

## THE POLICY EVALUATION WITH CHANNELS OF INFLUENCE TECHNIQUE: EXAMINATION OF STOCK MARKETS CASE

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*To show that stock prices reflect all information available including fiscal and monetary variables, we consider how budget deficits affect a financial market based on theoretical considerations and channels involved in the system. We argue that simple regression methodology is not enough to reflect all the information on stock price determination, since there exists a causal relationship among endogenous variables. To eliminate expected statistical problems, we set up a simultaneous equation model which includes fiscal as well as monetary information. Five major channels of fiscal effects on stock price determination have been hypothesized and tested. The results indicate that fiscal policy as well as monetary influences stock prices through four channels(i.e., liquidity, inflationary, psychological, and income effects).*

### I. INTRODUCTION

Unprecedented U.S. federal budget deficits and trade deficits in recent years have stimulated speculation about their adverse effects on the current and future performance of the U.S. economy, and we expect these two effects could well spill over into overall economy in the U.S. Previous studies have been more concerned the degree of impacts of economic policy on the final goals than the channels of influence. Thus, it has been used to employ the multiple regression technique to test the significance of policy variables on the target measures. However, In economic sense, this technique has weakness that it does not reflect the causal effect between policy variables and target variables. Based upon the above argument, we set up the structural model to absorb the impacts on interdependence among variables so that we employ the simultaneous method.

The main purpose of this paper is to develop some economic explanations of how the impact of economic policy transmits to the target measures.

To simplify this broad ideas, we apply the channels of influence technique to

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the stock markets. However, the macroeconomic literature has concentrated on the relationship between monetary policy and stock prices. Only little effort has been made to examine the fiscal effects of budget deficits on financial markets (Dar-rat 1988). In connection with this general objective, this study will attempt to identify the endogenous and exogenous variables that are believed to exercise influence on stock prices. To the extent that these channels can be disclosed, important advances in the connection of the government policy with activity of financial markets might be achieved. Section 2 reviews the literature related to the model and theoretical considerations. In section 3, a theoretical model is presented. From the model, the empirical model for tests is derived and discussed. We also specify the hypotheses. We describe the data and methodology employed in section 4. Empirical results are analyzed in section 5. Summary and conclusions are presented in the last section.

## II. THEORETICAL CONSIDERATIONS

### 1. Monetary Effects on Stock Prices

On the basis of the quantity theory of money, Sprinkel(1964) suggests that "as excessive liquidity developed, spending units would be induced to exchange money for less liquid forms of assets. This action would tend to place upward pressure on the price of less liquid assets such as common stocks"(p. 12). Keran(1971) and Modigliani(1972) develop an econometric model to explain the behavior of stock prices. They found that the nominal money stock has little direct effect on stock prices, but does have an indirect effect through inflation and expected corporate earnings. On the contrary, Hamburger and Kochin(1972) estimate the relationship between monetary policy and movements in equity prices. To do this, they divide the monetary effects into liquidity, earning, and risk premium effects. They also state that "It seem clear, however, that changes in monetary growth have a number of different effects on the market. The evidence presented here suggests that there is also a direct portfolio effect"(p. 246).

Using Barro's(1977) two-stage technique, he, divides the money growth into "anticipated" and "unanticipated" components. He investigates the relationship between the level of stock prices and two components. He finds that the level of stock prices are significantly related to contemporaneous and future changes in "unanticipated" money growth and not significantly related to changes in "anticipated" money growth. That is, only the unanticipated portion of money growth has a significant impact on stock prices, Rozeff(1974) examines stock market efficiency with respect to money supply data by testing regression models of stock returns on monetary variables. He shows evidence that there is no lag in the effect of monetary policy on the stock market. This is consistent with the efficient market model. However, according to the Monetary Portfolio (MP) model developed by

Brummer(1961), Friedman(1961) and Cagan(1972), unexpected increase(or decrease) in money growth causes disequilibrium in asset portfolios by the transmission mechanism. This wealth effect spills over a variety of assets in asset market: short and long term bonds, stocks and capital goods. Thus, monetary policy has a long lagged effect on asset markets in the economy. This is in contrast with the results from the efficient market hypothesis.

## 2. Fiscal Effects on Stock Prices

The aforementioned studies tended to concentrate on the interrelationship between the money stock and stock prices, even when they employed differing methods of research. Very little attention was devoted to examining fiscal effects on financial markets. In fact, the effect of fiscal policy(e.g tax cut) on stock prices and actual revenues collected are much more controversial, and require more extensive verification. Thus, reviewing the theoretical and empirical underpinning would be useful to justify the fiscal effects on stock prices.

According to Tobin's argument(1969), the determination of equilibrium prices in asset markets is influenced by fiscal policies as well as monetary policies, since the value of aggregate wealth may depend on asset prices, which are themselves related to the interest rate that is determined in the real and monetary sectors. Within the Tobin framework(1969), information on budget deficits should be included in the system to explain movements of the equity prices.

Darrat(1988) argued that past studies failed to test the SME hypothesis because only information on monetary policy was employed to reflect all available information. The possible effects of fiscal policy were not included. Thus, he develops a multiple regression model which includes monetary and fiscal policy variables such as the money growth rate and the budget deficit. He finds that in the case of Canada the empirical results do not conform to the stock market efficiency hypothesis since the lagged coefficients of both unanticipated and anticipated fiscal policy are statistically significant. However, the major drawback of his study was that he did not analyze the ways in which fiscal policy can affect stock prices.

## 3. Hypothetical Channels of Influence

### 3.A. Budget Deficit - Interest Rate - Stock Prices

The most widely used paradigm in macroeconomics is the IS-LM model. Its general use reflects not only that it is analytical, but also that most economists generally accept its basic concepts and structural assumptionl. According to this analysis, if either government spending increases or a tax reduction occurs, the level of equilibrium income increases at any given price level. The increase in income creates excess demand in the money market, thereby raising the interest rate along the LM curve. An alternative view is that of Barro(1974), who contends

that households understand that a current deficit entails additional future tax liabilities equal in present value to the current deficit. For this reason, households do not regard a deficit as contributing to their permanent private disposable income. Consequently, households do not raise their consumption but instead increase their savings. The interest rate may be unchanged. This is what we call "Ricardian equivalence theorem."

### 3.B. *Budget Deficit - Interest Rate - Trade Deficit - Stock Prices*

The budget deficit may also affect the trade deficit through the effect of changing the exchange rate. Trade deficit measures also have an impact on stock movements, since the trade deficit is not only one of the indicators of future economic activity, but is also a sign of weakening in the purchasing power of the U.S. dollar. Such weakness may induce a tightening of monetary policy in an effort to increase the value of the dollar. This effect can spill over into the stock market. According to conventional wisdom, the budget deficit is the main factor behind a higher trade deficit. If the budget deficit is increased, interest rates may go up which will raise the foreign exchange value of the dollar, and cause net exports to deteriorate.

### 3.C. *Budget Deficit - Interest Rate - User Cost of Capital - Investment - Stock Prices*

In this section, we will review how the liquidity effect is spread over the stock prices through the user cost of capital. The general definition of user cost of capital is expressed as a percentage figure:

$$UCC = r + d - p$$

where UCC = user cost of capital

r = interest rate

d = depreciation rate

p = capital gain or rate of inflation

If a higher interest rate is expected in the future as the budget deficit is anticipated to be larger, given the depreciation rate, the user cost of capital will be positively correlated with the interest rate. The higher user cost of capital will lead to not only lower investment in new plant and equipment, but will also reduce the corporate earning. Eventually, this information would be reflected in stock price movements.

### 3.D. *Budget Deficit - Changes in Personal Income and Wealth - Transmission Mechanism - Stock Prices*

According to the monetary portfolio (MP) model, "an investor reaches an equilibrium position in which, in general, he holds a number of assets including money in his portfolio of assets. A monetary disturbance such as an unexpected

increase (or decrease) in the growth rate of the money supply causes disequilibrium in asset portfolio by making actual money balances depart from desired money balances. The attempt by investors as a group to attain their desired money positions then transmits the monetary change to markets at large. Investors respond to the wealth effect of increased money growth by exchanging money for a variety of assets in asset markets: short and long-term bonds, stocks, real estate, durable goods, capital goods and human capital”(Rozelf, p.246).

### 3.E. *Budget Deficit - Confidence Level - Stock Prices*

An important variable, public confidence, may also be involved in the determination of stock prices. This variable has not been considered in previous studies.

According to the Fred(1986) study, to analyze economic behavior, two sets of factors, economic factors and psychological factors(confidence, expectations, and aspirations) should be considered since economic factors represent the ability to buy and psychological factors define the willingness to buy. However, it is not easy to measure confidence and expectations. Thus, he uses a proxy variable which is the Index of Consumer Sentiment (ICS) as an indicator of consumer confidence in order to analyze consumer behavior. This index was designed to more effectively explain the influence of consumer's expection on their future behavior. DRI model includes the ICS to measure the expections directly from consumer attitude surveys(Eckstein 1983). The most important idea is what makes consumers become more optimistic, or more pessimistic at a given time. If we apply this proxy variable to measure the confidence of rational agents, it might be an additional explanatory variable in explaining the effects of budget deficit announcements on stock price movement.

### 3.F. *Budget Deficit - Expected Inflation - Stock Prices*

When a deficit occurs, the Treasury must acquire money to clear the deficit. This is accomplished in the United States by issuing government bonds. Generally, the increased demand for credit in financial markets, if not affected by an increase in credit supply, puts upward pressure on interest rates. The Fed could undertake an action to ease monetary conditions to prevent the rise in interest rates in credit markets. To do this, the Fed would purchase government bonds from banks or the public. Both types of purchases would cause bank reserves to increase. To decide whether or not it is realized, we have to consider the relationship between the budget deficit and money growth. Feldstein (1980) argued that, an increase in the deficit placed upward pressure on the inflation rate, since the then current U.S. tax rules and monetary policy of keeping the real interest rate constant induced a higher inflation rate and lower capital intensity. This resulted in reduced real after-tax corporate profits and lower stock prices. However, Vance Roley and Pearce(1985) demonstrated a different possible channel through which

inflation might affect the stock market.

### 3.G. Budget deficit - Foreign capital inflow - Stock Prices

Foreign capital inflow in the U.S. has increased in the past decade. At year end 1987, foreign assets and investments in the U.S. total \$1.5 trillion and exceed the value of U.S. assets abroad. Foreign capital inflow can be divided into two categories: direct investment and portfolio investment. In this study, concentration is placed on the portfolio investment because this part is assumed to be relatively sensitive to the U.S. financial markets. If the budget deficit is increased, then domestic interest rates are generally expected to rise. This may induce a foreign capital inflow. Therefore, foreign investors will rearrange their asset portfolios based on the relative yields on comparable assets at home and abroad. A portion of the foreign capital inflow may be invested in stocks as well as in fixed yield securities. This may have a positive influence on stock prices. However, the total effect (liquidity and foreign capital effects) is ambiguous because rising interest rates tend to make stock prices go down. Therefore, foreign capital inflow is considered to be another factor useful in analyzing the demand for assets.

## III. THE MODEL

### 1. Liquidity Effects

- (1)  $m_d = M_d/p = f_1(R, GNP, INF)$
- (2)  $M_s = f_2(UR, R_d)$
- (3)  $M_d/p = M_s/p$
- (3a)  $R = f_3(INF, GNP, UR, R_d)$
- (3b)  $GNP = f_4(BD, M_s/D)$
- (3c)  $R = f_5(INF, BD, UR, R_d)$
- (4)  $X = f_6(E, P_w/P_x)$
- (5)  $p_x = g_1(p, GNP/GNP_p, E)$
- (6)  $M = f_7(GNP, P_i/P)$
- (7)  $p_i = g_2(p, GNP/GNP_p, E)$
- (8)  $TD = X - M$
- (9)  $E = f_8(x, m, M_s)$
- (10)  $CA = f_9(r, GNP, INF)$

### 2. Income Effects

- (11)  $GNP = C + I + G + X - M$
- (12)  $c = h_1(r, YD, BD)$
- (13)  $YD = GNP - DEPR - T$
- (14)  $T = h_2(GNP)$

$$(15) I = h_3(UCC, GNP, K_{-1})$$

$$(16) UCC = i + d - \text{inf}$$

$$(17) d = \text{DEPR}/K_{-1}$$

$$(18) K = K_{-1} + I_n$$

$$(19) BD = G_f - T_f$$

$$(20) T_f = h_4(GNP)$$

### 3. Psychological Effects

$$(21) ICS = h_5(C, BD, INF_{t-i}, TD, U, SP_{t-i})$$

$$(22) U = h_6(GNP/GNP_p)$$

### 4. Inflationary Effects

$$(23) INF = h_7(\% \Delta M, \% \Delta BD, GNP/GNP_p)$$

$$(24) P = P_{-1} (1 + INF)$$

### 5. Foreign capital Effect

$$(25) F = h_8(SP, BD)$$

$$(26) SP = h_9(R, GNP, ICS, INF, F, Z)$$

### List for Endogenous Variables

R	: market rate of interest
BD	: real budget deficit or surplus
$M_s$	: nominal money stock
INF	: inflation rate
GNP	: real gross national product
UR	: unborrowed reserve
$R_d$	: discount rate
P	: implicit GNP deflator
$P_w$	: price of world trade
$P_x$	: implicit deflator for exports
E	: weighted average exchange rate
$GNP_p$	: potential GNP
$P_i$	: price index of imports
TD	: trade deficit
X	: exports of goods and services
M	: imports of goods and services
E	: weighed average exchange rates
x	: real exports of goods and services
m	: real imports of goods and services
CA	: real corportate profit after tax

c	: real consumption expenditure
i	: real gross investment
g	: total government expenditure
YD	: real disposable income
DEPR	: depreciation with capital consumption adjustment
T	: total tax collection minus transfer payments and misc.
$K_{-1}$	: capital stock in previous period
UCC	: user cost of capital
$I_n$	: net investment
$G_f$	: total federal expenditures
$T_f$	: total federal receipts
ICS	: index of consumer sentiments
U	: unemployment rate
$GNP_p$	: potential GNP
F	: foreign capital inflow
Z	: lagged values of endogenous variables

#### IV. DATA AND METHODOLOGY

The study uses U.S. quarterly observations covering the period 1969 to the end of 1987. The starting period corresponds to the availability of the survey data used.

In the preceding model the variables  $R$ ,  $M_d$ ,  $M_s$ ,  $TD$ ,  $CA$ ,  $GNP$ ,  $YD$ ,  $C$ ,  $I$ ,  $X$ ,  $M$ ,  $U$ ,  $UCC$ ,  $d$ ,  $K$ ,  $E$ ,  $BD$ ,  $T$ ,  $T_f$ ,  $ICS$ ,  $P$ ,  $P_i$ ,  $P_x$ ,  $INF$  and  $SP$  are treated as jointly dependent, or endogenous variables and  $UR$ ,  $R_d$ ,  $P_w$ ,  $G_f$ ,  $DEPR$ ,  $GNP_p$ ,  $K_{-1}$ ,  $GNP_{t-1}$ ,  $ICS_{t-1}$ ,  $CA_{t-1}$ ,  $BD_{t-1}$ ,  $M_{t-1}$ ,  $INF_{t-1}$ , and  $SP_{t-1}$  are treated as exogenous or predetermined. In all, there are twenty-five equations (including the nine identities) to study the interdependence of twenty-five endogenous variables. Having assumed that the model represents the structure that truly generates the data, the problem exists as to whether it is possible to draw inferences from the probability distribution of the observed random variables back to an underlying structure.

In equation (26), the monetary effect and five hypothetical effects of fiscal policy on stock returns, which is assumed to reflect all information, is represented. Since each variable is regarded as endogenous, a simple linear regression method cannot be applied to estimate the parameter.

$$(26a) \quad SP = AY_{26} + BZ_{26} + V_{26}$$

Where  $Y_{26}$  are the included endogenous variables in equation (26a) and  $Z_{26}$  are the included predetermined variables in equation (26a). The 2SLS technique consists of replacing  $Y_{26}$  by a computed vector  $\hat{Y}_{26}$  which is the fitted value from regressing  $Y_{26}$  on the exogenous variables in the model,



$$\hat{Y}_{26} = Z(Z'Z)^{-1}Z'Y_{26}$$

where  $Z$  is the  $T \times K$  matrix of all the predetermined variables in the model ( $T$  = observations,  $K$  = number of predetermined variables in the model), Then an OLS regression of  $SP$  on  $\hat{Y}_{26}$  and  $Z_{26}$  is performed yielding the normal equations,

$$\begin{bmatrix} \hat{Y}_{26}' \hat{Y}_{26} & \hat{Y}_{26}' Z_{26} \\ Z_{26}' \hat{Y}_{26} & Z_{26}' Z_{26} \end{bmatrix} \begin{bmatrix} a \\ b \end{bmatrix} = \begin{bmatrix} \hat{Y}_{26}' SP \\ Z_{26}' SP \end{bmatrix}$$

where  $a$  and  $b$  denote the 2SLS estimator of  $A$  and  $B$ .

To separate the five effects of  $BD_t$  on  $SP_t$ , a total derivative of  $SP_t$  is taken with respect to  $BD_t$  in equation (26). The total effect of budget deficits on stock price can be shown as follows:

$$\begin{aligned} \frac{dSP_t}{dBD_t} &= \left( \frac{a_1}{dR_t} \right) \left( \frac{b_1}{dBD_t} \right) + \left( \frac{dSP_t}{dGNP_t} \right) \left( \frac{dGNP_t}{dBD_t} \right) + \left( \frac{dSP_t}{dICS_t} \right) \left( \frac{dICS_t}{dBD_t} \right) \\ &+ \left( \frac{dSP_t}{dINF_t} \right) \left( \frac{dINF_t}{dBD_t} \right) + \left( \frac{dSP_t}{dF_t} \right) \left( \frac{dF_t}{dBD_t} \right) \end{aligned} \quad (26b)$$

The total fiscal effect on stock price is assumed to have five hypothetical parts, with each part composed of two measures. The former portion,  $a_1$ , can be calculated by the regression in equation (26), and the latter portion,  $b_1$ , can be figured by the regression in equation (3b), (3c), (21), (24), and (25). Once the  $a_1$  and  $b_1$  are obtained, then the coefficients and sign of  $dSP_t/dBD_t$  can be calculated. The next task is to test the significance of the coefficient of  $dSP_t/dBD_t$ . To figure out the significance of the parameter, the standard errors of  $dSP_t/dBD_t$  is estimated. Since the estimator is nonlinear in the parameters, there is a reliance on asymptotic results. In general, if the estimator is  $f(A)$  then

$$f(A)_{1 \times 1} \sim N \left( \frac{dSP_t}{dBD_t}, \frac{df}{dA_{1 \times 10}} \text{Var}(A)_{10 \times 10} \frac{df'}{dA_{10 \times 1}} \right)$$

where  $A_{1 \times 10} = (a_{26}, a_{26,2}, a_{26,3}, a_{26,4}, a_{26,5}, a_{3c,2}, a_{3b,1}, a_{21,2}, a_{23,2}, a_{25,2})_{1 \times 10}$

An asymptotic variance of  $f(A)$  is composed of  $df/dA$  and  $\text{var}(A)$ <sup>22</sup>.  $df/dA = (a_{3c,2}, a_{3b,1}, a_{21,2}, a_{23,2}, a_{25,2}, a_{26,1}, a_{26,2}, a_{26,3}, a_{26,4}, a_{26,5})_{1 \times 10}$

To determine the variance-covariance matrix of  $f(A)_{10 \times 10}$  unknown parameter

vector  $(\beta)$  and the total covariance matrix  $(\text{var}(\beta)_{k \times k})$  should be defined<sup>21</sup>.

$$\beta_{k \times 1} = (X'X)^{-1}X'Y$$

Where  $X =$

$$\begin{bmatrix} \hat{X}_1 & & & & & \\ & \hat{X}_2 & & & & \\ & & \hat{X}_3 & & & \\ & & & \hat{X}_4 & & \\ & & & & \hat{X}_5 & \\ & & & & & \hat{X}_6 \end{bmatrix}$$

and  $X_i$  is all the explanatory variable in the equation i.

$$\text{Var}(\beta) = \text{plim} \left( \left( \frac{X'X}{T} \right)^{-1} \left( \frac{X'E(ee')X}{T} \right) \left( \frac{X'X}{T} \right)^{-1} \right)$$

Where  $e_t$  is relevant subset matrix of  $V_t$ .  
It is assumed that the covariance of  $e$  is as follow.  
 $E(ee') = \Sigma \times I$

where  $\Sigma =$

$$\begin{bmatrix} \Sigma e_{1i}^2 & \Sigma e_{1i}e_{2i} & \dots & \Sigma e_{1i}e_{6i} \\ \Sigma e_{2i}e_{1i} & \Sigma e_{2i}^2 & \dots & \dots \\ \dots & \dots & \dots & \dots \\ \Sigma e_{6i}e_{1i} & \dots & \dots & \Sigma e_{6i}^2 \end{bmatrix} \quad 6T \times 6T$$

If the  $\text{Var}(\beta)$  is rewritten,  
 $\text{Var}(\beta)_{k \times k} = (X'X)_{k \times k}^{-1} (X'\Sigma X)_{k \times k} (X'X)_{k \times k}^{-1}$   
where  $\Sigma k_i = K$   
 $k_i = \#$  of parameter estimated in equation i

To calculate the standard error of  $f(A)$ , the first step is to define  $X_{6t \times k}$  and  $\Sigma_{6t \times 6t}$ . Once  $X$  and  $\Sigma$  are obtained, then the variance-covariance matrix of  $\beta_{k \times k}$  can be determined. The second step is to select the variance-covariance elements of  $\text{var}(A)$  which is needed to test the significance of  $dSP_t/dBD_t$ .

Variance-covariance matrix of  $f(A)_{10 \times 10}$  is

$$\begin{bmatrix} \text{var}(a_{26,1}) & \text{cov}(a_{26,1} \ a_{26,2}) & \text{cov}(a_{26,1} \ a_{26,3}) & \dots & \text{cov}(a_{26,1} \ a_{25,2}) \\ \text{cov}(a_{26,2} \ a_{26,1}) & \text{var}(a_{26,2}) & \text{cov}(a_{26,2} \ a_{26,3}) & \dots & \text{cov}(a_{26,2} \ a_{25,2}) \\ \text{cov}(a_{26,3} \ a_{26,1}) & \text{cov}(a_{26,3} \ a_{26,2}) & \text{var}(a_{26,3}) & \dots & \text{cov}(a_{26,3} \ a_{25,2}) \\ \dots & \dots & \dots & \dots & \dots \\ \text{cov}(a_{25,2} \ a_{26,1}) & \text{cov}(a_{25,2} \ a_{26,2}) & \text{cov}(a_{25,2} \ a_{26,3}) & \dots & \text{var}(a_{25,2}) \end{bmatrix}$$

The third step is to calculate the  $\left[ \frac{\partial f}{\partial A} \text{var}(A) \frac{\partial f'}{\partial A} \right]_{1 \times 1}$  and

to take the square-root of  $\text{var}(f(A))$ , the standard error for  $dSP_t/dBD_t$  is defined. Once the standard error is determined, the significance of  $SP_t/BD_t$  can be determined.

If the sign of  $dSP_t/dBD_t$  is positive, it implies that the income and foreign capital effects outweigh the liquidity, psychological, and inflationary effects. If the sign of  $dSP_t/dBD_t$  is negative, then the liquidity, psychological, and inflationary effects outweigh the generating income and foreign capital effects<sup>23</sup>.

V. HYPOTHESIS AND EMPIRICAL RESULTS

1. Hypothesis:

$H_0: dSP_t/dBD_t = 0$

This hypothesis implies that the budget deficits significantly impact on stock prices.

$H_A: dSP_t/dBD_t \neq 0$

This hypothesis implies that the budget deficits do not significantly impact on stock prices.

2. Analysis of Budget deficits and Five Hypothetical Effects

The total effect of the budget deficits on stock prices is  $-0.095$  which is the sum of each of the four effects. This finding implies that the total effect of the budget

Total Effect of the Budget Deficits on Stock Prices

Variables		Estimated values				Total effect <sup>a</sup> =
		(a)	(b)	(c)	(d)	(a) + (b) + (c) + (d)
$\frac{dSP_t}{dR_t}$	$\frac{dR_t}{dCBD_t}$	-0.014	N/A	N/A	N/A	-0.095
$\frac{dSP_t}{dGNP_t}$	$\frac{dGNP_t}{dCBD_t}$	N/A	0.005	N/A	N/A	
$\frac{dSP_t}{dICS_t}$	$\frac{dICS_t}{dCBD_t}$	N/A	N/A	-0.070	N/A	
$\frac{dSP_t}{dINF_t}$	$\frac{dINF_t}{dCBD_t}$	N/A	N/A	N/A	-0.016	

Note: 1. (a) = (1) × (2), (b) = (3) × (4), (c) = (5) × (6), (d) = (7) × (8)  
<sup>a</sup>Total effect is the sum of the liquidity, income, psychological, and inflationary effect.

deficits on stock prices is negative, since the liquidity, psychological, and inflationary effects outweigh the generating income effect. This finding is consistent with that of Darrat (1988).

### 3. Significance Test

The next task is to test the significance of the coefficient of  $dSP_t/dBD_t$ . To determine the significance of the parameter, the standard errors of  $dSP_t/dBD_t$  must be estimated. Dividing the total effect of the budget deficits on stock prices by the standard error yields the overall significance of  $dSP_t/dBD_t$ . Since the estimator is nonlinear in the parameters, there is a reliance on asymptotic results. To get the standard error, the variance-covariance matrix of  $f(A)$  has been estimated. The  $f(A)$  matrix is defined as:

$$f(A) = (-1.51, 0.009, 0.022, 0.23, 0.82, -0.085, -5.27, 0.003)$$

If a partial derivative  $f(A)$  is taken with respect to the  $(A)$  matrix,  $df/dA$  would be followed:

$$df/dA = (0.009, -1.51, 0.23, 0.22, -0.085, 0.82, 0.003, -5.27).$$

The value of  $\{(df/dA) \text{Var}(A) (df/dA)'\}$ , which is the variance of  $dSP_t/dBD_t$ , is calculated and found to be 0.00333. If the square-root of the variance of  $dSP_t/dBD_t$  is taken, then we get the standard error of 0.0577. Therefore, the significance-ratio is  $1.646 (= 0.095/0.057)$  which seems to be fairly significant at the 10%  $\alpha$  level. This suggests that the budget deficits variable is an important variable in explaining the stock prices through four channels. This conclusion is consistent with that of Darrat (1988).

## VI. SUMMARY AND CONCLUSION

Recently, policy evaluation issues have been principal issues in macroeconomics. Most studies have examined the size effects of economic policy on the real sector. However, it has been also true that the needs to be justified how economic policy transmits to the target variables, and which method would be more appropriate to test it. To figure the interdependence of variables out, we apply this idea to the stock markets.

In this regard, particularly five major channels of fiscal effects on stock price determination have been hypothesized and the key variables that are believed to exercise influence on the stock price have been identified. This study argues that simple regression analysis does not fully explain the movement of the financial market, since five hypothetical channels which are assumed to relate fiscal measures with the stock market have endogenous characteristics. Thus, a simultaneous technique should be employed. The results indicated that fiscal policy as well as monetary policy influence stock prices through four channels (i.e., liquidity, inflationary, psychological, and income effects). From this finding, two conclusions can be drawn. First, simple measure on policy evaluation is not enough to explain the

movement of the target variables, since several channels are involved in the system. Second, if stock prices reflect monetary and fiscal information, not a single linear equation but simultaneous equations should be employed to explain stock price movements. This study suggests, to effectively stabilize the financial markets and the U.S. economy, careful attention should be required on the channels of influence.

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