The fiscal coefficients' patterns are similar across countries. The Canadian coefficients start out positive, increase for the second and third quarters and diminish. This pattern is also true for the United States, Japan, Germany, and Australia, but only the Canadian and United Kingdom summed coefficients are positive and significant, and indicate the impact of changed fiscal expenditures upon GNP are stronger than monetary changes. For the U.K., monetary changes are stronger.

The coefficients of the "pooled" equation exhibit the same general pattern as outlined for the individual countries. The summed coefficients of the monetary variable are statistically greater than zero, while the summed fiscal expenditure coefficients are not. As is generally the case with the individual countries, the fiscal coefficients are positive and significant for the contemporary and initial lag quarter, diminish and become negative for the third through the sixth quarter impact.

A Chow-Pooled "F" test procedure was used to evaluate the null hypothesis that the equations of the individual countries are not statistically different from the pooled equation. This test is never rejected, indicating a similarity of coefficient estimates across countries. This is true even though the coefficients of the fiscal expenditure variables for both the Canada and the U. K. are positive and significant due to the nature of the Chow test which tests the total estimates' explanatory power rather than equality of the individual coefficients.

The coefficients of the Total Spending Equation explain the percentage of a change in the money supply, or fiscal expenditures, in a

particular quarter that can be expected to cause a change in GNP. Although the summed impact of the monetary coefficients appears positive and significant, which tends to reinforce other studies, the values are much lower and the pattern is noticeably different [5,7,49,50]. The pattern, on the other hand, of the fiscal impact coefficients are similar to other studies as are the coefficient values, with the exception of Canada and the U.K.

The Interest Rate Equation (5) was estimated for the long term and the short term interest rates and is presented in Table 3.4, p. 42, and Table 3.5, p. 44. Interest rates are specified as dependent upon rates of change of the money stock ($\dot{M}_{t-i}$), past rates of change of real output ($\dot{X}_{t-i}$), and past rates of price change (P_{t-i}) adjusted by an unemployment rate index. Interest rates are not used in the model to develop a "transmission mechanism," rather, it is used to develop information for the Price Anticipation Equation (2).

The Price Equation (2) is presented in Table 3.3, p. 38. The Anticipated Price variable is developed using the estimated price coefficients from the Long Term Interest Rate Equation, where:

$$P_t^A = Y_{t-2}\left\{\left|\left(\sum_{i=o}^{n} P_i \frac{P_{t-i}}{U_{t-i}/U^*}\right) .01 + 1.0\right|^{1/4} - 1.0\right\}.$$

As shown, this coefficient is positive for all countries and significantly greater than zero for all but Japan.

The Demand Pressure variable developed a positive and significant summed coefficient for Australia, Japan, and the U.K.; negative and significant for Canada; and not significantly different from zero for Germany and the U.S.

An explanation for the variation in the Price Equation estimate is not readily apparent. This equation was estimated by varying the number of lags from the contemporary period to five lagged quarters. There was also a question of the possibility of a structural shift occurring due to the collapse of the international monetary system, various price freeze policy decisions, and/or the "Energy Crisis." Equations were reestimated using dummy variables for different time periods of 1970-74. The dummy variable appeared significant in a small number of estimates, but this was not true across countries nor for all lag periods within countries. The results presented are considered "best" as a group and for comparability.

The Long Term (LTR) and Short Term (STR) interest Rate Equations shown in Table 3.4, p. 42, and Table 3.5, p. 44, respectively, were estimated in a number of forms using contemporary rates of change of the money supply as well as a one-quarter lag. Similarly, the number of lags for the output influence as well as price influence variable were varied from zero to thirteen quarters. Those reported are "best" using the criteria of minimal standard errors, and significance of added lagged variables upon the $\bar{R}^2$ value.

A review of the STR equation shows that the monetary influence on the interest rate is negative as expected although the significance of the coefficient is acceptable only in the cases of Canada, Germany, and Japan. The coefficients of output influence on the short term interest rate tended to be positive as expected, but generally insignificant for the individual and summed coefficients (sums only are shown). The

individual coefficients of the price variable were generally positive, though not uniformly significant; the summed coefficients are both positive and significant.

As in the case of the Price Equation, the LTR and STR Equations were estimated with variations of the lag periods using the same criteria of evaluating the added impact on $\bar{R}^2$ and minimal standard errors. The results tend to substantiate the Fisherian argument of a price influence on interest rates, though the theoretically expected influence of the monetary and output influence is not consistent. Similarly for the LTR Equation, the monetary and output influence are generally not significant, while the price influence is positive and significant. Eliminating the monetary and/or output variables totally from the estimation process caused a decrease in the $\bar{R}^2$ values for the equation, though the size of this decrease varied. Since the SLM does include these variables, and they are theoretically important, the "best" results are reported.

The Unemployment Rate Equation (7) is shown in Table 3.6. The $\bar{R}^2$ and contemporary GNP Gap variable's power in explaining the rate of unemployment is consistently high. A close investigation of the variables in this equation indicates the $\bar{R}^2$ and GNP Gap variable should be high and significant since the GNP Gap is a function of the unemployment rate, the level of frictional unemployment, and a productivity factor of 3 percent. In the case of each country, the constant is extremely close to the value of the frictional level of unemployment, and the coefficient of the GNP Gap variable is extremely close to the productivity factor. Simply stated, the $\bar{R}^2$ and coefficients are high since the equation is one

Table 3.6

Unemployment Rate Equation

$$U_t = a_o + g_1 G_t + g_2 G_{t-1}$$

Country	Time Period	Constant	G_t	G_{t-1}	$\bar{R}^2$ D-W S.E.
Australia	3/61 - 2/74	1.43 (1864)	.34 (422.6)	-.001 (-1.42)	.9998 1.50 .0044
Canada	4/59 - 2/74	4.67 (274.6)	.36 (100.3)	-.006 (-1.81)	.9953 1.87 .115
Germany	4/60 - 2/74	.72 (215.2)	.35 (193.0)	-.003 (-0.17)	.9992 1.50 .019
Japan	4/59 - 2/74	.91 (2347)	.34 (750.9)	-.0007 (-1.61)	.9999 2.20 0
United Kingdom	4/59 - 2/74	2.00 (306.5)	.34 (230.4)	-.001 (-0.71)	.9990 2.01 0
United States	4/59 - 2/74	4.00 (404.6)	.36 (153.4)	-.005 (-2.31)	.9981 1.99 .033

Symbols are defined as follows:

U_t = unemployment as a percent of labor force in quarter t.

$$G_t = \frac{X_t^f - X_t}{X_t^f} \times 100$$

X_t^f = potential real output in quarter t. (1963 = 100)

X_t = actual real output in quarter t. (1963 = 100)

Table 3.6 (Continued)

Note: "t" statistics appear in parenthesis with each regression coefficient.

$\bar{R}^2$ is the percent variation in the dependent variable which is explained by the independent variables, adjusted for d.f.

SE is the standard error of the estimate.

D-W is the Durbin Watson statistic.

All equations passed a standard 'F' test at the 5 percent level of significance.

where a dependent variable is regressed upon a multiple of itself as the independent variable.

In summary, the SLM has been estimated using a 2SLS estimating procedure. The estimates show a remarkable similarity in the pattern and significance of coefficients across all countries. With the exception of the Unemployment Rate Equation (7), the $\bar{R}^2$ values of the estimated equations are all within the generally acceptable range. In addition to the general similarity across countries, the Total Spending Equation (1) was estimated and tested using a "Chow Pooled 'F' Test." The null hypothesis that the equations are statistically equivalent was accepted with a 5 percent probability of this occurring by chance.

CHAPTER 4

SUMMARY AND CONCLUSIONS

The purpose of this chapter is to summarize the results of this study and to present conclusions and policy suggestions. Since the results of this study are presented in detail in Chapter 3, reference to the results will be on a general level.

The two-decade debate between Monetarists and Keynesians has centered around the question of the relative importance of changes in monetary variables and fiscal variables in causing changes in GNP. The debate centers around fundamental differences in interpretation of how each policy change affects the underlying decision making processes of economic units. Subsidiary to the debate, but integral to the argument in general, are the questions of the importance of the impact of changes in the money supply or fiscal expenditures upon interest rates, the price level, employment and output; and how the impacts are transmitted through the economy.

Whereas Keynesians argue that monetary policy is effective as a policy tool by its impact upon interest rates, Monetarists argue that the impact is too general and dispersed to be traced specifically through particular markets, but do have impact on a wide range of interest rates and therefore affect the yields on a wide range of assets. Keynesians also argue that changes in fiscal expenditures have a direct and immediate impact upon aggregate demand and have a multiplicative effect upon GNP. Monetarists,

on the other hand, argue that changes in fiscal expenditures tend to "crowd out" private demand and therefore have minimal impact on GNP. This is especially true during periods of full employment.

The prime objective of this study is to evaluate the "generality" of Monetarist arguments, as presented in the SLM, using data from six countries with similar economic systems. The results, as presented in Chapter 3, indicate the SLM is applicable to "open market" oriented economies and generally substantiate Monetarist arguments.

The estimates of the Total Spending Equation are all within a statistically acceptable range. In all countries, the summed coefficients of the monetary variables' impact upon changes in GNP are positive and significant, confirming the argument of a strong effect of changes in the money supply upon changes in GNP. In four of the six countries the impact of changes in fiscal expenditures upon changes in GNP are not statistically different from zero, which raises some questions concerning the validity of Keynesian arguments. This result is substantiated by the "Chow Pooled 'F' Test" which consistently failed to reject the hypothesis of equivalency of the individual and pooled coefficient estimates of the Total Spending Equation.

The Interest Rate Equations of the SLM do not attempt to specify a "transmission mechanism" but are specified in a manner to provide information to calculate a price anticipation variable for the Price Equation. The Interest Rate Equations are also used to evaluate the question of a "Fisher" or expected price effect upon interest rates and includes variables to evaluate the effect of demand pressures. The estimates of

the coefficients of the equations indicate that, for the time period studied, demand pressure did not have a consistent impact upon interest rates, but the expected price or "Fisher" effect is substantitated.

The Price Equation indicates a direct and important role of anticipated inflation upon prices. Output pressure appears to have a relatively small effect, again, for the period studied.

The Employment Equation, as pointed out in Chapter 3, is shown to be of a questionable structure and will not be commented upon.[2]

Basically two criteria are used to evaluate the generality of this model. In addition to the similarity of estimated coefficients, the pattern of the coefficients is also believed important. That is, the values of the coefficients were not necessarily expected to be identical, but the similarity of the pattern of the coefficients is believed important for substantiation of the model's "generality."

Due to the number of lagged variables in the Interest Rate Equations, the individual coefficients are not presented. The pattern of the coefficients of the price variables in both the Long Term Interest Rate Equation and the Short Term Interest Rate Equation are similar across countries. Contemporary period up and up to two or three quarter lagged price variables generally have low valued ($\pm$.01) and statistically insignificant coefficients. The three to six quarter lagged variables tended to have larger (.04 to .30) and statistically significant coefficients. The coefficients of the seventh through tenth quarter variables

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[2]The question of the structure of the Employment Equation was discussed with K. Carlson directly. He stated that he and Andersen are aware of the noted problem and are reevaluating its structure.

tended to diminish in size and statistical significance. Summed coefficients are positive and (with the exception of the Short Term Interest Rate Equation for Germany) statistically significant.

The pattern of the coefficients of the demand pressure (output) variables in both the Long Term and Short Term Interest Rate Equations are similar to the pattern of the price variable coefficients, are lower valued and generally not statistically significant either individually or summed.

The significance and values of the summed Demand Pressure coefficients of the Price Equation varied considerably, being positive and significant for Australia, Japan, and the U.K.; not significantly different from zero for the U.S. and Germany; and negative and significant for Canada. But, even though there are differences in the summed coefficients, the pattern of the coefficients are similar (see Table 3.3, p. 38).

The size and significance of the Demand Pressure and Price coefficients were initially thought disappointingly low. But both the Demand Pressure and Price variables are specified or adjusted to unemployment levels in relationship to a frictional unemployment concept. In light of the arguments developed earlier and those of W. Oi [61] and D. Gordon [40] indicating a theoretical basis for business firms to lag employment policy adjustments to changes in demand the fact of positive and significant coefficients at all appears to reaffirm the accuracy and validity of the SLM.

An examination of the pattern of the Total Spending Equation indicates a remarkable similarity. For contemporary and first quarter

lags the estimated fiscal variable coefficients are generally characterized by small and statistically insignificant values; estimated coefficients of variables lagged four to six quarters generally are near zero or negative. The estimated monetary variables coefficients which are initially positive fall then rise, producing an oscillating pattern whose summed values are positive and significant.

Overall, this study tends to substantiate the generality of the SLM: the criteria established as a framework for evaluating the generality of the model are fulfilled. Additionally, central Monetarist arguments are substantiated while Keynesian arguments of a consistent and strong effect of changed fiscal expenditures upon changes in GNP are not.

The implications of this study for policy considerations are fairly straightforward. It is apparent from this study that changes in the money supply have a significant impact upon nominal GNP. Unfortunately, nominal and real GNP are not equivalent measures of economic activity. This implies that a continuous policy of "easy" money is a precursor of inflation which affects interest rates and validates inflationary pressures.

Unfortunately, this study does not substantiate Monetarist arguments pertaining to the consistency or evenness of the impact of changes in the money supply upon GNP. The oscillating pattern noted above is contradictory to other reported single-equation estimates of the Total Spending Equation and the original work of Andersen and Carlson [5, 7, 49, 50]. These other studies reported both ordinary least squares and Almon Distributed Lag techniques of estimation, with coefficient

estimates indicating a strong and consistent rather than oscillating pattern as reported here. However, M. Friedman (see in particular 33, pp. 12-13) has consistently argued that the impact of a change in the money supply can have an oscillatory effect upon changes in nominal GNP and P^u which could be exacerbated by policies of central banks when changes in the rate of change of the money supply vary widely from quarter to quarter. Thus, rather than destroying the claims of Monetarists concerning the importance of a steady monetary policy, it reinforces the concern about the destabilizing consequences of an "easy" or highly variable policy. Therefore, implications of the discrepancy between this and other studies can be viewed as enlightening and perhaps a warning rather than as indicating a weakness in Monetarist arguments. This is especially true since the trend of monetary policy in the U. S. and most of the other countries in this study are characterized by "loose" and erratic monetary policy, particularly in the late 1960's and early 1970's, whereas the earlier studies covered periods with more stable monetary policies.

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APPENDIX

STATISTICAL DATA

The basic data for this study were obtained from the IMF publication, International Financial Statistics, 1959-75. This data is gathered by the various countries and adjusted to consistent standards.

The Interest Rates used are an exception to this statement in that they are not equivalent to the rates used in the original study nor are they for identical type financial assets. This was felt to be a major concern since most studies show the structure of interest rates for different assets do move together. Therefore, interest rates used were kept consistent within each country. GNP and money supply data were seasonally adjusted by the four quarter moving average method.

Unemployment data were obtained from the International Labor Organization publications, International Labor Preview: A Statistical Supplement, 1959-1964, and the Bulletin of Labor Statistics, 1964-75.

Data on government transfers were obtained from:

Australia - Reserve Bank of Australia: Statistical Bulletin, 1959-74.

Canada - Canadian Yearbook, 1959-74.

Germany - Monthly Report of Deutsche Bundesbank; Monthly Statistical Supplement, 1959-74.

Japan - Japan Statistical Yearbook, 1959-74.

United Kingdom - Annual Abstract of Statistics, 1959-74.

United States - Unemployment Insurance Statistics, 1959-74.

VITA

George P. Lephardt was born in New York, New York, on November 11, 1940. He went to primary and secondary schools in New York, New York. He graduated from The University of Delaware, Newark, Delaware, with a Bachelor of Arts Degree in Economics in 1969, and The University of Wisconsin, Milwaukee, Wisconsin, with a Master of Arts Degree in Economics in 1971. He entered the Graduate School at The University of Tennessee, Knoxville, in September 1971, and received the Doctor of Philosophy Degree with a major in Economics in August 1976. He is currently a member of the faculty at Ball State University, Muncie, Indiana.