Southeast Asian Studies, Vol. 18, No. 1, June 1980

資料・研究ノート

The Bank of Thailand Model and Its Application to Policy Simulations*

Mitsuo EZAKI**

I Introduction

There exist only a few macroeconometric models for the Thai economy. A simple but pioneering model was constructed in the middle of the 1960's by Chinawoot Soonthornsima [1964], while detailed and comprehensive models were developed only recently by Chulalongkorn University (Virabongsa Ramangkura [1975, 1976]) and the Bank of Thailand (Olarn Chaipravat [1976], Olarn Chaipravat, Kanitta Meesook and Siri Ganjarerndee [1979a], etc.).1) The Bank of Thailand model (abbreviated as BOT model) is now under continuous revisions and improvements in accordance with updated basic data. It is employed as the country model for Thailand in the Asian Sub-Link Project of the Center for Southeast Asian Studies, Kyoto University.2) The purpose of this paper is to investigate basic features and workabilities of the BOT model theoretically and empirically (Section 2), and to derive some policy implications for the Thai economy based on the simulation analyses applied to the BOT model (Section 3). The present paper may be considered as a supplement to the research works of the Bank of Thailand on the macroeconometric model building for the Thai economy.3)

* The present paper depends on the progress report for the medium-term projections project of ESCAP drafted in October 1979 by the author who had worked at Development Planning Division, ESCAP, as an economic affairs officer for the one-year fixed term from November 9, 1978 to November 8, 1979. The paper owes much to the valuable assistance and cooperation given by Mr. Olarn Chaipravat, Mrs. Kanitta Meesook and Mr. Siri Ganjarerndee of Department of Economic Research, Bank of Thailand, Mr. K. Clark, Mr. R. Siegel and Mr. S. Arai of Data Processing Section, ESCAP, and Mr. A. Kohno and Mr. S. Abe of Development Planning Division, ESCAP, to whom deep appreciations are expressed. Views and remaining errors in the paper, however, are solely of the author.

** 江崎光男, The Center for Southeast Asian Studies, Kyoto University

1) See Olarn Chaipravat [1976] for a brief chronology and assessment of the Thai econometric models.

2) The project is organized and headed by Professor Shinichi Ichimura. The BOT model is adopted as a country model also in the medium-term projections project of ESCAP.

3) See Olarn Chaipravat, Kanitta Meesook and Siri Ganjarerndee [1979b] for the current version of BOT model. See its references for the earlier versions and the related researches made at Bank of Thailand.

II Basic Features and Workabilities of the BOT Model

The latest version of Bank of Thailand model was presented at the Asian Sub-Link Project Symposium held on March 22–24, 1979 in Kyoto, Japan. The symposium paper (Olarn Chaipravat, Kanitta Meesook and Siri Ganjarerndee [1979a] or [1979b]) contains not only a full presentation of the whole system of BOT model but also a detailed explanation on each structural equation, giving relevant economic backgrounds in the Thai economy.[4] Here we will pinpoint a general equilibrium framework adopted for the Thai economy which may be considered as the most essential feature of the BOT model and, then, discuss about several other features and workabilities of the model based on such testing simulations as partial, total and final tests, which are not shown in the symposium paper mentioned above.

II–1 General Equilibrium Setup of the BOT Model

The Bank of Thailand model is a non-linear system of 184 equations, of which the first 115 equations constitute the real sector of the system while the remaining 69 equations describe the financial sector of the system. Variables in the real sector consist of productions, expenditures (including exports and imports), incomes (including tax revenues), prices, wages, employment, capital stocks, and so on. These real variables are dependent, more or less, on the financial sector through the following financial variables (where * means exogenous):

> *FTDHBCB*, *FSDHBCB*, *FTDHBFC*, *FSDHBFC*, *FDDHBFC*, *FSTHBGS*, *FGBHHGV**, *RLCB*, *RLFC*, *RTDCB**, *RSDCB**, *RTDFC**, *RSDFC**, *RDDFC**, *RTGS**, *RGBHH**, and *RFO**.

Variables in the financial sector, on the other hand, consist of deposits, lendings, borrowings, interest rates, etc., in the four major financial institutions of Thailand (i.e., commercial banks, finance companies, government saving bank and central bank). Variables corresponding to the balance of payments account constitute the final part of the financial sector. These financial variables are also dependent on the real sector through a number of real variables, so that the system as a whole is a system of interdependence to be determined simultaneously. However, the interactions between real and financial sectors are not symmetrical in that the dependence of the financial sector on the real sector is far stronger than the converse. Equations in the system except identities are all estimated by ordinary least squares method (OLS). Real equations are estimated for the period around 1961–1976, while financial equations are estimated for 1969–1976.

There are four supply-demand equilibrium conditions in the BOT model.

4) See the symposium paper for the notation and structural equations of BOT model, which are omitted here to save space.

One is in the real sector and the other three are in the financial sector. Most of the variables in the real sector are interdependent with each other in a complicated manner. From the aggregate point of view, however, there exists a key equation which plays a role of mediator in the complex interdependent system of the real sector. It is the real aggregate demand and supply equality of goods and services (eq. (70) which is the equilibrium condition) to determine domestic price level (*PD* which is the deflator for both consumption and investment expenditures). This framework is illustrated in Fig. 1. The main part of the real sector is the production-employment-income-expenditure block, in which variables are not only interdependent with each other but also dependent on *PD* and other prices (and also on several financial variables listed above). *PD*, on the other hand, is dependent on the levels of various demands (*CONHHR*,..., *XGSR*

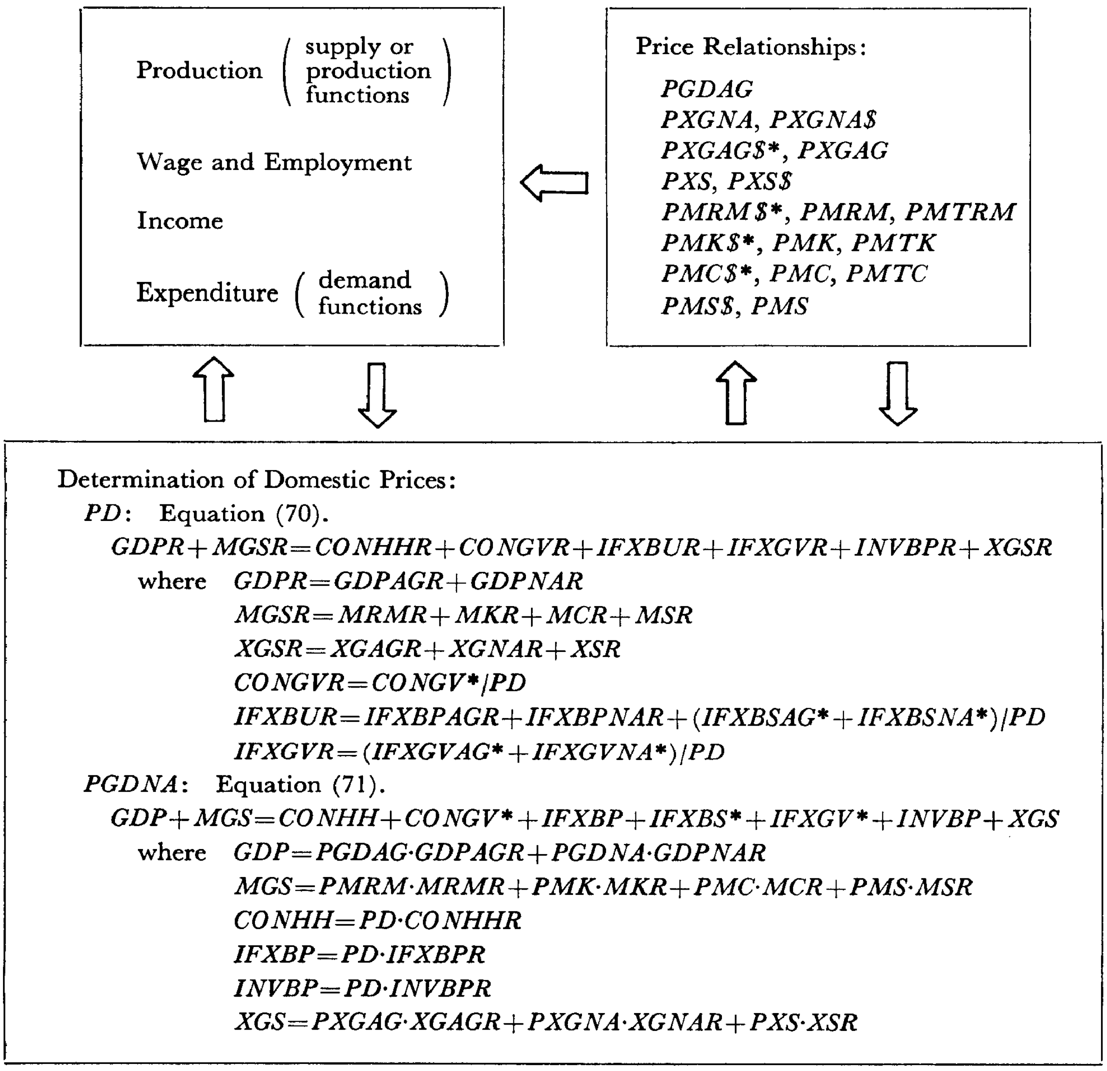

Fig. 1 Equilibrium Setup in the Real Sector

and *MGSR*) and supplies (*GDPR*) which are determined in the main block.[5] The same is true for *PGDNA* (non-agricultural price deflator) to be determined by the nominal aggregate demand and supply identity (eq. (71)).[6] The other prices are dependent on *PD* and *PGDNA* but not on the variables in the main block. Note that eq. (70) of Fig. 1, which describes the equilibrium condition directly in the form of implicit function, must be transformed into alternative explicit form with *PD* on the left-hand side:

$$PD=(CONGV^*+IFXGVAG^* +IFXGVNA^*+IFXBSAG^* +IFXBSNA^*)/(GDPR +MGSR-CONHHR -IFXBPAGR-IFXBPNAR -INVBPR-XGSR)$$

Such a transformation is necessary in solving the non-linear system of BOT model by the Gauss-Seidel method.[7] The same is true for eq. (71), whose alternative expression is:

$$PGDNA=\frac{1}{GDPNAR}[CONHH +CONGV^*+IFXBP+IFXBS +IFXGV+INVBP+XGS-GDPAG -MGS]$$

These may be regarded as an ingeneous device in the real sector of BOT model.

5) MGSR is determined by the demand factors but not by the supply conditions, so that MGSR may better be placed on the right-hand side of eq. (70) with minus sign.

6) Another appropriate variable, if any, may be selected in place of PGDNA as a variable to be determined by this nominal identity.

7) See the appendix of this paper for the Gauss-Seidel method.

The financial sector of BOT model has three supply-demand equilibrium conditions. The first is the market clearing equation for loans, overdrafts and discounts of commercial banks (*FLNCBBU*) to determine commercial banks' lending rate (*RLCB*). The second is the market clearing identity for loans and discounts of finance companies (*FLDFCBU*) to determine finance companies' lending rate (*RLFC*). The third is the identity between supply of and demand for inter-bank loans from commercial banks to finance companies (*FLOCBFC*) to determine interbank market rate of interest (*RIB*). These three equilibrium identities together with their supply and demand components, which are summarized in Table 1, constitute the main and essential part of the financial sector in the BOT model. The equilibrium framework of the financial sector is clearcut and rather straightforward compared to that of the real sector, because various supply and demand equations are directly connected with the market clearing equilibrium identities. It is quite interesting to see that the sign conditions are satisfied completely not only for income or saving variables but also for relevant interest rates in component demand and supply functions. As stated for the real sector, the Gauss-Seidel method requires to express every endogenous variable by an explicit function of other variables, so that the three equilibrium equations ((145), (165) and (169)) are solved for the three equilibrium interest rates (*RLCB*, *RLFC* and *RIB*) respectively in the actual

Table 1 Equilibrium Setup of the Financial Sector

RLCB: FLNCBBU^s = FLNCBBU^d (eq. 145)

(144) $FLNCBBU^s = \mathrm{f}(\overset{(+)}{FDFXXCB},\ \overset{(+)}{RLCB})$

(132) $FDFXXCB = FDTXXCB - (FRCCBBT + FRBCBGV + FBCCBGV + FCDCDBA)$

(127–130) $= (1 - ZK1^* - ZK2^* - ZM1^* - ZM2^*)\cdot FDTXXCB$

(131) $FDTXXCB = FDTHBCB + FDTOFCB + FDTFOCB^* + FDTGVCB^*$

(133) $FDTHBCB = FDDHBCB + FSDHBCB + FTDHBCB$

(152) $FDDHBCB = \mathrm{f}(\overset{(+)}{GDP},\ \overset{(+)}{ENBCB^*},\ \overset{(-)}{RDDFC^*},\ \overset{(-)}{RSDCB^*},\ \overset{(-)}{RTDCB^*})$

(153) $FSDHBCB = \mathrm{f}(\overset{(+)}{USVHH},\ \overset{(+)}{ENBCB^*},\ \overset{(+)}{RSDCB^*}, \text{etc.})$

(154) $FTDHBCB = \mathrm{f}(\overset{(+)}{USVHH},\ \overset{(+)}{ENBCB^*},\ \overset{(+)}{RTDCB^*}, \text{etc.})$

(155) $FDTOFCB = \mathrm{f}(\overset{(+)}{GDP},\ RTDCB^* \overset{(+)}{-} .3RIB)$

(145) $FLNCBBU^d = FLOCBBU + FDDCBBU + FDMCBBU + FDXCBFO$

(140) $FLOCBBU = \mathrm{f}(\overset{(+)}{GDP},\ RLCB \overset{(-)}{-} .9RLFC)$

(141) $FDDCBBU = \mathrm{f}(\overset{(+)}{GDP},\ RLCB \overset{(-)}{-} .99RLFC)$

(142) $FDMCBBU = \mathrm{f}(\overset{(+)}{MGS},\ RLCB \overset{(-)}{-} .9RFO^*)$

(143) $FDXCBFO = \mathrm{f}(\overset{(+)}{XGS},\ RLCB \overset{(-)}{-} .01RFO^*)$

RLFC: FLDFCBU^d = FLDFCBU^s (eq. 165)

(164) $FLDFCBU^d = \mathrm{f}(\overset{(+)}{IFXTO},\ \overset{(-)}{RLFC} - .01(RLCB + RFO^*))$

(165) $FLDFCBU^s = \mathrm{f}(\overset{(+)}{FDFXXFC},\ \overset{(+)}{RLFC} - .9RSH^*)$

(162) $FDFXXFC = FDTXXFC - FRBFCGV$

(160) $= (1 - ZK3^*)\cdot FDTXXFC$

(161) $FDTXXFC = FDDHBFC + FDDCBFC + FSDHBFC + FTDHBFC$

(166) $FDDHBFC = \mathrm{f}(\overset{(+)}{GDP},\ \overset{(+)}{ENBFC^*},\ \overset{(+)}{RDDFC^*}, \text{etc.}/\dot{PD})$

(137) $FDDCBFC = \mathrm{f}(\overset{(+)}{FDFXXCB},\ \overset{(+)}{RDDFC^*} - .01(RIB + RLFC + RTB^* \text{ etc.}))$

(167) $FSDHBFC = \mathrm{f}(\overset{(+)}{USVHH},\ \overset{(+)}{ENBFC^*},\ \overset{(+)}{RSDFC^*} - .1RTDCB^*,\ \overset{(-)}{\dot{PD}})$

(168) $FTDHBFC = \mathrm{f}(\overset{(+)}{USVHH},\ \overset{(+)}{ENBFC^*},\ \overset{(+)}{RTDFC^*} - .1RTDCB^*,\ \overset{(-)}{\dot{PD}})$

RIB: FLOCBFC^d = FLOCBFC^s (eq. 169)

(169) $FLOCBFC^d = \mathrm{f}(\overset{(+)}{FLDFCBU},\ \overset{(-)}{RIB} - .01(RFO^* + RGB^*))$

(146) $FLOCBFC^s = \mathrm{f}(\overset{(+)}{FDTXXCB},\ \overset{(+)}{RIB} - .99(RLCB + RFO^* + RGB^*))$

* Numbers in brackets are equation numbers. Signs in brackets mean those of the estimated coefficients. $\dot{PD}$ = growth rate of PD. Note that, in the original formulation, the last three interest rates of eq. (152) are combined into a weighted average ($.3RDDFC^* + .5RSDCB^* + .2RTDCB^*$) as in eqs. (155), (140) and so on. The same is true for the interest rates in eqs. (153), (154), (166) and (137). The best weighting scheme is searched for empirically by using goodness of fit criteria in the BOT model.

device in the real sector of BOT model. computation.[8]

The 28 endogenous variables in the financial sector that correspond to the 28 financial equations of Table 1 are not only interdependent with each other but also dependent on such variables in the real sector as *GDP*, *USVHH*, *MGS*, *XGS*

8) See alternative expressions of eqs. (145), (165) and (169) shown in the symposium paper.

and *IFXTO* (and also on the exogenous variables). On the other hand, the real sector is dependent on such variables in the financial sector as *RLCB*, *RLFC*, *FTDHBCB*, *FSDHBCB*, *FTDHBFC*, *FSDHBFC*, *FDDHBFC* and *FSTHBGS*, all of which except the last appear in the equilibrium framework of Table 1. The last *FSTHBGS* is determined by eq. (173) with one real and several exogenous variables on the right-hand side:

$$(173)\quad FSTHBGS = f(\overset{(+)}{USVHH}, \overset{(+)}{RSTGS^*} - .1(RTDFC^* + RTDCB^*))$$

Therefore, the real sector *plus* the main part of the financial sector (Table 1) *plus* equation (173) can be regarded as a self-complete system without any feed-back effects from the rest of the financial sector. The rest of the financial sector including the balance of payments account is determined only recursively, so that such important variables as net foreign capital inflow of private sector (*FKFBPFO*), overall balance of payments position (*UBP$*), etc. can affect neither the performance of the real sector nor the key variables in the financial sector. This seems to be a weak point in the BOT model.

II–2 Testing Traceability of the BOT Model

To what extent a model traces the actual economy can be checked by comparing the estimated values of each variable in the model with the corresponding actual data for the estimation period. Three methods are usually used to see this traceability of a model. The first is the partial test, by which the goodness of fit is checked for each equation separately using actual data for all of the explanatory variables in each equation without distinguishing between endogenous and predetermined (lagged endogenous+exogenous) variables. The second is the total test, by which the goodness of fit is checked for the model as a whole simultaneously but statically using actual data for all of the predetermined variables without distinguishing between lagged endogenous and exogenous variables in solving the system. The third is the final test, by which the goodness of fit is checked for the model as a whole simultaneously and dynamically using estimated values for the lagged endogenous variables in solving the system in each period successively. Not to mention, the total test is a case of the static simulation while the final test is a case of the dynamic simulation.

The final test is important among others in the sense that the performance of a model can be unsatisfactory in the light of the final test even if it is quite satisfactory in the light of the partial and total tests. However, all of the three testing methods have been applied to the BOT model since each method has some merits of its own. For example, the partial test can be applied to identities to check their correctness. Actually, errors or inconsistencies, though not serious, were found in several identities in the financial sector of BOT model (i.e., eqs. (116), (159), (161) and (183)). The results of partial test for the estimated equations of BOT model are generally satisfactory, reflecting high or proper values of R^2's and Durbin-Watson ratios. The results of total test are also fairly satisfactory.

The final test has been applied to the three cases of BOT model for the period 1969–1976[9]:

(a) the whole system,

(b) the real sector, treating all financial variables (eqs. (116)–(184)) as exogenous, and

(c) the financial sector, treating all real variables (eqs. (1)–(115)) as exogenous.

The results are again generally satisfactory, especially for (b) and (c). Concerning the whole system (case (a)), however, no remarkable differences are found between (a) and (b) for the real variables (1)–(115), while considerably large discrepancies are observed between (a) and (c) for several financial variables (116)–(121), (148) and (149). A bad performance of the whole system in relation to these financial variables seems to be caused by *XGS\$* (eq. (69)) and *MGS\$* (eq. (37)) through *UBP\$* (eq. (180)) and *UBA\$* (eq. (181)). Traceability of the whole system is fairly good for the other financial variables including the three key interest rates and the demand and supply equations which determine them (See Table 1). The whole system (real+financial) excluding financial variables of bad performance (i.e., equations (116)–(121), etc.) is self-complete since those financial variables of bad performance are determined only recursively without giving any feed-back effects to the rest of the system.[10] It seems, therefore, possible to effectively make various policy simulations based on the whole system, neglecting the results on several financial variables which are probably misleading but have no effects on the essential part of the system.

Though most of the endogenous variables are generally traced well for the real sector, some important quantities such as *GDPAGR*, *GDPNAR*, *GDPR*, etc. tend to be underestimated slightly in earlier years of the estimation period while overestimated slightly in later years, resulting in a slight overestimation of their growth rates for the sample period. Corresponding nominal values, on the other hand, are simulated well without showing any tendency of overestimation or underestimation. As a result, key aggregate prices such as *PD*, *PGDNA*, *PGDAG*, etc. tend to be overestimated slightly in earlier years while underestimated slightly in later years, indicating a slight underestimation of their growth rates in the sample period. It is difficult to find direct and clearcut reasons for the bias consistently observed for several key

9) Note that the estimation period for the financial equations is 1969–1976. The final test for 1963–1976 was also tried for the real sector.

10) It should be noted that a smaller system consisting of the real sector, equations of Table 1 and eq. (173) is self-complete as explained before.

variables of the real sector in testing the BOT model dynamically by final test.

III Policy Simulations for the Thai Economy: 1972–1976

Various policy simulations have been attempted for the Thai economy, giving shocks to several selected exogenous variables in the BOT model:

(1) public consumption expenditures (*CONGV*)
(2) public investment expenditures (*IFXBSAG*, *IFXBSNA*, *IFXGVAG* and *IFXGVNA* treated as a group)
(3) exchange rate (*ZXR$*)
(4) world income (*GDPWR1* and *GDPWR2* treated as a group)
(5) price of imported raw materials and fuels (*PMRM$*), and
(6) price of export of agricultural products (*PXGAG$*).

Shocks are given to these exogenous variables in the form of increasing their levels by 10% from their actual values either throughout the simulation period (1972–1976) or in the starting year (1972) only:

(i) sustained shocks given for the 1972–1976 period, and
(ii) once-and-for-all shocks given in 1972 only.

The simulation results for these shocked cases are compared with the standard simulation without shocks, which is the same as the final test for the 1972–1976 period, to derive policy implications for the Thai economy. Furthermore, the shocked simulations are applied to two cases of the BOT model:

(a) the whole system, and
(b) the real sector, treating all of the financial variables as exogenous,

which make it possible to clarify further the structure and characteristics of the BOT model. The shocked simulations, therefore, have been attempted in 24 ($6 \times 2 \times 2$) ways for the 1972–1976 period. Simulation results on the sustained shocks are summarized in Appendix Tables A.1–A.8 on several key variables (i.e., *GDPR*, *GDP*, *PD*, *USVFO$* and *RLCB*) for illustrative purposes.[11] These tables are useful to see the time pattern of the changes in key endogenous variables caused by various external shocks. Here we discuss results on the sustained shocks only in terms of the multipliers and elasticities averaged for the simulation period 1972–1976. Results on the once-and-for-all shocks are not referred to here since they are quite similar to and less conspicuous than those on the sustained shocks.

III–1 Sustained Shocks on the Public Expenditures

Public expenditures are often discussed in connection with their multiplier effects on various aspects of the aggregate economy. Since the exogenous shocks were given to *nominal* public expenditures (i.e., government consumption expenditures (*CONGV*) and investment expenditures of state enterprises and general government (*IFXBSAG*, *IFXBSNA*, *IFXGVAG*

11) The original results (i.e., computer printouts) cover all of the 184 endogenous variables.

and *IFXGVNA*)), we discuss here the multipliers in nominal terms and supplement them with relevant elasticities. Table 2 summarizes multipliers and elasticities of several selected variables with respect to nominal public consumption and investment expenditures based on the average results for the 1972–1976 period. Note in the table that elasticities of real variables (*GDPR*, etc.) with respect to nominal expenditures are somewhat misleading. However, elasticities of real variables with respect to real expenditures can be estimated approximately by allowing for the elasticity of *PD* which is used as the common deflator for both consumption and investment in the BOT model. For example, the elasticity of *GDPR* with respect to *real* public consumption may be approximated as .045/(1.0−.163)=.054 based on the figures for the whole system in Table 2.

Table 2 Multipliers and Elasticities with Respect to Nominal Public Expenditures, Average Results for 1972–1976

	Public consumption Whole system	Public consumption Real sector	Public investment Whole system	Public investment Real sector
Multipliers				
GDP	1.96	2.19	1.24	1.53
GDPAG	.38	.42	.21	.25
GDPNA	1.58	1.77	1.04	1.28
XGS	−.005	−.006	.009	.008
MGS	.67	.76	.61	.73
−*USVFO*[a]	−.67	−.77	−.60	−.72
FKFBPFO	.03	—	−.001	—
UBP$[b]	−.63	—	−.59	—
YLBNA	.98	1.10	.65	.79
Elasticities				
GDP	.204	.227	.069	.085
GDPAG	.127	.139	.037	.045
GDPNA	.238	.267	.083	.103
XGS	−.003	−.003	.003	.002
MGS	.303	.345	.148	.176
−*USVFO*[a]	−5.736	−6.628	−2.731	−3.323
FKFBPFO	.220	—	−.004	—
UBP$	−5.402	—	−2.712	—
YLBNA	.212	.237	.074	.091
GDPR	.045	.053	.031	.036
GDPAGR	−.013	−.015	.003	.002
GDPNAR	.071	.082	.043	.051
XGSR	−.042	−.047	−.008	−.011
MGSR	.299	.344	.167	.197
NEMNA	.146	.163	.052	.064
WGRNA	.071	.079	.022	.027
PD	.163	.179	.039	.050
RLCB	.226	—	.128	—
RLFC	.071	—	.135	—
RIB	.144	—	.095	—

[a] Defined as surplus.
[b] Multiplied by 20.0 to adjust exchange rate.

From the table, we can see that the multiplier or elasticity effects of public consumption are generally larger than those of public investment. This should be so possibly for the nominal variables in which price factors are automatically involved. General price levels (*PD*, etc.) in the BOT model are determined by various supply and demand conditions. Public consumption is a demand factor with no direct effects on production while public investment, though it is also a demand factor, directly affects production capacity through capital accumulation, resulting in far bigger price increases in the former than in the latter. Real variables (*GDPR*, etc.), however, show a little bigger elasticities for public consumption than for public investment in Table 2. This seems to be caused by some short-run factor with no direct implications on supply capacities since the elasticity of *GDPR* with respect to *CONGV* tends to decline overtime for the simulation period while the elasticity for *IFXBS* and *IFXGV* has a constant tendency to increase overtime.[12] It is interesting to see in Table 2 that the elasticities of *GDPAGR* and *XGSR* (whose major components are agricultural exports) are negatively large in the case of public consumption while they are either positive or negative but very small in absolute values in the case of public investment. This is due to the shift of labor from agriculture to non-agriculture caused by the enlarged effective demand, the nature of which is different between public consumption and public investment as mentioned above.[13]

The real sector of BOT model, where all of the financial variables are treated as exogenous, exaggerates slightly the multiplier or elasticity effects of public expenditures. Government deficit financing to increase its consumption and investment expenditures necessarily leads to the excess demand in the financial market, resulting in the rise in market clearing interest rates (*RLCB*, *RLFC* and *RIB*) as shown in Table 2. Results on the real sector do not allow for this aspect of interaction between real and financial markets. Yet, the discrepancies are not very large between the whole system and the real sector, indicating the role of financial sector as supplementary (but neither negligible nor unimportant) to the real sector in the actual economic activities.

III–2 Sustained Shocks on the Exchange Rate and the World Income

Let us next consider the shocked simulations for the changes in exchange rate and world income. In the former, the exchange rate of bahts per US dollars (*ZXR$*) was increased by 10% from about 20 *B/$* to about 22 *B/$* for the period 1972–1976. In the latter, the two kinds of world income (*GDPWR1* and *GDPWR2*) were made higher by 10% than their actual levels during the period 1972–1976. Table 3 summarizes simulation results for the above two cases in terms of average multipliers and average elasticities.[14] Note that multipliers are not calculated in the latter case of world income since the data for world income are not original but in the form of indexes with unit value (1.0) for the base year.

We discuss, first, the case of exchange rate changes. We can see from Table 3 that the baht devaluation has positive and favorable effects on various aspects of the Thai economy. For example, the 10% devaluation in bahts will increase trade surplus (or decrease trade deficit) by 71 million US dollars, nominal GDP by 14 billion bahts or 5.54%, real

12) See Tables A.1 and A.2. The same is true for GDPNAR and NEMNA, though the results on them are not shown in the appendix tables.

13) Note that agricultural exports (XGAGR) is dependent not only on demand factors but also on supply conditions (See eq. (64)).

14) See Tables A.3 and A.4 for the time pattern of the changes in key endogenous variables.

Table 3 Multipliers and Elasticities with Respect to Exchange Rate and World Income, Average Results for 1972–1976

	Exchange rate		World income	
	Whole system	Real sector	Whole system	Real sector
Multipliers*				
GDP	14,283	15,970		
GDPAG	5,765	6,061		
GDPNA	8,518	9,909		
XGS$	.45	.15		
MGS$	−71.34	−39.98		
−*USVFO$*	71.80	40.17		
UBP$	75.67	—		
FKFBPFO	503	—		
YLBNA	5,826	6,702		
Elasticities				
GDP	.554	.620	.195	.221
GDPAG	.720	.757	.084	.097
GDPNA	.480	.558	.246	.277
XGS$	.002	.001	.539	.539
MGS$	−.247	−.139	.287	.332
−*USVFO$*	4.679	2.659	3.801	2.992
UBP$	4.893	—	3.842	—
FKFBPFO	1.209	—	.054	—
YLBNA	.470	.541	.209	.237
GDPR	.051	.071	.058	.066
GDPAGR	.023	.019	−.016	−.018
GDPNAR	.064	.094	.090	.102
XGSR	.088	.076	.517	.512
MGSR	−.273	−.157	.283	.333
NEMNA	.134	.179	.185	.204
WGRNA	.356	.383	.026	.036
PD	.516	.564	.119	.136
RLCB	.620	—	.251	—
RLFC	.164	—	.059	—
RIB	.384	—	.162	—

* Note that the figures for multipliers mean the average annual changes in the variables listed here in the case of 10% devaluation of baht (approximately from 20 *B/$* to 22 *B/$*) for the 1972–1976 period. Measuring units for multipliers are either million bahts or million US dollars.

production levels (*GDPR*, *GDPAGR* and *GDPNAR*) by 0.2%–0.6%, non-agricultural employment by 1.34% and so on.[15] The baht devaluation, of course, has unfavorable effects also for the Thai economy. For example, the same 10% devaluation will cause 5.16% increase in general price level (*PD*), which, however, is not large enough to offset completely the favorable effects mentioned above.[16] In other words, increases in nominal levels caused by devaluation will be offset to some extent by rising prices, resulting in a slight improvement of various economic activities in real terms. It may be concluded, therefore, that the devaluation of bahts will improve the balance of payments situation in Thailand without deteriorating the national welfare in real terms. The baht devaluation seems to be one of the possible measures to be discussed seriously in order to solve the balance of payments problem which Thailand is currently facing.

Multipliers and elasticities for the case of exchange rate changes in Table 3 indicate only small discrepancies between the whole system and the real sector except for those of imports (*MGS$*) (and also those of the surplus in current balance (−*USVFO$*) as a consequence). Imports have become exceptional because of the structure of the model. In other words, two major components of imports,

15) Note that these figures are approximate averages and other conditions are assumed to be unchanged in deriving them.

16) Real consumption also increases, though slightly, in spite of price increases.

i.e., import of raw materials and fuels (*MRMR*) and import of capital goods (*MKR*), receive considerable influences from interest rates (i.e., *RLCB* and *RLFC*) by the process illustrated below:

$$\left.\begin{matrix} RLCB \\ RLFC \end{matrix}\right] \xrightarrow{(-)} IFXBPNAR$$

$$\begin{matrix} \xrightarrow{(+)} KFXBPNAR \xrightarrow{(+)} GDPNAR \xrightarrow{(+)} MRMR \\ \xrightarrow{(+)} MKR \end{matrix}$$

The real sector where all of the financial variables including *RLCB* and *RLFC* are treated as exogenous cannot allow for this dependency on the financial sector, resulting in a considerable discrepancy for imports (*MGS$*) in Table 3. We must be very careful in dealing with the financial sector because we may obtain misleading results on some variables if the financial sector is completely neglected.

Let us next consider the case where the world income was changed. The results are more or less similar to those of the previous case where the exchange rate was changed but, in nature, more moderate and more favorable for the Thai economy. In other words, the rise in foreign income brings about many windfall benefits to Thailand through her export growth such as rise in both nominal and real *GDP*'s, considerable improvement in balance of payments deficit, etc., without giving any unfavorable effects such as inflationary pressures unlike the previous case of baht devaluation. The present case is the growth led by exports but helped by lucky conditions in foreign countries which Thailand cannot always expect to exist. The previous case, on the other hand, has much in common with the growth through import substitution. It is quite interesting to see in the Thai economy that exports do not increase significantly while imports decrease considerably when the exchange rate is devalued.

III-3 *Sustained Shocks on the Import Price of Raw Materials and Fuels and the Export Price of Agricultural Products*

Sustained shocks were given also to two important price variables in the Thai international trade. First, the import price of raw materials and fuels (*PMRM$*) was increased by 10% for the 1972–1976 period. Second, the export price of agricultural products (*PXGAG$*) was increased by 10% for the same simulation period. These two cases seem to be useful to analyze the performance of Thai economy in the first half of the 1970's. In that period, the Thai economy, like many other developing countries, suffered from the oil shocks (1973–74) but, at the same time, enjoyed the boom in primary commodities (1972–74) which offset their unfavorable effects.[17] As a result, Thailand could show a good performance in *GDP* growth and balance of payments even during the period of oil shocks, where most of the developed countries experienced rather severe recessions under balance of payments pressures. To analyze this situation properly, however, it seems better to investigate

17) For a general description of the commodities export boom in the ESCAP region, see ESCAP [1978], pp. 39–44.

not only the case of positive shocks mentioned above but also the case of negative shocks where *PMRM$* and *PXGAG$* respectively are decreased by 10% for the simulation period 1972–1976.

Average elasticities corresponding to positive shocks are summarized in Table 4, while those corresponding to negative shocks are summarized in Table 5.[18] No remarkable differences are found between the two tables though the elasticities of negative shocks are slightly bigger than those of positive shocks in almost all cases. The BOT model may be said to give almost symmetrical results on policy simulations whether the exogenous shocks are given in the positive direction or in the negative direction.

As seen from Table 4 (or Table 5), the *rise* in import price of raw materials and fuels (*PMRM$*) causes *negative* or *unfavorable* effects on such key variables as balance of payments, real productions (except *GDPAGR*), non-agricultural employment and general price levels. On the contrary, the *rise* in export price of agricultural products (*PXGAG$*) causes *positive* or *favorable* effects on the same variables. However, the favorable effects of the rise in *PXGAG$* are considerably larger in degree than the unfavorable effects of the rise in *PMRM$*. This seems to be due to the industrial structure of Thailand where agriculture still occupies a significant position not only in exports but also in productions. According to our estimates of average elasticities, only 2% increase in *PXGAG$* is enough to offset the unfavorable effects

Table 4 Elasticities with Respect to Import Price of Raw Materials and Fuels and Export Price of Agricultural Products, Average Results for 1972–1976*

	Import price of raw materials and fuels		Export price of agricultural products	
	Whole system	Real sector	Whole system	Real sector
GDP	.041	.046	.204	.225
GDPAG	.084	.087	.276	.288
GDPNA	.022	.028	.172	.196
XGS	.027	.026	.515	.515
MGS	.071	.079	.203	.240
−*USVFO*	−.873	−1.042	4.977	4.345
UBP$	−.517	—	4.784	—
FKFBPFO	.265	—	−.117	—
YLBNA	.037	.042	.128	.150
GDPR	−.017	−.015	.070	.076
GDPAGR	.004	.003	.022	.021
GDPNAR	−.025	−.023	.090	.099
XGSR	−.141	−.142	−.150	−.154
XGAGR	.003	.002	−.091	−.092
XGNAR	−.409	−.411	−.042	−.050
XSR	−.027	−.029	−.846	−.850
MGSR	−.262	−.253	.185	.223
MRMR	−.824	−.814	.251	.290
MKR	.099	.113	.127	.184
MCR	−.017	−.016	.115	.116
MSR	.026	.030	.291	.304
NEMNA	−.050	−.047	.185	.200
WGRNA	.091	.093	−.060	−.052
PD	.093	.096	.014	.029
PGDAG	.079	.082	.251	.264
PGDNA	.048	.052	.078	.093
RLCB	.047	—	.210	—
RLFC	.022	—	.004	—
RIB	.003	—	.214	—

* The figures here are based on the case of 10% increase in *PMRM$* or *PXGAG$* for the 1972–1976 period. See Table 5 for the figures based on the opposite case.

18) See Tables A.5 and A.6 for positive shocks while Tables A.7 and A.8 for negative shocks.

Table 5 Elasticities with Respect to Import Price of Raw Materials and Fuels and Export Price of Agricultural Products, Average Results for 1972–1976: the Case of Negative Shocks*

	Import price of raw materials and fuels		Export price of agricultural products	
	Whole system	Real sector	Whole system	Real sector
GDP	.049	.054	.208	.229
GDPAG	.102	.104	.297	.309
GDPNA	.025	.032	.167	.193
XGS	.028	.028	.513	.513
MGS	.083	.093	.200	.237
−*USVFO*	−1.082	−1.280	4.998	4.367
UBP$	−.653	—	4.813	—
FKFBPFO	.320	—	−.110	—
YLBNA	.044	.050	.125	.147
GDPR	−.021	−.019	.070	.076
GDPAGR	.005	.004	.027	.025
GDPNAR	−.032	−.029	.089	.098
XGSR	−.165	−.167	−.179	−.183
XGAGR	.004	.003	−.111	−.112
XGNAR	−.479	−.481	−.042	−.050
XSR	−.034	−.035	−1.026	−1.031
MGSR	−.314	−.304	.182	.219
MRMR	−.988	−.975	.240	.279
MKR	.118	.134	.124	.182
MCR	−.021	−.020	.120	.122
MSR	.031	.035	.297	.311
NEMNA	−.064	−.059	.181	.196
WGRNA	.111	.113	−.061	−.054
PD	.112	.116	.013	.028
PGDAG	.096	.099	.268	.282
PGDNA	.058	.062	.076	.092
RLCB	.055	—	.216	—
RLFC	.027	—	.002	—
RIB	.003	—	.232	—

* The figures here are based on the case of 10% *decrease* in *PMRM$* or *PXGAG$* for the 1972–1976 period.

of 10% increase in *PMRM$* in the case of current balance of paytmens (−*USVFO*), while only 3% in the case of real overall production (*GDPR*). It must, however, be noted that the BOT model may underestimate the effects of changes in *PMRM$*, because there exist no direct linkages from imports of raw materials and fuels (*MRMR*) to real productions (*GDPNAR*) in the BOT model which employs production functions of the ordinary value added type. Still, our simulation results may be considered as a quantitative evidence which explains the good performance of the Thai economy during the oil shock period.

The three interest rates (*RLCB*, *RLFC* and *RIB*) are affected in a different manner by the changes in *PMRM$* and *PXGAG$*. This is due to the supply and demand structure of the financial sector and its interactions with the real sector (See Table 1). In other words, increases in *PMRM$* causes excess demand for loans of commercial banks (*FLNCBBU*) through the increase in private sector's demand for discounts of import bills and trust receipts at commercial banks (*FDMCBBU*) under the *depressed* phase of the national economy. On the other hand, increase in *PXGAG$* causes excess demand for loans of commercial banks (*FLNCBBU*) through the increase in foreign sector's demand for discounts of export bills at commercial banks (*FDXCBFO*) under the *boomed* phase of the national economy. Furthermore, whether the national economy is depressed or boomed is a crucial factor to determine the supply of funds for loans of both commercial banks and finance companies which depends on such income variables as *GDP* and *USVHH*. By this structure of supply and demand interactions are generated our results on the three interest rates as shown in Table 4 or Table 5.

IV Concluding Remarks

We have stressed the general equilibrium nature of the Bank of Thailand model in clarifying its basic features. It is quite interesting to see that such an equilibrium system is effective in describing not only the real sector but also the financial sector of a developing country like Thailand. We have also applied the BOT model to various testing and policy simulations to check its workabilities and to derive policy implications for the Thai economy.

The BOT model is well formulated theoretically, and fairly workable empirically. It seems, however, that the BOT model has some minor deffects to be improved in the successive revisions in accordance with updated basic data. For example, first, the balance of payments variables to be determined only recursively have no effects on the essential part of the system. Second, the model tends to generate a slight but consistent bias for such key variables as production levels and corresponding prices. Third, there exist no direct linkages *from* imported raw materials and fuels *to* real productions in the system. These points may be worthy of detailed investigations in the subsequent researches for a new version of BOT model.

The BOT model is a system of non-linear equations formulated in conformity with the Gauss-Seidel method to solve it. The appendix of this paper provides a very brief review of the Gauss-Seidel method.[19] It is hoped that the review is useful not only for a technical understanding of the BOT model but also for a reference in the actual computations of other non-linear systems.

Appendix: The Gauss-Seidel Method

The Gauss-Seidel method is an iterative technique for solving the non-linear system of equations. It can be illustrated, without loss of generality, by a simple case of three-equation system. First, write the three non-linear equations in the form of explicit functions:

$$y_1=f_1(y_2, y_3, z),\quad y_2=f_2(y_1, y_3, z)$$
$$\text{and}\quad y_3=f_3(y_1, y_2, z)$$

where z is a vector of predetermined variables with fixed values.

Then, the iteration begins with the values of y_i's computed as:

$$\begin{cases} y_1^{(1)}=f_1(y_2^{(0)}, y_3^{(0)}, z) \\ y_2^{(1)}=f_2(y_1^{(1)}, y_3^{(0)}, z) \\ y_3^{(1)}=f_3(y_1^{(1)}, y_2^{(1)}, z) \end{cases}$$

where

$y_i^{(0)}$ = initial value of y_i, and

$y_i^{(1)}$ = value of y_i in the first iteration.

For the k-th iteration, we compute

$$\begin{cases} y_1^{(k)}=f_1(y_2^{(k-1)}, y_3^{(k-1)}, z) \\ y_2^{(k)}=f_2(y_1^{(k)}, y_3^{(k-1)}, z) \\ y_3^{(k)}=f_3(y_1^{(k)}, y_2^{(k)}, z) \end{cases}$$

19) See Johnson and van Peeterssen [1976] for various methods of solving nonlinear system of equations in relation to the Project LINK.

This iterative process continues until the computed y_i's satisfy some appropriate convergence criterion like

$$|y_i^{(k)}-y_i^{(k-1)}|<\epsilon_i \qquad (i=1, 2, 3)$$

where ϵ_i's are sufficiently small numbers.[20]

This is the ordinary procedure of the Gauss-Seidel method. We have, however, applied a modified procedure to the BOT model, which computes the values of y_i's in the k-th iteration as[21]

$$\begin{cases} y_1^{(k)}=y_1^{(k-1)}+0.5\cdot \\ \qquad (f_1(y_2^{(k-1)}, y_3^{(k-1)}, z)-y_1^{(k-1)}) \\ y_2^{(k)}=y_2^{(k-1)}+0.5\cdot \\ \qquad (f_2(y_1^{(k)}, y_3^{(k-1)}, z)-y_2^{(k-1)}) \\ y_3^{(k)}=y_3^{(k-1)}+0.5\cdot \\ \qquad (f_3(y_1^{(k)}, y_2^{(k)}, z)-y_3^{(k-1)}) \end{cases}$$

It should be noted that the Gauss-Seidel method, whether it is the original version or the modified one, does not always give converged solutions to a system to be solved, depending on the nature of the system, the selection of initial values, and so on.

20) The convergence criterion

$$|y_i^{(k)}/y_i^{(k-1)}-1.0|<10^{-5} \qquad \text{(for any } i\text{)}$$

was employed for the BOT model.

21) This modified version was proposed by Mr. Satoshi Yasuda of Kyoto University. He was kind enough to let the author use his computer program on the Gauss-Seidel method.

References

Chaipravat, Olarn. 1976. A Macroeconometric Model of Thailand with Special Emphasis on the Mechanism of Domestic Price Determination for a Small, Open Economy. In *Central Bank Macroeconometric Modelling in Pacific Basin Countries.* (Proceedings of the First Pacific Basin Central Bank Conference on Econometric Modelling, held at the Federal Reserve Bank of San Francisco, May 27–29, 1975) Federal Reserve Bank of San Francisco.

Chaipravat, Olarn, Meesook, Kanitta; and Ganjarerndee, Siri. 1979a. Bank of Thailand Model of the Thai Economy. DP/79/25. Bangkok: Department of Economic Research, Bank of Thailand.

———. 1979b. The Bank of Thailand Model of the Thai Economy. *Tonan Ajia Kenkyu* [Southeast Asian Studies] 17(2): 201–249.

Johnson, K. N.; and Peeterssen, A. van. 1976. Solving and Simulating the LINK System. In *The Models of Project LINK,* edited by J. L. Waelbroeck. North-Holland.

Ramangkura, Virabongsa. 1975. A Macroeconometric Model for Thailand: A Classical Approach. In *Finance, Trade and Economic Development in Thailand: Essays in Honor of Khunying Suparb Yossundara,* edited by Prateep Sondysuvan. Bangkok: Sompong Press.

———. 1976. *Chulalongkorn Econometric Model.* Bangkok: Economic Research Unit, Faculty of Economics, Chulalongkorn University.

Soonthornsima, Chinawoot. 1964. *A Macroeconometric Model for Economic Development of Thailand.* Bangkok: N. A. Intrasuksri.

United Nations (ESCAP). 1978. *Economic and Social Survey of Asia and the Pacific, 1977.* Bangkok: United Nations (ESCAP).

Table A.1 Sustained Shocks on *CONGV* (10% up for 1972–76)*

		1972	*1973*	*1974*	*1975*	*1976*	*Average***
GDPR (*Variable 5*):							
(1W)	Standard, WS	163,717	180,568	201,108	211,629	224,976	196,400
(1R)	〃 RS	163,951	180,550	200,520	212,110	224,839	196,394
(2W)	Shocked, WS	164,792	181,405	202,060	212,457	225,748	197,292
(2R)	〃 RS	165,138	181,497	201,668	213,073	225,800	197,435
(3W)	(2W)−(1W)	1,075	836	951	828	771	892
(3R)	(2R)−(1R)	1,186	947	1,148	963	961	1,041
(4W)	(3W)/(1W)	.0066	.0046	.0047	.0039	.0034	.0045
(4R)	(3R)/(1R)	.0072	.0052	.0057	.0045	.0043	.0053
GDP (*Variable 8*):							
(1W)	Standard, WS	172,292	208,868	274,023	296,591	336,220	257,599
(1R)	〃 RS	173,197	208,747	271,060	298,800	335,670	257,495
(2W)	Shocked, WS	176,376	212,729	279,559	302,494	343,059	262,844
(2R)	〃 RS	177,730	213,031	277,389	305,295	343,258	263,341
(3W)	(2W)−(1W)	4,084	3,861	5,536	5,902	6,839	5,244
(3R)	(2R)−(1R)	4,533	4,283	6,329	6,495	7,588	5,845
(4W)	(3W)/(1W)	.0237	.0185	.0202	.0199	.0203	.0204
(4R)	(3R)/(1R)	.0262	.0205	.0233	.0217	.0226	.0227
PD (*Variable 70*):							
(1W)	Standard, WS	1.0419	1.1040	1.3428	1.4183	1.5169	1.2848
(1R)	〃 RS	1.0455	1.1035	1.3315	1.4262	1.5153	1.2844
(2W)	Shocked, WS	1.0580	1.1190	1.3652	1.4429	1.5434	1.3057
(2R)	〃 RS	1.0633	1.1200	1.3569	1.4528	1.5441	1.3074
(3W)	(2W)−(1W)	.0161	.0151	.0224	.0246	.0265	.0209
(3R)	(2R)−(1R)	.0178	.0166	.0254	.0266	.0288	.0230
(4W)	(3W)/(1W)	.0154	.0136	.0167	.0174	.0175	.0163
(4R)	(3R)/(1R)	.0170	.0150	.0191	.0187	.0190	.0179
USVFO$ (*Variable 101*):							
(1W)	Standard, WS	192.86	−175.66	−239.05	203.82	785.30	153.45
(1R)	〃 RS	207.48	−175.81	−296.03	240.23	779.45	151.06
(2W)	Shocked, WS	245.93	−117.02	−145.22	307.96	915.73	241.47
(2R)	〃 RS	268.29	−109.04	−187.53	358.58	925.80	251.22
(3W)	(2W)−(1W)	53.06	58.64	93.83	104.13	130.43	88.02
(3R)	(2R)−(1R)	60.81	66.77	108.49	118.35	146.35	100.15
(4W)	(3W)/(1W)	.2752	−.3338	−.3925	.5109	.1661	.5736
(4R)	(3R)/(1R)	.2931	−.3798	−.3665	.4927	.1878	.6630
RLCB (*Variable 145*):							
(1W)	Standard, WS	11.0982	10.8261	11.5996	12.2640	11.4141	11.4404
(1R)	〃 RS	10.7000	10.7300	12.3000	11.9900	11.4300	11.4300
(2W)	Shocked, WS	11.2875	11.0664	11.8804	12.5520	11.7104	11.6993
(2R)	〃 RS	10.7000	10.7300	12.3000	11.9900	11.4300	11.4300
(3W)	(2W)−(1W)	.1893	.2402	.2808	.2880	.2963	.2589
(3R)	(2R)−(1R)	.0000	.0000	.0000	.0000	.0000	.0000
(4W)	(3W)/(1W)	.0171	.0222	.0242	.0235	.0260	.0226
(4R)	(3R)/(1R)	.0000	.0000	.0000	.0000	.0000	.0000

* Standard, WS = Standard Simulation based on the whole system.
〃 RS = 〃 〃 〃 〃 〃 real sector.
Shocked, WS = Shocked 〃 〃 〃 〃 whole system.
〃 RS = 〃 〃 〃 〃 〃 real sector.
** Average = Arithmetic average for 1972–76.

Table A.2 Sustained Shocks on *IFXBS*'s and *IFXGV*'s (10% up for 1972–76)

		1972	*1973*	*1974*	*1975*	*1976*	*Average*
GDPR (*Variable 5*):							
(1W)	Standard, WS	163,717	180,568	201,108	211,629	224,976	169,400
(1 R)	〃 RS	163,951	180,550	200,520	212,110	224,839	196,394
(2W)	Shocked, WS	164,157	180,927	201,609	212,398	225,955	197,009
(2 R)	〃 RS	164,480	180,960	201,104	213,002	225,962	197,104
(3W)	(2W)−(1W)	440	358	500	768	978	609
(3 R)	(2R)−(1R)	528	418	584	892	1,123	709
(4W)	(3W)/(1W)	.0027	.0020	.0025	.0036	.0044	.0031
(4 R)	(3R)/(1R)	.0032	.0023	.0029	.0042	.0050	.0036
GDP (*Variable 8*):							
(1W)	Standard, WS	172,292	208,868	274,023	296,591	336,220	257,599
(1 R)	〃 RS	173,197	208,747	271,060	298,800	335,670	257,495
(2W)	Shocked, WS	174,029	209,936	275,234	298,701	338,973	259,374
(2 R)	〃 RS	175,283	210,037	272,585	301,426	339,037	259,674
(3W)	(2W)−(1W)	1,737	1,067	1,211	2,109	2,753	1,775
(3 R)	(2R)−(1R)	2,086	1,289	1,525	2,626	3,367	2,179
(4W)	(3W)/(1W)	.0101	.0051	.0044	.0071	.0082	.0069
(4 R)	(3R)/(1R)	.0120	.0062	.0056	.0088	.0100	.0085
PD (*Variable 70*):							
(1W)	Standard, WS	1.0419	1.1040	1.3428	1.4183	1.5169	1.2848
(1 R)	〃 RS	1.0455	1.1035	1.3315	1.4262	1.5153	1.2844
(2W)	Shocked, WS	1.0488	1.1073	1.3456	1.4240	1.5230	1.2897
(2 R)	〃 RS	1.0538	1.1076	1.3355	1.4336	1.5234	1.2908
(3W)	(2W)−(1W)	.0069	.0033	.0028	.0057	.0062	.0050
(3 R)	(2R)−(1R)	.0082	.0041	.0040	.0074	.0081	.0064
(4W)	(3W)/(1W)	.0066	.0030	.0021	.0040	.0041	.0039
(4 R)	(3R)/(1R)	.0079	.0037	.0030	.0052	.0053	.0050
USVFO$ (*Variable 101*):							
(1W)	Standard, WS	192.8697	−175.6693	−239.0589	203.8281	785.3048	153.4549
(1 R)	〃 RS	207.4824	−175.8165	−296.0324	240.2303	779.4506	151.0629
(2W)	Shocked, WS	228.5153	−147.5729	−210.4359	251.7036	854.3296	195.3079
(2 R)	〃 RS	249.0998	−143.1929	−261.1886	299.1607	862.2455	201.2249
(3W)	(2W)−(1W)	35.6456	28.0963	28.6229	47.8755	69.0248	41.8530
(3 R)	(2R)−(1R)	41.6174	32.6236	34.8438	58.9304	82.7949	50.1620
(4W)	(3W)/(1W)	.1848	−.1599	−.1197	.2349	.0879	.2727
(4 R)	(3R)/(1R)	.2006	−.1856	−.1177	.2453	.1062	.3321
BLCB (*Variable 145*):							
(1W)	Standard, WS	11.0982	10.8261	11.5996	12.2640	11.4141	11.4404
(1 R)	〃 RS	10.7000	10.7300	12.3000	11.9900	11.4300	11.4300
(2W)	Shocked, WS	11.2387	10.9526	11.7117	12.4190	11.6110	11.5866
(2 R)	〃 RS	10.7000	10.7300	12.3000	11.9900	11.4300	11.4300
(3W)	(2W)−(1W)	.1405	.1264	.1120	.1550	.1969	.1462
(3 R)	(2R)−(1R)	.0000	.0000	.0000	.0000	.0000	.0000
(4W)	(3W)/(1W)	.0127	.0117	.0097	.0126	.0173	.0128
(4 R)	(3R)/(1R)	.0000	.0000	.0000	.0000	.0000	.0000

Table A.3 Sustained Shocks on *ZXR$* (10% up for 1972–76)

		1972	*1973*	*1974*	*1975*	*1976*	*Average*
GDPR (*Variable 5*):							
(1W)	Standard, WS	163,717	180,568	201,108	211,629	224,976	196,400
(1 R)	〃 RS	163,951	180,550	200,520	212,110	224,839	196,394
(2W)	Shocked, WS	165,909	181,596	202,389	212,100	225,057	197,410
(2 R)	〃 RS	166,486	181,836	202,299	212,987	225,358	197,793
(3W)	(2W)−(1W)	2,192	1,027	1,280	470	80	1,010
(3 R)	(2R)−(1R)	2,534	1,286	1,779	877	518	1,399
(4W)	(3W)/(1W)	.0134	.0057	.0064	.0022	.0004	.0051
(4 R)	(3R)/(1R)	.0155	.0071	.0089	.0041	.0023	.0071
GDP (*Variable 8*):							
(1W)	Standard, WS	172,292	208,868	274,023	296,591	336,220	257,599
(1 R)	〃 RS	173,197	208,747	271,060	298,800	335,670	257,495
(2W)	Shocked, WS	182,738	219,323	290,742	312,451	354,156	271,882
(2 R)	〃 RS	185,070	220,302	289,923	316,573	355,455	273,465
(3W)	(2W)−(1W)	10,446	10,455	16,718	15,859	17,936	14,283
(3 R)	(2R)−(1R)	11,873	11,555	18,863	17,773	19,785	15,970
(4W)	(3W)/(1W)	.0606	.0501	.0610	.0535	.0533	.0554
(4 R)	(3R)/(1R)	.0686	.0554	.0696	.0595	.0589	.0620
PD (*Variable 70*):							
(1W)	Standard, WS	1.0419	1.1040	1.3428	1.4183	1.5169	1.2848
(1 R)	〃 RS	1.0455	1.1035	1.3315	1.4262	1.5153	1.2844
(2W)	Shocked, WS	1.0941	1.1540	1.4161	1.4910	1.6001	1.3510
(2 R)	〃 RS	1.1035	1.1577	1.4126	1.5061	1.6043	1.3568
(3W)	(2W)−(1W)	.0522	.0500	.0733	.0727	.0832	.0663
(3 R)	(2R)−(1R)	.0580	.0542	.0811	.0799	.0890	.0724
(4W)	(3W)/(1W)	.0501	.0453	.0546	.0513	.0549	.0516
(4 R)	(3R)/(1R)	.0554	.0491	.0609	.0560	.0587	.0564
USVFC$ (*Variable 101*):							
(1W)	Standard, WS	192.8697	−175.6693	−239.0589	203.8281	785.3048	153.4549
(1 R)	〃 RS	207.4824	−175.8165	−296.0324	240.2303	779.4506	151.0629
(2W)	Shocked, WS	139.8364	−246.0215	−279.5664	116.1889	677.8304	81.6536
(2 R)	〃 RS	174.9962	−226.2294	−293.3211	188.7451	710.2964	110.8975
(3W)	(2W)−(1W)	−53.0333	−70.3522	−40.5075	−87.6392	−107.4744	−71.8013
(3 R)	(2R)−(1R)	−32.4862	−50.4130	2.7113	−51.4851	−69.1541	−40.1654
(4W)	(3W)/(1W)	−.2750	.4005	.1694	−.4300	−.1369	−.4679
(4 R)	(3R)/(1R)	−.1566	.2867	−.0092	−.2143	−.0887	−.2659
RLCB (*Variable 145*):							
(1W)	Standard, WS	11.0982	10.8261	11.5996	12.2640	11.4141	11.4404
(1 R)	〃 RS	10.7000	10.7300	12.3000	11.9900	11.4300	11.4300
(2W)	Shocked, WS	11.6009	11.4675	12.3964	13.0658	12.2208	12.1503
(2 R)	〃 RS	10.7000	10.7300	12.3000	11.9900	11.4300	11.4300
(3W)	(2W)−(1W)	.5027	.6413	.7968	.8017	.8067	.7099
(3 R)	(2R)−(1R)	.0000	.0000	.0000	.0000	.0000	.0000
(4W)	(3W)/(1W)	.0453	.0592	.0687	.0654	.0707	.0620
(4 R)	(3R)/(1R)	.0000	.0000	.0000	.0000	.0000	.0000

Table A.4 Sustained Shocks on *GDPWR*'s (10% up for 1972–76)

		1972	*1973*	*1974*	*1975*	*1976*	*Average*
GDPR (*Variable 5*):							
(1W)	Standard, WS	163,717	180,568	201,108	211,629	224,976	196,400
(1R)	〃 RS	163,951	180,550	200,520	212,110	224,239	196,394
(2W)	Shocked, WS	164,814	181,455	202,334	212,807	226,267	197,535
(2R)	〃 RS	165,185	181,560	201,963	213,444	226,325	197,695
(3W)	(2W)−(1W)	1,097	886	1,225	1,177	1,290	1,135
(3R)	(2R)−(1R)	1,233	1,010	1,443	1,334	1,485	1,301
(4W)	(3W)/(1W)	.0067	.0049	.0061	.0056	.0057	.0058
(4R)	(3R)/(1R)	.0075	.0056	.0072	.0063	.0066	.0066
GDP (*Variable 8*):							
(1W)	Standard, WS	172,292	208,868	274,023	296,591	336,220	257,599
(1R)	〃 RS	173,197	208,747	271,060	298,800	335,670	257,495
(2W)	Shocked, WS	176,433	212,680	279,714	301,980	342,339	262,633
(2R)	〃 RS	177,888	213,033	277,625	304,844	342,553	263,189
(3W)	(2W)−(1W)	4,140	3,811	5,690	5,388	6,139	5,034
(3R)	(2R)−(1R)	4,691	4,285	6,565	6,044	6,883	5,694
(4W)	(3W)/(1W)	.0240	.0183	.0208	.0182	.0183	.0195
(4R)	(3R)/(1R)	.0271	.0205	.0242	.0202	.0205	.0221
PD (*Variable 70*):							
(1W)	Standard, WS	1.0419	1.1040	1.3428	1.4183	1.5169	1.2848
(1R)	〃 RS	1.0455	1.1035	1.3315	1.4262	1.5153	1.2844
(2W)	Shocked, WS	1.0577	1.1161	1.3597	1.4336	1.5328	1.3000
(2R)	〃 RS	1.0634	1.1173	1.3517	1.4437	1.5335	1.3019
(3W)	(2W)−(1W)	.0158	.0122	.0170	.0154	.0160	.0153
(3R)	(2R)−(1R)	.0179	.0138	.0202	.0176	.0181	.0175
(4W)	(3W)/(1W)	.0152	.0110	.0126	.0108	.0105	.0119
(4R)	(3R)/(1R)	.0171	.0125	.0152	.0123	.0120	.0136
USVFO$ (*Variable 101*):							
(1W)	Standard, WS	192.8697	−175.6693	−239.0589	203.8281	785.3048	153.4549
(1R)	〃 RS	207.4824	−175.8165	−296.0324	240.2303	779.4506	151.0629
(2W)	Shocked, WS	156.4323	−231.9461	−296.1842	133.7070	713.6507	95.1319
(2R)	〃 RS	180.1779	−222.9634	−336.3585	184.8039	723.6314	105.8583
(3W)	(2W)−(1W)	−36.4374	−56.2768	−57.1253	−70.1211	−71.6541	−58.3230
(3R)	(2R)−(1R)	−27.3045	−47.1469	−40.3261	−55.4263	−55.8192	−45.2046
(4W)	(3W)/(1W)	−.1889	.3204	.2390	−.3440	−.0912	−.3801
(4R)	(3R)/(1R)	−.1316	.2682	.1362	−.2307	−.0716	−.2992
RLCB (*Variable 145*):							
(1W)	Standard, WS	11.0982	10.8261	11.5996	12.2640	11.4141	11.4404
(1R)	〃 RS	10.7000	10.7300	12.3000	11.9900	11.4300	11.4300
(2W)	Shocked, WS	11.3248	11.0993	11.9216	12.5714	11.7208	11.7276
(2R)	〃 RS	10.7000	10.7300	12.3000	11.9900	11.4300	11.4300
(3W)	(2W)−(1W)	.2266	.2732	.3219	.3074	.3067	.2872
(3R)	(2R)−(1R)	.0000	.0000	.0000	.0000	.0000	.0000
(4W)	(3W)/(1W)	.0204	.0252	.0278	.0251	.0269	.0251
(4R)	(3R)/(1R)	.0000	.0000	.0000	.0000	.0000	.0000

Table A.5 Sustained Shocks on *PMRM$* (10% up for 1972–76)

		1972	*1973*	*1974*	*1975*	*1976*	*Average*
GDPR (*Variable 5*):							
(1W)	Standard, WS	163,717	180,568	201,108	211,629	224,976	196,400
(1 R)	〃 RS	163,951	180,550	200,520	212,110	224,839	196,394
(2W)	Shocked, WS	163,931	180,307	200,658	211,127	224,338	196,072
(2 R)	〃 RS	164,209	180,296	200,089	211,659	224,222	196,095
(3W)	(2W)−(1W)	214	−261	−449	−502	−638	−327
(3 R)	(2R)−(1R)	257	−254	−430	−450	−616	−298
(4W)	(3W)/(1W)	.0013	−.0014	−.0022	−.0024	−.0028	−.0017
(4 R)	(3R)/(1R)	.0016	−.0014	−.0021	−.0021	−.0027	−.0015
GDP (*Variable 8*):							
(1W)	Standard, WS	172,292	208,868	274,023	296,591	336,220	257,599
(1 R)	〃 RS	173,197	208,747	271,060	298,800	335,670	257,495
(2W)	Shocked, WS	173,379	209,407	274,877	297,832	337,823	258,664
(2 R)	〃 RS	174,461	209,326	271,979	300,262	337,361	258,678
(3W)	(2W)−(1W)	1,087	538	854	1,240	1,603	1,064
(3 R)	(2R)−(1R)	1,264	579	919	1,461	1,691	1,183
(4W)	(3W)/(1W)	.0063	.0026	.0031	.0042	.0048	.0041
(4 R)	(3R)/(1R)	.0073	.0028	.0034	.0049	.0050	.0046
PD (*Variable 70*):							
(1W)	Standard, WS	1.0419	1.1040	1.3428	1.4183	1.5169	1.2848
(1 R)	〃 RS	1.0455	1.1035	1.3315	1.4262	1.5153	1.2844
(2W)	Shocked, WS	1.0516	1.1127	1.3535	1.4317	1.5339	1.2967
(2 R)	〃 RS	1.0561	1.1123	1.3423	1.4405	1.5326	1.2968
(3W)	(2W)−(1W)	.0097	.0087	.0107	.0134	.0171	.0119
(3 R)	(2R)−(1R)	.0105	.0089	.0108	.0144	.0173	.0124
(4W)	(3W)/(1W)	.0093	.0079	.0080	.0095	.0112	.0093
(4 R)	(3R)/(1R)	.0101	.0080	.0081	.0101	.0114	.0096
USVFO$ (*Variable 101*):							
(1W)	Standard, WS	192,8697	−175.6693	−239.0589	203.8281	785.3048	153.4549
(1 R)	〃 RS	207.4824	−175.8165	−296.0324	240.2303	779.4506	151.0629
(2W)	Shocked, WS	203.8456	−171.1288	−228.7776	221.1356	809.1330	166.8416
(2 R)	〃 RS	221.3397	−170.2025	−284.5880	262.0247	805.3047	166.7757
(3W)	(2W)−(1W)	10.9759	4.5405	10.2813	17.3075	23.8282	13.3867
(3 R)	(2R)−(1R)	13.8573	5.6140	11.4444	21.7944	25.8541	15.7128
(4W)	(3W)/(1W)	.0569	−.0258	−.0430	.0849	.0303	.0872
(4 R)	(3R)/(1R)	.0668	−.0319	−.0387	.0907	.0332	.1040
RLCB (*Variable 145*):							
(1W)	Standard, WS	11.0982	10.8261	11.5996	12.2640	11.4141	11.4404
(1 R)	〃 RS	10.7000	10.7300	12.3000	11.9900	11.4300	11.4300
(2W)	Shocked, WS	11.1552	10.8681	11.6403	12.3202	11.4844	11.4936
(2 R)	〃 RS	10.7000	10.7300	12.3000	11.9900	11.4300	11.4300
(3W)	(2W)−(1W)	.0570	.0420	.0406	.0561	.0703	.0532
(3 R)	(2R)−(1R)	.0000	.0000	.0000	.0000	.0000	.0000
(4W)	(3W)/(1W)	.0051	.0039	.0035	.0046	.0062	.0047
(4 R)	(3R)/(1R)	.0000	.0000	.0000	.0000	.0000	.0000

Table A.6 Sustained Shocks on *PXGAG$* (10% up for 1972–76)

		1972	1973	1974	1975	1976	Average
GDPR (*Variable 5*):							
(1W)	Standard, WS	163,717	180,568	201,108	211,629	224,976	196,400
(1 R)	〃 RS	163,951	180,550	200,520	212,110	224,839	196,394
(2W)	Shocked, WS	163,959	181,671	202,895	213,385	226,918	197,766
(2 R)	〃 RS	164,226	181,756	202,495	213,998	226,927	197,880
(3W)	(2W) − (1W)	242	1,102	1,786	1,755	1,941	1,365
(3 R)	(2R) − (1R)	274	1,206	1,974	1,888	2,087	1,486
(4W)	(3W)/(1W)	.0015	.0061	.0089	.0083	.0086	.0070
(4 R)	(3R)/(1R)	.0017	.0067	.0098	.0089	.0093	.0076
GDP (*Variable 8*):							
(1W)	Standard, WS	172,292	208,868	274,023	296,591	336,220	257,599
(1 R)	〃 RS	173,197	208,747	271,060	298,800	335,670	257,495
(2W)	Shocked, WS	174,189	213,226	280,933	302,866	343,063	262,855
(2 R)	〃 RS	175,227	213,544	278,797	305,704	343,140	263,282
(3W)	(2W) − (1W)	1,896	4,357	6,909	6,274	6,843	5,256
(3 R)	(2R) − (1R)	2,030	4,797	7,737	6,903	7,470	5,787
(4W)	(3W)/(1W)	.0110	.0209	.0252	.0212	.0204	.0204
(4 R)	(3R)/(1R)	.0117	.0230	.0285	.0231	.0223	.0225
PD (*Variable 70*):							
(1W)	Standard, WS	1.0419	1.1040	1.3428	1.4183	1.5169	1.2848
(1 R)	〃 RS	1.0455	1.1035	1.3315	1.4262	1.5153	1.2844
(2W)	Shocked, WS	1.0405	1.1062	1.3485	1.4198	1.5176	1.2865
(2 R)	〃 RS	1.0447	1.1073	1.3404	1.4300	1.5180	1.2881
(3W)	(2W) − (1W)	−.0014	.0023	.0057	.0016	.0007	.0018
(3 R)	(2R) − (1R)	−.0009	.0039	.0089	.0038	.0027	.0037
(4W)	(3W)/(1W)	−.0013	.0020	.0043	.0011	.0005	.0014
(4 R)	(3R)/(1R)	−.0008	.0035	.0067	.0027	.0018	.0029
USVFO$ (*Variable 101*):							
(1W)	Standard, WS	192.8697	−175.6693	−239.0589	203.8281	785.3048	153.4549
(1 R)	〃 RS	207.4824	−175.8165	−296.0324	240.2303	779.4506	151.0629
(2W)	Shocked, WS	145.2700	−237.4501	−318.9845	106.4552	690.2807	77.1143
(2 R)	〃 RS	161.9843	−229.7509	−359.9916	156.7573	698.1194	85.4237
(3W)	(2W) − (1W)	−47.5997	−61.7809	−79.9256	−97.3729	−95.0241	−76.3406
(3 R)	(2R) − (1R)	−45.4981	−53.9344	−63.9592	−83.4730	−81.3312	−65.6392
(4W)	(3W)/(1W)	−.2468	.3517	.3343	−.4777	−.1210	−.4975
(4 R)	(3R)/(1R)	−.2193	.3068	.2161	−.3475	−.1043	−.4345
RLCB (*Variable 145*):							
(1W)	Standard, WS	11.0982	10.8261	11.5996	12.2640	11.4141	11.4404
(1 R)	〃 RS	10.7000	10.7300	12.3000	11.9900	11.4300	11.4300
(2W)	Shocked, WS	11.1654	11.0428	11.9150	12.5717	11.7100	11.6810
(2 R)	〃 RS	10.7000	10.7300	12.3000	11.9900	11.4300	11.4300
(3W)	(2W) − (1W)	.0672	.2166	.3154	.3077	.2959	.2406
(3 R)	(2R) − (1R)	.0000	.0000	.0000	.0000	.0000	.0000
(4W)	(3W)/(1W)	.0061	.0200	.0272	.0251	.0259	.0210
(4 R)	(3R)/(1R)	.0000	.0000	.0000	.0000	.0000	.0000

Table A.7 Sustained Shocks on *PMRM$* (10% *down* for 1972–76)

		1972	*1973*	*1974*	*1975*	*1976*	*Average*
GDPR (*Variable 5*):							
(1W)	Standard, WS	163,717	180,568	201,108	211,629	224,976	196,400
(1R)	〃 RS	163,951	180,550	200,520	212,110	224,839	196,394
(2W)	Shocked, WS	163,463	180,887	201,675	212,256	225,776	196,812
(2R)	〃 RS	163,649	180,857	201,065	212,671	225,606	196,770
(3W)	(2W)−(1W)	−253	319	566	626	800	411
(3R)	(2R)−(1R)	−302	307	545	561	767	375
(4W)	(3W)/(1W)	−.0015	.0018	.0018	.0030	.0036	.0021
(4R)	(3R)/(1R)	−.0018	.0017	.0017	.0026	.0034	.0019
GDP (*Variable 8*):							
(1W)	Standard, WS	172,292	208,868	274,023	296,591	336,220	257,599
(1R)	〃 RS	173,197	208,747	271,060	298,800	335,670	257,495
(2W)	Shocked, WS	171,005	208,208	273,027	295,106	334,340	256,337
(2R)	〃 RS	171,715	208,031	270,010	297,044	333,669	256,094
(3W)	(2W)−(1W)	−1,286	−660	−995	−1,485	−1,879	−1,261
(3R)	(2R)−(1R)	−1,481	−716	−1,049	−1,755	−2,000	−1,400
(4W)	(3W)/(1W)	−.0075	−.0032	−.0036	−.0050	−.0056	−.0049
(4R)	(3R)/(1R)	−.0086	−.0034	−.0039	−.0059	−.0060	−.0054
PD (*Variable 70*):							
(1W)	Standard, WS	1.0419	1.1040	1.3428	1.4183	1.5169	1.2848
(1R)	〃 RS	1.0455	1.1035	1.3315	1.4262	1.5153	1.2844
(2W)	Shocked, WS	1.0303	1.0933	1.3298	1.4020	1.4965	1.2704
(2R)	〃 RS	1.0330	1.0926	1.3185	1.4089	1.4946	1.2695
(3W)	(2W)−(1W)	−.0116	−.0107	−.0130	−.0163	−.0204	−.0144
(3R)	(2R)−(1R)	−.0125	−.0109	−.0130	−.0173	−.0207	−.0149
(4W)	(3W)/(1W)	−.0112	−.0097	−.0096	−.0115	−.0134	−.0112
(4R)	(3R)/(1R)	−.0119	−.0099	−.0097	−.0121	−.0137	−.0116
USVFO$ (*Variable 101*):							
(1W)	Standard, WS	192.8697	−175.6693	−239.0589	203.8281	785.3048	153.4549
(1R)	〃 RS	207.4824	−175.8165	−296.0324	240.2303	779.4506	151.0629
(2W)	Shocked, WS	179.7975	−181.8823	−251.8356	182.2215	756.0055	136.8613
(2R)	〃 RS	191.2179	−183.3980	−309.6569	213.3094	747.2812	131.7507
(3W)	(2W)−(1W)	−13.0722	−6.2131	−12.7767	−21.6066	−29.2994	−16.5936
(3R)	(2R)−(1R)	−16.2645	−7.5815	−13.6245	−26.9209	−32.1693	−19.3121
(4W)	(3W)/(1W)	−.0678	.0354	.0534	−.1060	−.0373	−.1031
(4R)	(3R)/(1R)	−.0784	.0431	.0460	−.1121	−.0413	−.1278
RLCB (*Variable 145*):							
(1W)	Standard, WS	11.0982	10.8261	11.5996	12.2640	11.4141	11.4404
(1R)	〃 RS	10.7000	10.7300	12.3000	11.9900	11.4300	11.4300
(2W)	Shocked, WS	11.0298	10.7753	11.5520	12.1970	11.3311	11.3770
(2R)	〃 RS	10.7000	10.7300	12.3000	11.9900	11.4300	11.4300
(3W)	(2W)−(1W)	−.0684	−.0509	−.0476	−.0671	−.0829	−.0634
(3R)	(2R)−(1R)	.0000	.0000	.0000	.0000	.0000	.0000
(4W)	(3W)/(1W)	−.0062	−.0047	−.0041	−.0055	−.0073	.0055
(4R)	(3R)/(1R)	.0000	.0000	.0000	.0000	.0000	.0000

Table A.8 Sustained Shocks on *PXGAG$* (10% *down* for 1972–76)

		1972	*1973*	*1974*	*1975*	*1976*	*Average*
GDPR (*Variable 5*):							
(1W)	Standard, WS	163,717	180,568	201,108	211,629	224,976	196,400
(1 R)	〃 RS	163,951	180,550	200,520	212,110	224,839	196,394
(2W)	Shocked, WS	163,512	179,438	199,280	209,856	223,030	195,023
(2 R)	〃 RS	163,718	179,314	198,496	210,195	222,740	194,893
(3W)	(2W) − (1W)	−204	−1,130	−1,827	−1,772	−1,946	−1,376
(3 R)	(2R) − (1R)	−233	−1,236	−2,023	−1,914	−2,098	−1,501
(4W)	(3W)/(1W)	−.0012	−.0063	−.0091	−.0084	−.0087	−.0070
(4 R)	(3R)/(1R)	−.0014	−.0068	−.0101	−.0090	−.0093	−.0076
GDP (*Variable 8*):							
(1W)	Standard, WS	172,292	208,868	274,023	296,591	336,220	257,599
(1 R)	〃 RS	173,197	208,747	271,060	298,800	335,670	257,495
(2W)	Shocked, WS	170,453	204,414	266,960	290,174	329,236	252,247
(2 R)	〃 RS	171,240	203,852	263,176	291,732	328,030	251,606
(3W)	(2W) − (1W)	−1,839	−4,454	−7,062	−6,416	−6,983	−5,351
(3 R)	(2R) − (1R)	−1,956	−4,895	−7,884	−7,067	−7,639	−5,888
(4W)	(3W)/(1W)	−.0113	−.0213	−.0258	−.0216	−.0208	−.0208
(4 R)	(3R)/(1R)	−.0113	−.0234	−.0291	−.0237	−.0228	−.0229
PD (*Variable 70*):							
(1W)	Standard, WS	1.0419	1.1040	1.3428	1.4183	1.5169	1.2848
(1 R)	〃 RS	1.0455	1.1035	1.3315	1.4262	1.5153	1.2844
(2W)	Shocked, WS	1.0441	1.1013	1.3369	1.4166	1.5161	1.2831
(2 R)	〃 RS	1.0472	1.0996	1.3223	1.4222	1.5125	1.2808
(3W)	(2W) − (1W)	.0021	−.0022	−.0059	−.0017	−.0007	−.0017
(3 R)	(2R) − (1R)	.0017	−.0038	−.0092	−.0040	−.0028	−.0036
(4W)	(3W)/(1W)	.0021	−.0020	−.0044	−.0012	−.0005	−.0013
(4 R)	(3R)/(1R)	.0016	−.0035	−.0069	−.0028	−.0019	−.0028
USVFO$ (*Variable 101*):							
(1W)	Standard, WS	192.8697	−175.6693	−239.0589	203.8281	785.3048	153.4549
(1 R)	〃 RS	207.4824	−175.8165	−296.0324	240.2303	779.4506	151.0629
(2W)	Shocked, WS	241.9104	−113.7914	−159.0427	301.2311	880.2485	230.1112
(2 R)	〃 RS	254.6882	−121.6733	−231.4221	323.6479	859.9621	217.0406
(3W)	(2W) − (1W)	49.0407	61.8778	80.0162	97.4030	94.9437	76.6563
(3 R)	(2R) − (1R)	47.2058	54.1432	64.6103	83.4176	80.5116	65.9777
(4W)	(3W)/(1W)	.2543	−.3522	−.3347	.4779	.1209	.4995
(4 R)	(3R)/(1R)	.2275	−.3080	−.2183	.3472	.1033	.4368
RLCB (*Variable 145*):							
(1W)	Standard, WS	11.0982	10.8261	11.5996	12.2640	11.4141	11.4404
(1 R)	〃 RS	10.7000	10.7300	12.3000	11.9900	11.4300	11.4300
(2W)	Shocked, WS	11.0356	10.6034	11.2728	11.9441	11.1081	11.1928
(2 R)	〃 RS	10.7000	10.7300	12.3000	11.9900	11.4300	11.4300
(3W)	(2W) − (1W)	−.0626	−.2228	−.3269	−.3199	−.3060	−.2476
(3 R)	(2R) − (1R)	.0000	.0000	.0000	.0000	.0000	.0000
(4W)	(3W)/(1W)	−.0056	−.0206	−.0282	−.0261	−.0268	−.0216
(4 R)	(3R)/(1R)	.0000	.0000	.0000	.0000	.0000	.0000