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THE SRI-WEFA SOVIET ECONOMETRIC MODEL: PHASE ONE
DOCUMENTATION

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Stanford Research Institute

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**THE SRI-WEFA SOVIET ECONOMETRIC MODEL:
PHASE ONE DOCUMENTATION**

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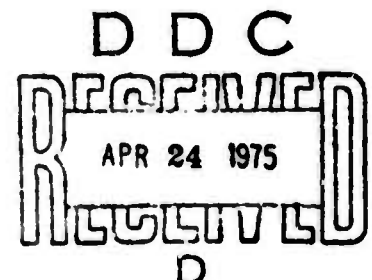
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ABSTRACT

This paper presents the results of Phase I of work on an econometric model of the Soviet Union. The structure of the model is explained and is followed by a discussion of the insights into the operation of the Soviet economy gained through preparation and use of the model. In the two subsequent sections the use of the model is explored, first in the examination of alternative scenarios and the alteration of the model for inferential study, and then the use of the model for forecasting the performance of the Soviet economy. The latter section includes an ex-post forecast for 1973. Model documentation and data sources are presented in the appendices.

This model is a first stage result and many changes are anticipated in the subsequent phases of modeling, which will include an increase in the number of sectors of production to sixteen.

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FOREWORD

The coming of age of econometric modeling has produced on the Soviet economic analysts scene, economists trained both in Soviet economic analysis and modern econometric methods. The Strategic Studies Center, as part of its Comparative and Soviet Economics Program, felt the need and timeliness of this first, large-scale effort to construct an econometric model of the Soviet Union. The talents of SRI/SSC's Soviet economists were added to the econometric modeling experience of Wharton Econometric Forecasting Associates, which included some experience with modeling socialist economies, to accomplish this first phase of work on the Soviet econometric model. This paper presents the structure of the econometric model, several applications in simulation and forecasting, and insights gained in model construction and use.

The authors would like to acknowledge Dr. Herbert S. Levine, Senior Research Consultant to the Strategic Studies Center and Professor of Economics at the University of Pennsylvania, Dr. Lawrence R. Klein of Wharton Econometric Forecasting Associates and Professor of Economics at the University of Pennsylvania, Dr. F. Gerard Adams of Wharton EFA and Professor of Economics at the University of Pennsylvania, Dr. Ross S. Preston, Wharton EFA and the Department of Economics, University of Pennsylvania, Dr. Mitsuo Saito, visiting Professor at the University of Pennsylvania and Charles Movit, Research Analyst, SRI/SSC.

The authors would also like to thank the many Soviet specialists and econometrics specialists who participated in the three colloquia on the model held this past year.

Richard B. Foster
Director
Strategic Studies Center

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SECTION ONE: INTRODUCTION

Objectives

The central objective of our research was to develop an econometric model of the Soviet economy, one that would serve as a flexible tool for scenario analysis and for forecasting short- and medium-term. While some attention has been paid to longer run characteristics, our primary concern has not been to build a ^{growth} model for the USSR, but rather a macroeconomic model which would assess the impact of plans and other administrative instruments. Concurrently, however, we have been developing a capability for input-output analysis for the sectoral disaggregation anticipated in a second year of research. In forecasting for Western economies, macroeconomic models have been successfully adapted for longterm projections (5-15 years), particularly through integrating an inter-industry framework. It should be emphasized that our objective was not only to build a short and medium term model for forecasting purposes, but also for the analysis of alternative scenarios. The latter objective is of great importance to the policymaker. A model which can simulate the total system responses to specified stimuli, associated with alternative Soviet decision or world situation scenarios, can prove to be of great value to both scholars and policymakers.

Justification for an Econometric Approach

Since the early 1950's, major quantitative research on the Soviet economy has established a significant stock of good data and considerable understanding of Soviet statistics. With the accumulation of a data sample sufficient for

standard estimation techniques, it seemed appropriate to bring Western expertise with econometric models together with the measurement experience and descriptive analysis of Soviet specialists. It was hoped that this interaction, appropriately centered at the University of Pennsylvania with its specialists on the Soviet economy and on econometric modelling, would result in an advance in our scholarly understanding of the Soviet economy and through this in policy analysis of Soviet prospects.

With respect to understanding the Soviet system, econometric methodology forces the reduction of theory to tractable specifications, and thus subjects received theory and description to statistical testing. Furthermore, as a result of the estimation work we have done on our proposed model, we hope others will be stimulated to undertake studies of socialist economic behavior through the use of econometric model building.

For policy analysis and forecasting, econometric models have proved to be a valuable tool. A well-conceived and well-managed econometric model enhances rather than supplants observer expertise. We elaborate on this point in Section 5 below. Here, let us just say that given a macroeconomic model, specialists on individual sectors of the Soviet economy should be able to concentrate on the particulars of those individual sectors with the model handling the evaluation of interaction and full-system effects. Not only does the model provide quantitative measures of the interactions among economic variables in a system context, but it does so with explicit assumptions and statistical properties.

What Has Been Accomplished

We feel that the objectives of our year's research have been accomplished. Some, indeed, have been surpassed. For example, in our original proposal we indicated an objective of developing a model composed of 15-20 equations. In

actuality, a medium-scale econometric model, consisting of over 100 behavioral equations and identities, has been specified and estimated. The model is related to Soviet plans. While we have not modelled the Soviet system of plan construction, the model is driven by plan budget data and it does contain explicit reference to the economic impact of Soviet annual and five-year plans. The structure of the model is described in Section Two of this report. In order to develop our model, we have collected extensive data on the Soviet economy and built a computer databank of over 650 time series. Our efforts at data collection and construction are discussed in Appendix B.

During the estimation stage, a number of insights have been gained into the operation of the Soviet economy. We have quantified several established hypotheses including the shortrun impact of defense expenditures upon sectoral investment. In addition, new hypotheses such as the role of profits in investment determination have been explored. Through our series of working papers, (Appendix C) we have circulated our findings for critical comment. A brief survey of our work in econometric history is presented in Section Three below.

The estimated econometric model has been programmed with WEFA expertise to serve as a flexible tool for scenario analysis and forecasting. Different versions of the model may be selected for particular problems posed by the user. Our initial use of the model for scenarios and forecasting is described in Sections Four and Five. During the present year, we intend to make the SRI-WEFA model a "living model" through continuous exercise and analysis with participation of those who are prospective users of the system for policy analysis.

Finally, we have prepared the input-output framework (using the reconstructed 1959 and 1966 Soviet I-O tables) necessary for disaggregation of the macroeconomic

model in the second stage of our project. We have also partially incorporated some input-output structure in the present model for one version of consumption determination. Using the input-output technology and final demand matrices, we have generated synthetic variables for deliveries to personal consumption. These allow us to treat directly the impact of supply influences on Soviet household consumption.

SECTION TWO: THE ECONOMIC STRUCTURE OF THE SRI-WEFA MODEL

In this section of the report, the essential structure of the econometric model will be presented in a descriptive and non-technical way. A more complete analysis of its specification and use is included as Appendix A to this report. We begin with a discussion of the dimensions of the model and a description of the exogenous environment. Then we discuss the key behavioral relationships of the model, and conclude by briefly indicating the procedural steps in solution and the major feedback flows within a given period.

Dimensions of the Model

Before discussing the structure of the SRI-WEFA Model, it is important that the degree of disaggregation in this macroeconomic system be understood. A complete picture of the disaggregation may be gained from the list of Model variables provided in Appendix A; in this section of the report we will discuss only the levels of disaggregation on the sides of supply (production and factor inputs) and demand (components of GNP end-use).

On the supply side, GNP is composed of the output of five productive sectors:

- (1) Industry (I)
- (2) Agriculture (A)
- (3) Construction (C)
- (4) Transport and Communications (T)
- (5) Government, Services and Trade (G)

The letter symbol for each sector is used in identifying the components of output (X), capital (K) and employment (N) when the sector letter appears second in a variable name. The fifth production category (G) corresponds roughly to the non-material sphere of the national economy in Marxian terms.

Capital assets are disaggregated into these same five categories, but there is a further disaggregation for the agricultural and government sectors. In agriculture, we distinguish between physical capital (which includes draft animals) and productive livestock (cows, sheep, pigs, etc.). In the government sector, we disaggregate capital stock into housing and nonhousing categories because of different patterns of investment and capital formation. The same five categories are used for disaggregating employment but in the agricultural sector we distinguish between employment in the socialized sector (state and collective farms) and in the private sector. Furthermore, we are also concerned with the stocks of specialist manpower (EMT) employed in industry and in transport and communications. Thus, we have five production categories, seven capital categories, and eight employment categories in the Model.

On the demand side, GNP by end-use is disaggregated as indicated in Table 1 below. There are four categories of consumption, three categories of investment, four categories of government spending (as usually defined in the West), net exports and an end-use residual category. Note that Science as an end-use category within government has not been divided into civilian research and development on the one hand and military and space science on the other, as is frequently done in Western evaluations of Soviet GNP. New fixed investment is, however, broken down further into the six categories of physical capital. The net exports category of GNP end-use is composed of 5 export and 7 import categories which are also presented in Table 1.

This level of disaggregation in the Model was regarded as workable and attainable during the initial stage of our research. It provides sufficient detail for macroeconomic scenarios and forecasting, and at the same time is not so complex as to preclude non-technical discussions and direct user participation.

In the second stage of the project, we anticipate substantial disaggregation of the supply side of the Model and also further disaggregation in the foreign trade component of end-use.

TABLE 1

END-USE CATEGORIES IN THE MODEL

- | | |
|---|---|
| 1. Consumption | (a) Food
(b) Soft Goods
(c) Durable Goods
(d) Personal Services |
| 2. Investment | (a) New Fixed Capital Investment
1) Agriculture
2) Industry
3) Construction
4) Transport and Communications
5) Housing
6) Services and Trade
(b) Capital Repair
(c) Inventories |
| 3. Government | (a) Administration
(b) Health and Education
(c) Science
(d) Defense |
| 4. Net Exports | (a) Exports to CMEA
1) Food
2) Other
(b) Exports to other Centrally-Planned Economies (CPE's)
(c) Exports to Developed West
(d) Exports to Less Developed Countries (LDC's)
(e) Imports from CMEA
(f) Imports from other CPE's
(g) Imports from Developed West
1) Wheat and Wheat Flour
2) Machinery and Manufacturing
3) Other
(h) Imports from LDC's
1) Food
2) Other |
| 5. End-Use Residual (Grain Reserves, Livestock Accumulation, Statistical Discrepancy) | |

Exogenous Variables

The exogenous environment of the model may be partitioned into three groups of variables: (1) pure exogenous variables, (2) predetermined variables, and (3) annual policy variables. The category of pure exogenous variables includes those which cannot be influenced^{significantly} by Soviet economic policy, past or present. Of major importance in this category are weather variables, temperature and precipitation, which affect the harvest. Another important set of pure exogenous variables are developments in foreign economies: indexes of world trade, world market prices, and activity levels in CMEA economies. Essentially, we assume that Soviet trade policy and political influence have a negligible impact upon such developments so that we may disregard all such feedback in the formal specification. At present, this is probably a reasonable assumption; if Soviet trade becomes more significant in world trade activity, these interrelationships can be best handled within the framework of the LINK system.

Predetermined variables include the inherited stocks of productive factors: population, fixed capital, land, livestock, and inventories. Within the present model, changes in population and demographic structure are regarded as purely exogenous. However, the location^{of population} (urban/rural) and ^{the} participation in the labor force are influenced by economic variables. Another important group of predetermined variables are the past agricultural harvests which influence current allocational decisions by Gosplan, state and collective farms, and peasant households. A third group of variables which could be included in the predetermined category are those timing variables imposed by the modeller (usually in the form of dummy variables) to capture the timing of investment projects (the five-year plan cycle) and the timing of major organizational and price reforms (e.g., the 1967-68 industrial price reform).

The policy variables which play crucial roles in the model are those decision variables represented in the Annual Plan and its derivative Annual Budget. Although there are innumerable discretionary variables available to Soviet policymakers, the model focuses upon a small number of aggregate policy variables which directly enter into the behavioral equations. One such policy variable is defense expenditure which is treated as strictly exogenous. A second group of policy variables includes the financing of economic sectors: industry and construction, agriculture, transport and communications, social and cultural measures, and housing. While financing is exogenous, investment is endogenous, influenced by sectoral financing, defense expenditure, and gross profits. A third group of policy variables are transfer expenditure and tax rates which influence the size and composition of the state budget.

The Core of the Model

It is within such an exogenous environment that the modelled economy is presumed to operate. Given values for all exogenous variables, the system of behavioral relationships which we have estimated statistically will determine a solution to the model. A solution consists of estimated values for each endogenous (explained) variable included in the model. In this report, we will not examine each behavioral relation in the system in detail; rather, we will describe what might be called the core of the model, i.e., its economic structure and the causal links among key components. In a supplement to be issued later than this report, we will discuss each behavioral relation in the model.

The core of the SRI-WEFA model consists of seven major components:

- (1) Factor Supply Equations
- (2) Sectoral Production Functions
- (3) Capital Investment Functions
- (4) Income, Wage and Price Equations
- (5) Consumption Functions
- (6) Foreign Trade Equations
- (7) Residual Analysis

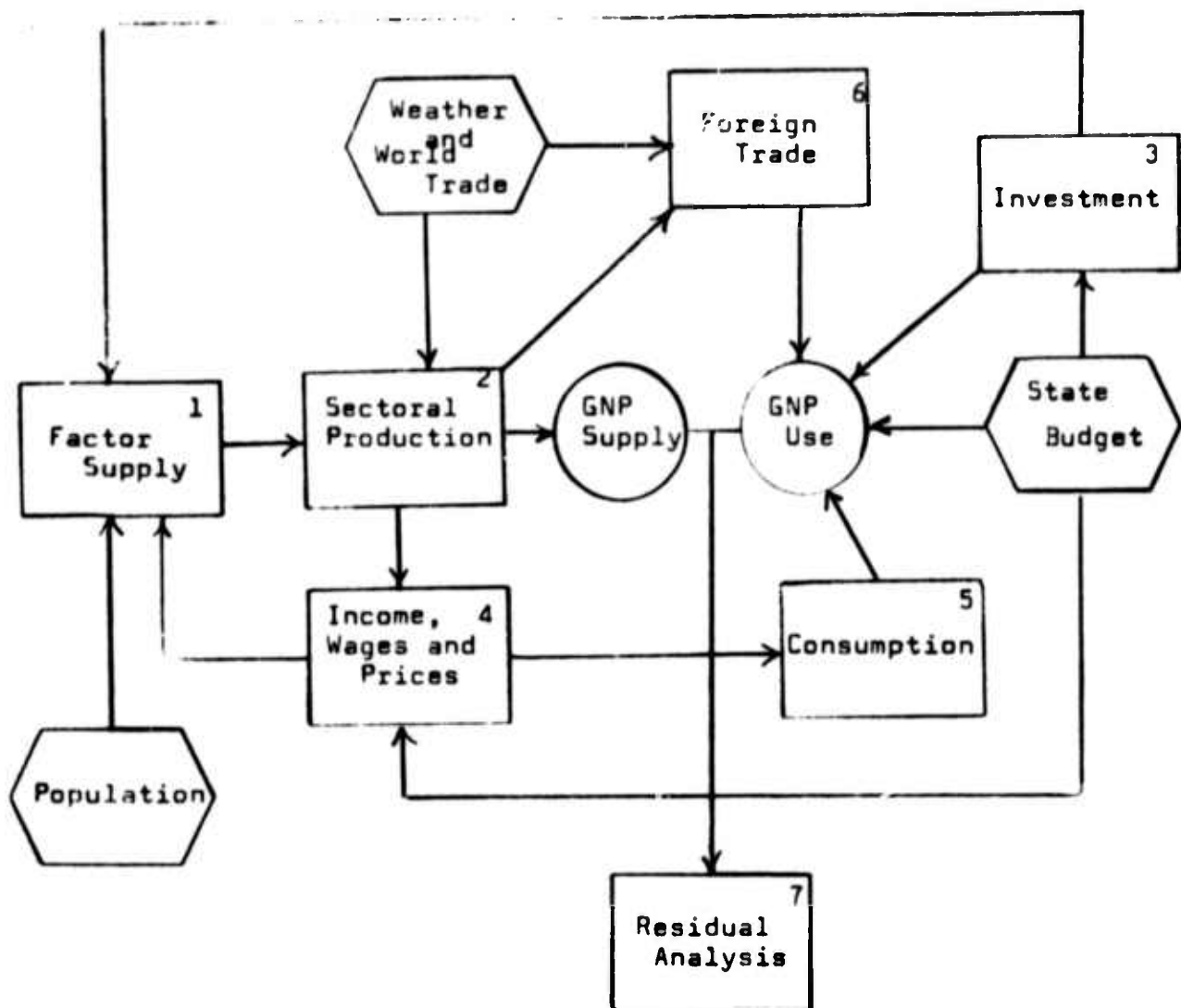
The links between these components are diagrammed below in Figure 1 and we shall describe briefly the contents of each component. Appendix A to this report contains a more technical description of the model with a complete list of equations, sectors, and variables. An index of model equations corresponding to the following description of the core is included below in Table 2.

(1) Factor Supply Equations

In the model, mean annual population and sown acreage are exogenous and start-of-year capital stocks, inventories, and livestock herds are predetermined. The distribution of population between urban and rural categories and labor participation rates are endogenous, dependent upon wage differentials, relative housing scarcities, and past harvests. The allocations of total nonagricultural employment to industry, construction, transport and communications, and the government sectors is influenced by the five-year-plan cycle (whether the given year is toward the start or the end of the current 5YP) and the previous year's allocations of investment.

Current year additions to January 1 capital stocks are predicted by sectoral capital formation equations which phase current and past investment expenditures in capital increments. The timing of that phasing is influenced from the five-year plan. Similarly, additions to specialist employees in industry and transport are determined by appropriate past enrollments in higher technical education. Inputs of current purchases to agriculture are significantly influenced by recent harvests. Growth in the herd of livestock depends upon provision for young livestock and recent harvests.

FIGURE 1
The Core of the SRI-WEFA Model



Endogenous components represented by rectangles.

Exogenous variables and partially exogenous components
represented by hexagons.

(2) Sectoral Production Functions

For each of five sectors we have estimated a production function, relating output to the levels of inputs. Except for construction, all output time-series are Western reconstructions of Soviet data (see Appendix B for a justification of this choice). In two sectors, industry and transport/communications, the labor force is disaggregated into specialist and non-specialist employees. Where high correlation between output and input series precluded direct estimation of factor contributions to output, observed factor shares in established prices were used to determine the relative factor contributions; this step was necessary only for the industrial and government sectors. For agriculture, after considerable experimentation, we adopted a two-step estimation procedure: (a) to estimate a production function for "potential output" obtained by connecting agricultural peaks with line segments, (b) to relate deviations from "potential output" to weather conditions and measures of factor input intensities.

(3) Investment Functions

Given last year's investment allocations, investment in the current year is a function of budget financing in the Annual Plan, the level of gross profits, budget outlays on defense expenditure, and the current and preceding harvests. Positive impact of financing plans upon sectoral investment is found in industry, transport, communications, and housing. Economy-wide gross profits affect industrial investment through decentralized enterprise demand or centralized response to generally favorable economic conditions. Defense expenditure tends to crowd out investment in industry, housing and the services/trade sector, at least in the short-run. The current harvest has a positive

impact upon agricultural investment (decentralized activity by state and collective farms) and upon industrial investment (through the level of gross profits). In a "crisis response" fashion, harvest failures in the previous year boost the current level of agricultural investment.

(4) Income, Wage and Price Equations

Money income of households is largely determined by employment and money wage rates, with adjustment for transfer payments and direct taxes set by the Budget. Changes in the category of gross profits are influenced by price reforms and harvest conditions. In our model, the longrun industrial real wage is determined by average productivity in industry with only partial adjustment in most years but large adjustments in years of major wage reform (the timing for which is exogenous). A similar relationship links the longrun agricultural real wage to average productivity in agriculture, while other sectoral wage rates essentially move in tandem with the industrial wage. Non-food prices are essentially marked-up on the industrial money wage but where past prices influence the current money wage (the real wage being determined by average productivity). Food prices reflect shortrun scarcities via a "negotiated" food price; harvest failures thus have inflationary consequences for the economy, at least in the short run.

(5) Consumption Functions

When key supply constraints are taken into account, there do appear to be stable relationships between consumption expenditures and disposable income, both measured in real terms. Consumption is broken down into four categories: food, nondurables, durable goods, and services (including health and education).

Food and nondurable consumption are constrained by agricultural production as well as being influenced by the relative price of food. Expenditures on durable goods and services are constrained by relevant sectoral productions. As discussed in Section Four, there are alternative ways in which consumption may be determined with greater influence from supply: either completely when consumption is the residual category of end-use, or through delivery variables obtained from the 1966 input-output table.

(6) Foreign Trade

The USSR's exports and imports are determined primarily by levels of domestic and foreign production with limited influence from prices and rather more from harvest failures. Four trading regions are identified: CMEA (the six East European economies), other Centrally-planned Economies or CPE's (Cuba, China, North Korea, etc.), the Developed West, and Less Developed Countries (LDC's). On the commodity dimensions, food exports to CMEA, wheat and wheat flour imports from the Developed West, machines-manufactures imports from the Developed West, and food imports from LDC's are separately treated. USSR trade flows are measured in dollars and then converted and deflated to constant domestic rubles as an end-use category for residual analysis.

(7) Residual Analysis

In this component of the core, other end-use categories including capital repair, inventory investment, science and administration are estimated. National Product by sector-of-origin is computed using sectoral outputs and 1970 sectoral weights in established prices. We also have an estimated equation for an end-use residual category which conceptually includes state grain reserves, other undisclosed items, dollar-ruble conversion errors and statistical discrepancy.

In the context of the model solution, when consumption is obtained directly there will also be a simulation residual equal to the difference between sector-of-origin GNP and end-use GNP. Alternatively, when consumption is obtained as the residual end-use category, there is no simulation residual; all end-use categories including the modelled end-use residual are computed and subtracted from sector-of-origin GNP to determine aggregate consumption.

TABLE 2

Index of Equations and the Model Core

The list of equations is provided in Appendix A. This index relates the discussions of the Model core in Section Two to particular equation numbers in that list.

<u>Component</u>	<u>Equations</u>	
(1) Factor Supply	A.1 - A.2 K.1 - K.14 N.1 - N.12	Other Inputs Capital Formation Population and Employment
(2) Production Functions	X.1 - X.6	Production
(3) Investment	I.1 - I.9	Investment
(4) Income, Wages and Prices	P.1 - P.13 W.1 - W.5 Z.1 - Z.7	Prices Wages Incomes
(5) Consumption	C.1 - C.5	Consumption
(6) Foreign Trade	E.1 - E.7 M.1 - M.9	Exports Imports
(7) Residual Analysis	I.10--I.13 G.1 - G.6	Inventories Aggregate Identities and Balances

A Solution of the Model

With the foregoing descriptions of the exogenous environment and the endogenous relationships, we may now step through the solution procedure of the model for any given year. Reflecting Western analysis of the Soviet economy, the SRI-WEFA Model is essentially supply-oriented rather than demand-oriented, in contrast to models built for analysis of Western economies. Figure 1 above should be helpful in following this discussion of the solution procedure. Let us take the year 1972 as our example. To solve the model for 1972 we need 1972 values for each exogenous variable and 1971 (and earlier for some variables) values for endogenous variables whose past values influence current behavior. These 1971 values for endogenous variables might be the actual observed values in a one-period simulation or the solution values of the model for 1971 in a dynamic simulation.

Though our model is not recursive, we leave aside system feedbacks for the moment so that we can describe the solution process in a step-by-step manner. The major feedback loops will then be described afterwards. We begin with the exogenous data from the annual plan on sectoral financing and defense expenditure. These variables largely determine investment expenditure. Current investment, together with inherited capital stocks, determines the supply of capital for the current period. Labor supplies for all sectors are essentially determined by predetermined variables including past labor allocation, income differentials, relative housing stocks, and past investment. Consequently, sectoral outputs and GNP by sector-of-origin are then computed given factor supplies and the exogenous weather variables.

Incomes, wage rates and prices adjust during the current year in accord with production and employment. Household incomes, adjusted by personal taxes and transfer payments in the State budget, and relative prices then determine consumption demand (which is also constrained by production in certain categories). Foreign trade flows are influenced by domestic production levels as well as world market conditions. The endogenous components of the State budget are also computed taking the current harvest into account. Inventories adjust in response to current consumption, the agricultural harvest, nonagricultural GNP and defense expenditure. The addition of all end-use categories provides us with end-use GNP which is subtracted from sector-of-origin GNP to give us the simulation residual for 1972.

The foregoing discussion and Figure 1 have been simplified to achieve clarity of presentation by abstracting from feedback loops which make the solution of the model a simultaneous equation problem (one which usually requires 8-12 computer iterations for each year's solution). The major feedback in the system arises from the current harvest. The current harvest has a direct effect on agricultural investment and an indirect impact upon current industrial investment through influence upon the gross profits. Another important feedback loop involves the influence of the real industrial wage upon the labor participation of the urban population. There are several other feedback elements in the model, but those mentioned are the major sources of simultaneity in the system. In our experiments with Model I in the second year of the project, we intend to investigate other promising macro-economic interactions.

SECTION THREE: INSIGHTS GAINED THROUGH ECONOMETRIC

STUDY OF THE SOVIET UNION

When an economist builds an econometric model of a Western market economy, he may draw upon a rich theoretical literature that identifies crucial behavioral components of the macroeconomic system as well as developed tradition of model construction. In approaching the same task for a centrally-planned Soviet-type economy, while there does not exist a comparable theoretical and econometric literature, the analyst is presented with an unusually rich descriptive and statistical literature. One of the most exciting tasks in current research on the Soviet economy involves the testing and quantification of hypotheses explicit and implicit in our "received wisdom". We hope that the initial efforts described in this report will serve to stimulate other econometric studies and motivate specialists in this area to evaluate critically the assumptions, procedures and conclusions of such work.

Econometric and descriptive analysis of the Soviet economy should be complementary activities for purposes of understanding, policy analysis and forecasting. An important virtue of the econometric discipline is that it requires one first to conceptualize and estimate regularities of behavior. At that stage, anomalies and disturbances are both clarified and brought into perspective. Almost unavoidably, the "special events" loom large in any descriptive analysis. Within the framework of an econometric model, the analyst is able to discriminate among these "special events", incorporating those of significant impact into an econometric history of the USSR.

An Econometric History of the Soviet Union

In our first year of this project, we feel that notable steps have been taken in developing an econometric history of the USSR for the past two decades. As indicated above, such a history rests first upon a tenable abstraction of economic behavior, a system of operational relationships with both theoretical and statistical content. Second, it should clearly date and quantify the significant changes in economic policy and pure exogenous variables. We will emphasize the first aspect of our econometric history of the USSR as we indicate the major insights into the operation of the Soviet economy that we have gained during the construction of our model. The rest of this section is organized in accord with the components introduced in Section Two.

(1) Factor Supply Equations*

Many of the most interesting discoveries arose during the estimation of capital formation equations for the various sectors of the Soviet economy. In principle, there should be technical relations that phase current and past investment into additions to capital stock (basic funds in Soviet capital accounting). However, we soon recognized that the timing of project completions for certain sectors was quite sensitive to the Five-Year-Plan cycle, i.e., whether a particular year falls toward the beginning or the end of the Five-Year-Plan then in operation. After considerable experimentation, we selected one/^{timing}dummy variable which best captured the impact of investment planning institutions. This variable was constructed to reflect a concentration of project completions toward the end of a Five-Year-Plan and spilling over into the initial year of the subsequent Plan, and it made special allowance for the Seven-Year-Plan (1959-1965). In evaluating the gestation lags for sectoral investment

*See Working Paper #18 for a fuller discussion of these matters.

we also observed the impact of construction priorities; the services and trade sector, in particular, had an unusually long lag of three to four years and was less predictable than other sectors.

The estimation of capital formation equations also identified several anomalies in the official data for sectoral capital stock, that is on years in which the observed change in capital stock could not be reconciled statistically with the observed investment series. In two cases, we concluded that there had been an undisclosed accounting transfer of capital stock between sectors: a transfer from industry to transport in 1958 and a transfer from industry to housing in 1962. We adjusted the corresponding capital stocks, to make each series more consistent, before estimating sectoral production functions.

On the employment side, our estimations tended to confirm the urban drift of Soviet population to increase after a harvest failure, to diminish with the reduction of urban/rural income differentials, and to increase with greater urban housing availability. Participation of the rural population in agricultural employment rose during and immediately after a harvest failure, and private agricultural activity increased after harvest failures. Participation in nonagricultural employment varied directly with increases in the industrial real wage and also rose toward the end of a Five-Year-Plan. We also found^{that} the allocation of nonagricultural employees across sectors was sensitive to past investment ratios, confirming the anticipated pattern of wage fund budgeting from year to year.

(2) Sectoral Production Functions

Substantial econometric work has been done previously on production functions for Soviet industry, at the aggregate and branch levels. Because of the serious statistical problem posed by the high correlation between industrial inputs and output, it is impossible to choose "the" correct specification of aggregate industrial output. Our model includes as alternatives both a Cobb-Douglas and a CES production function for Soviet industry, each being estimated with constraints on factor elasticities. Each performs adequately over the sample period 1955-1972, but ^{they} suggest quite different longrun forecasts for Soviet growth.

Some new ground was broken in estimating production functions for construction and for transport and communications. We found slightly increasing returns in Soviet construction though this was in a specification excluding disembodied technical progress. In transport and communications we confirmed the earlier estimations for Soviet railroads by Holland and Helen Hunter. We found changes in output best explained by capital stock (adjusted for the 1958 transfer), specialist manpower, and a railway utilization index.

Economists who have used standard methods to estimate production functions for Soviet agriculture have frequently been discouraged by high estimates for the labor elasticity and returns to scale. Apparently, this result arises from the observed correlation in the short run between summer precipitation and man-days worked. To overcome this problem, we adopted a two-step estimation procedure. First we computed a "potential output" series by connecting peaks in agricultural output. Then we estimated a Cobb-Douglas production function for potential output using mandays and capital stock; we found a very reasonable result with nearly constant returns to scale and a labor elasticity of about 0.55. We then found that deviations from potential output so determined could be explained by weather variables for spring-summer precipitation and winter temperature, current purchases (fertilizer, fuel, etc.) per ruble of fixed capital, and the ratio of labor input to sown acreage.

(3) Investment Functions

Confirming previous work by Stanley Cohn and others, we found nonagricultural investment to be acutely sensitive to the level of defense expenditure (actually, the nonpersonnel component). At least in the short run, an increase in defense spending tends to crowd out investment in industry and the services and housing sector. We also found an impact of the financing plan, published in the Annual Budget, upon realized investment in industry, construction, transport and communications, and housing. Furthermore, we found that the level of gross profits in the economy had a significant positive impact upon the level of industrial investment (and total nonagricultural investment). This finding is consistent with a number of hypotheses about investment determination, and we have made some progress toward discriminating among them. In this regard, it is surprising that gross profits are more significant than profits retained for decentralized investment. Thus, a micro financial cash-flow theory for industrial investment is not supported by our work. Furthermore, economy-wide gross profits are a better predictor than are industry gross profits. This might support the argument that under socialism national saving may be quickly reallocated to where investment needs are greatest without the necessity for complex capital markets as in the West. Tentatively, we lean toward the hypothesis that profits in the Soviet economy, as in Western economies, are a positive proxy for supply conditions, including the state of the harvest. This may suggest that the Soviet financial system intervenes in the investment process to adjust investment demand to the supply situation.

Investment in agriculture has been rising sharply since 1965. Most of the variation around that trend can be explained by current and past harvests. The current harvest has a direct impact upon investment through decentralized construction activity by state and collective farms; such work is curtailed during harvest failures. We also find evidence of a pattern of

"crisis response" by the Soviet leadership; i.e., agricultural investment is boosted after each harvest failure while there is no symmetrical reaction to bumper harvests. This reaction pattern is also observed for current purchases, deliveries from other sectors as inputs to agricultural production: deliveries are boosted after each harvest failure.

(4) Income, Wage and Price Equations

It was a pleasant surprise to find that real wage rates in Soviet industry and agriculture could be reasonably explained by a fairly simple model. In our model, the real wage, in the longer-run, bears a stable relationship to average productivity while the price level is determined by a markup on wage costs per unit of output. In the shortrun, there is a partial adjustment of real wages (scaled by last period's price level) toward current average productivity. Given Soviet institutions, it is not surprising that adjustment parameters for both wages and prices need to be variable rather than constant in order to incorporate the timing of major reforms. For the 1960's, the gap between average productivity and the real wage widened in most years, closing significantly only in years of major wage reform.

In our work on Soviet prices, it is difficult to choose an indicator for "free" agricultural prices. After considering the Soviet official series for kolkhoz market prices, we followed a suggestion of Professor Trembl's and constructed an aggregate index from Narkhoz statistics on the "sales of food-stuffs to consumer cooperatives at negotiated prices." Because of its more reasonable pattern after the mid-1960's, we have incorporated the latter index into our consumption price index for food. By allowing reforms to affect adjustment rates, we have developed an acceptable system for other price relationships based upon the markup principle. We have also

estimated equations to explain the movement of sectoral investment deflators, prices which are implicit in the official "constant price" investment series. Each investment deflator depends upon the price index for construction-installation work (an exogenous variable in our model) and the wholesale price index for heavy industry. We chose not to use the official price index for machine-building and metal-working, a series quite untrustworthy because of the new-product pricing bias.

(5) Consumption Functions

It was possible to estimate stable relationships between disposable income and consumption and the estimated propensities to consume were rather similar to those for other economies at a corresponding stage of development. Our major efforts were devoted to estimating price effects and considering relevant supply constraints. The relative consumption price between food and nonfood commodities proved significant in the allocation of consumption across categories. Furthermore, we found clear evidence for harvest constraints on food and soft goods consumption, and some evidence for other supply constraints on durable goods and services. We did not find any evidence to support the often-discussed impact of savings account accumulation upon purchases of durable goods; this effect may still be valid at the micro level for certain income groups but our findings did not substantiate it at the aggregate level.

(6) Foreign Trade

Foreign trade proved to be one of the most difficult components of the model, a result which probably stems from the classification problems in the data (the complete plant difficulty among others), the short sample period

for consistent data, and the fundamental nonregularity of a Soviet trade policy. Many important swings could not be predicted except through the mobilization of extensive descriptive literature. We did find, however, plausible impacts of domestic and foreign activity upon Soviet trade flows and a few significant price effects.

We found only weak, ^{if any,} confirmation for the widely-held hypothesis that Soviet exports are determined by import needs. ^{in some formulations} On the contrary, we found in the short run that exports were actually somewhat less in years of domestic scarcity and high imports. An alternative hypothesis is suggested which emphasizes the importance of supply pressure, viz., in those years when taut plans require additional imports, industries which produce for both domestic and foreign users react more to domestic needs and curtail their exports.

Since the USSR is rapidly expanding its foreign trade with the developed West, further work needs to be done on this component of the model and considerable judgment will be required in forecasting Soviet trade.

Anticipated Gains in Understanding Through the Use of the Model

In this section we have presented some of the insights gained through econometric analysis on specific relations in the model. Beyond these partial insights gained through construction of a model, there are more general discoveries to be made through extensive use of the model for scenarios and forecasts. Within the framework of the entire model, one may experiment with alternative versions of a particular equation or a particular component. The model allows one to evaluate the total influence of one variable upon another, both direct and indirect. This work has only begun and we intend to exercise the model ^{more during} the second year of the project, involving a wider constituency in judging the contribution of the econometric model to our understanding of the Soviet economy.

SECTION FOUR: USE OF THE ECONOMETRIC MODEL FOR SCENARIO ANALYSIS

In this section of the report we discuss the major variations which may be used in simulating the model and we describe two conditional scenarios in some detail. In scenario analysis, the user must first decide what version of the model should be selected for his particular problem; the version of the model is determined in operation by setting certain logical switches for the solution program. Second, the user must supply all the necessary assumptions and adjustments that define the scenario in contrast to the economic path actually observed. The model will then be simulated or solved for the desired historical period and a supplementary program is used to display, numerically and graphically, the scenario path compared to the actual path or another simulated path.

Alternative Versions of the Model

In setting up the estimated model for solution, we have programmed alternative versions for certain components of the system, notably consumption and investment. A version of the model is defined by the particular components included in the system for that specific simulation. In addition to the versions described below, we can create further versions by making certain sectors of the model exogenous. For example, we might choose to make all foreign trade variables exogenous; i.e., use the actually observed trade flows rather than those predicted by our behavioral equations. By contrast, we might wish to focus only upon the direct interactions between production and foreign trade, and therefore exogenize the rest of the model to preclude any indirect effects.

(1) Basic Version of the Model

The basic version of the model provides a benchmark for judging the sample-period performance of all other versions. Plan budgeting data is used in the prediction of sectoral investment and total nonagricultural investment is obtained by identity as the sum of its predicted components. Consumption categories (food, softgoods , durables and personal services) are estimated directly^{with aggregate consumption as their sum,} or as shares of total consumption when that is estimated directly. There is no end-use category which serves as a residual item; a simulation residual in the model absorbs any generated imbalance between GNP supplied and GNP demanded.

The performance of this version of the model over the period 1961-1972 has been very encouraging. For Gross National Product by producing sector, in dynamic simulation we find/a mean absolute error of 3.7 Billion 1970 rubles, or a root-mean-squared percentage error of 1.65%. For industrial output we find a RMS% error of 2.19% with the major prediction errors in the model's overprediction for 1964-1969. For agricultural output, the dynamic simulation produces a RMS% error of 2.23% with the largest prediction error in 1969 where we fail to capture the harvest decline (we do much better for 1963 and 1972). Among the principal end-use categories, we generate a RMS% error of 1.35% for total investment and 1.57% for total consumption expenditure. As expected, the prediction errors are larger for foreign trade with a 2.89% error for total Soviet exports and 6.14% error for total Soviet imports. A large portion of trade errors are attributable to underprediction for 1972. Detailed trade data was not available for 1972 so the trade sector was estimated only with time series to 1971. The error in total consumption is larger (1.81% compared with 1.57%) when it is predicted directly with a single behavioral equation rather than computed by summing the direct estimations for categories of consumption. Error statistics are shown in Table 3.

TABLE 3

Dynamic Simulation Error Properties, 1961-1972

Basic Version of the Model

<u>Variable</u>		<u>Root-Mean Squared Percentage Error</u>	<u>Mean Absolute Error</u>	<u>Mean Absolute Percentage Error</u>
GNP	GNP (B 1970 Rubles)	1.65%	3.7	1.36%
XITOT	Industrial Output (1970=100)	2.19	1.5	1.93
XATOT	Agricultural Output (B 1955 Rubles)	2.23	1.01	1.74
XCRUB	Construction Output (B 1970 Rubles)	2.98	1.0	2.76
ITOTAL	Total Investment (B 1970 Rubles)	1.35	0.7	1.10
IIN	Investment in Industry (B 1970 Rubles)	1.53	0.3	1.21
IA	Investment in Agriculture (B 1970 Rubles)	4.05	0.4	3.39
CR	Total Consumption (B 1970 Rubles)	1.57	2.1	1.15
CRF	Consumption, Food (B 1970 Rubles)	2.05	1.4	1.49
CRND	Consumption, Non-durables (B 1970 Rubles)	2.46	0.8	2.06
CRD	Consumption, Durables (B 1970 Rubles)	2.44	0.2	2.02
CRS	Consumption, Services (B 1970 Rubles)	1.70	0.5	1.23
%D	Household Income (B 1970 Rubles)	2.36	2.8	1.84
ZPG&	Gross Profits (B Current Rubles)	3.39	1.8	2.98
MWT\$	Total Imports (M U.S.\$ Current)	6.14	477.4	4.45
EWT\$	Total Exports (M U.S.\$ Current)	2.89	226.5	2.46
NI	Industrial Employment (Thousand Persons)	0.89	192.2	0.69
NC	Construction Employment (Thousand Persons)	2.66	186.2	2.34
NTA	Agricultural Labor, Adjusted (Thousand Persons)	1.91	649.1	1.68
WI&	Industrial Wage Rate (Rubles/year)	2.03	25.9	1.88
PAFC70	Negotiated Agricultural Price (1970 = 100)	6.97	5.3	6.22

(2) Version with Exogenous Shares for Non-Agricultural Investment

This version enables the user directly to reallocate investment between sectors in scenario analysis or forecasting. Total investment and total nonagricultural investment may be left endogenous to the system or exogenized as are the shares for nonagricultural investment. This permits the user to use the model for forecasting years when the annual budget is not yet determined or available. When we estimate total nonagricultural investment and distribute it with observed investment shares, the errors are slightly larger than in our basic version of the model: 1.69% RMS% error for GNP and 1.37% for total investment.

(3) Version with Total Consumption as a Residual Category

In this version, increases in end-use categories such as defense or investment may depress consumption expenditure since consumption is defined as GNP supplied less all other end-use demands. This version, therefore, is closer in spirit to a common Western perception of Soviet allocative response than is true of the basic version. Since the simulation/forecast residual is forced into the consumption category, one should expect larger errors for consumption. For total consumption, we find a RMS% error of 3.60 compared with 1.57 in the basic version; the largest errors are produced in an overprediction for the mid-1960's. Using the consumption share equations to allocate residual consumption across its categories, the RMS% error rises to 3.64 for food, 4.04 for nondurables, 5.15 for durables, and 3.24 for services.

(4) Version with Consumption Constrained by Sectoral Outputs Through an I-O Matrix

Using input-output and end-use matrices from the 1966 Input-Output table and supplementary calculations, we computed a synthetic index of deliveries to personal consumption components for the sample period 1955-1972. We then estimated consumption components as functions of those synthetic supply indices (as well as relative prices and other variables). In this version, then, sectoral outputs have a more direct impact upon consumption categories. Though we find larger errors in consumption in this version, they are primarily attributable to the 1964-1969 overprediction of industrial output. Consequently, we feel that this is an auspicious sign for the incorporation of input-output analysis in our future econometric models of the USSR.

RMS% errors for total consumption and the four categories are as

follows:

<u>Category</u>		<u>RMS%</u> <u>Version (4)</u>	<u>RMS%</u> <u>Version (1)</u>
CR	Total Consumption	2.81	1.57
CRF	Food	2.64	2.05
CRND	Nondurables	6.15	2.46
CRD	Durables	4.25	2.44
CRS	Services	1.21	1.70

Scenario I: Removal of the 1963 Harvest Failure

For this scenario we chose to use the basic variant of the model and substitute average weather conditions (computed over the period 1959-1972) for the cold winter and dry summer of 1963. Given the importance of crisis response to harvest failure, we were interested in both the shortrun and longrun consequences when a harvest failure was removed by adjusting the exogenous weather variables from actual historical values. To present this scenario, we will refer to a sequence of charts which compare the scenario path with a simulation path without counterfactual weather for 1963. In these charts, the + signs indicate the scenario path and the * signs indicate the simulation path with actual weather variables.

We begin with agricultural output in Chart I.1; while XATOT is higher in 1963 in the scenario, it is lower for the rest of the simulation period. The reason for this apparent paradox is given in Chart I.2 for agricultural investment. Investment is higher for 1963 for the scenario path because of decentralized investment by state and collective farms; however, scenario investment in agriculture falls behind in 1964-65 because of the absence of "crisis response" by the Soviet leadership and never catches up to the basic simulation path. The impact of diminished capital on agricultural production would have been even more severe except for the augmentation of the agricultural labor force as seen in Chart I.3. Initially (1964-67), the scenario path lacks the increased participation in response to a harvest failure. However, by 1968, the outmigration of rural population stimulated by the harvest failure has come to dominate the participation effect so that agricultural labor is greater on the scenario path. Because of this decrease in agricultural output and increase in agricultural labor, the average labor productivity is less on the scenario path and consequently the agricultural wage rate is diminished as we observe in Chart I.4.

Despite the longrun fall in agricultural output we see in Chart I.5, that scenario GNP is higher by 1968. This results from increased employment and capital stock in the nonagricultural sectors. The increase in nonagricultural employment is somewhat surprising since urban population is initially less on the scenario path. However, the participation rate of the urban population rises because of an increase in the industrial real wage. In turn, the industrial real wage is raised because of the different path of the "negotiated" price for agricultural commodities presented in Chart I.6. The removal

of the harvest failure boosts gross profits as seen in Chart I.7 which in turn raises investment in industry, construction, transport and communications, and services and trade. By the end of the 1960's, this additional capital stock has raised production in the nonagricultural sectors and outweighed the decline in agriculture.

Our final comments on scenario I pertain to the impact upon Soviet foreign trade. As seen in Chart I.8, Soviet exports of food to CMEA economies are larger in 1963-65 under the scenario but smaller thereafter as agricultural production falls behind. As Chart I.9 indicates, imports of wheat and wheat flour from the West are much less in 1964 without the harvest failure but are greater from 1965 on because of the lower scenario production. Other trade flows are also affected but the third intriguing result concerns imports of machinery and manufactures from the West, an effect presented in Chart I.10. These imports are greater in 1963 and 1964, but less from 1965 on, partially in compensation for the increased wheat imports from the West.

Scenario II: A Soviet Defense Build-up, 1965-1967

The actual path of Soviet defense expenditures in the postwar period remains quite a controversial issue among Western analysts. Stanley Cohn has used the official Soviet defense budget supplemented by some proportion of USSR expenditures on science to cover military R&D and military space programs. Most likely, additional defense expenditures are concealed in the financing component of the State budget or elsewhere; however, there is no consensus as to the magnitude of that concealed expenditure or about its movement over time. If such a component varies considerably over the 1960's, then we have not fully accounted for defense impacts upon the Soviet

economy in our model construction. Nevertheless, we have been successful in deriving significant defense impacts, particularly upon investment and consumer durables, using only the nonpersonnel component of the official series for defense expenditures.

Many Western analysts have suggested that a major buildup in military hardware took place from 1965 to 1967 without any substantial rise in the official budget. Certainly, in our work we have noted anomalies in just this period; e.g., a shortfall in industrial investment below its predicted level and a drop in factor productivity in Soviet industry. Consequently, we felt that an interesting scenario would be to augment the official defense budget by, say, 2 billion rubles for each year 1965-1967 and examine the impact upon the national economy. Unlike Scenario I, where we know the actual weather conditions in 1963, in Scenario II, we do not know the true level of defense expenditures in 1965, only the official budget. With a significantly different series for Soviet defense expenditures, one would need to reestimate certain components of the model (particularly the investment functions). We have not done this so far for any alternative expenditure series for defense.

In Chart II.1, we note with some surprise the magnitude of the defense impact upon total investment when all the direct and indirect effects are taken into account. Investment falls by nearly as much (95%) as defense rises. This impact is felt upon all nonagricultural sectors with a 0.9 B ruble fall in industrial investment (Chart II.2), a 0.3 B ruble fall in transport/communications investment (Chart II.3), a 0.4 B ruble fall in housing investment (Chart II.4), and a 0.3 B ruble fall in services/trade investment (Chart II.5) for the years 1965-1967. There was also a very small reduction in investment in the construction industry. As a consequence of reduced non-agricultural capital, we see a reduced GNP in Chart II.6, the reduction amounting to 1.5 billion rubles by 1970.

This diminished capital stock produces a very interesting longrun impact on our model of the Soviet economy. Average labor productivity is less in Soviet industry and this restrains the rise in the industrial wage as seen in Chart II.7. This lowers money incomes and household consumption, thereby adjusting on the demand side to the reduction in GNP supplied. For consumption of durable goods (Chart II.8), we see first the crowding-out effects of defense spending in 1965-1967 and then the delayed income effect from 1968 onwards. This reduction in urban incomes slows the population drift away from agriculture, this lowers slightly nonagricultural employment (Chart II.9) and raises agricultural employment and agricultural output (Chart II.10). The reduction in Soviet GNP serves over the longrun to lower total imports by slightly less than 1% (Chart II.11) and total exports by about 0.2% (Chart II.12).

Conclusions

In these two scenarios and others that we have run, the model has demonstrated quite reasonable behavior. However, the user of the model must be careful in scenario analysis not to push the system unreasonably far from the historical values for exogenous variables. We feel that our analysis has produced a model which simulates Soviet economic behavior quite well in the neighborhood of the historical path. But to drive the model far from that historical path makes the strong assumption that behavior would be unchanged in quite different circumstances. In the case of Scenario II, for example, a 2 billion ruble increase in defense spending is comparable to actually observed annual changes. However, a 10 billion ruble increase in 1965 would be quite far from the historical record and one would have less confidence in the consequent path traced by the model.

SCENARIO 1. ABSENCE OF 1963 HARVEST FAILURE
COMPARED WITH BASIC SIMULATED PATH

SIMULATION, COLUMNS: WHOLE MODEL
SCENARIO 1 COLUMNS: NEGATIVE 1963 HARVEST FAILURE DYN. WHOLE

DATE	SIMULATION (1 + 1)	SCENARIO 1 (1 + 1)	DIFFERENCE (TIE = X)	DIFFERENCE (TIE = X)	TOTAL AGRICULTURAL EMPLOYMENT	GRAPH RANGE OF VALUES	THOUS. PERSONS
1961	40290.9	40290.9	0.0	0.0			40290.9
1962	40359.9	40059.9	0.0	0.0			
1963	39423.7	39751.6	-327.9	-0.03			
1964	39591.0	39417.1	64.7	0.16			
1965	40232.0	40057.4	174.4	0.43			
1966	40141.1	39806.4	332.6	0.83			
1967	39517.0	39223.7	293.3	0.74			
1968	38946.9	39006.4	-61.6	-0.16			
1969	38517.5	38734.0	-216.5	-0.56			
1970	38130.4	38277.7	-147.3	-0.39			
1971	37765.5	37922.9	-157.4	-0.40			
1972	37260.0	37496.1	-236.1	-0.61			

CHART 1.3

SUMMARY STATISTICS: MEAN ABSOLUTE ERROR..... 165.5
MEAN ABSOLUTE PERCENTAGE ERROR..... 0.42
ROOT MEAN SQUARED ERROR..... 200.4
ROOT MEAN SQUARED PERCENTAGE ERROR..... 0.51

DATE	SIMULATION (1 + 1)	SCENARIO 1 (1 + 1)	DIFFERENCE (TIE = X)	DIFFERENCE (TIE = X)	WAGE RATE, STATE AND COLLECTIVE FARMS	GRAPH RANGE OF VALUES	RUBLES/YEAR
1961	391.5	391.5	0.0	0.0			1041.7
1962	439.2	439.2	0.0	0.0			
1963	436.7	440.2	-33.5	-12.25			
1964	541.3	538.1	3.2	0.39			
1965	601.0	589.8	11.1	1.45			
1966	700.9	695.0	5.9	1.45			
1967	718.6	705.3	13.3	1.85			
1968	805.5	791.0	14.6	1.81			
1969	870.5	855.7	14.8	1.70			
1970	992.9	975.7	17.1	1.73			
1971	1041.7	1023.2	18.4	1.77			
1972	1022.4	1003.9	18.5	1.81			

CHART 1.4

SUMMARY STATISTICS: MEAN ABSOLUTE ERROR..... 14.8
MEAN ABSOLUTE PERCENTAGE ERROR..... 2.27
ROOT MEAN SQUARED ERROR..... 19.9
ROOT MEAN SQUARED PERCENTAGE ERROR..... 3.03

SCENARIO 1. ABSENCE OF 1963 HARVEST FAILURE COMPARED WITH BASIC SIMULATED PATH

SIMULATION COLUMNS: WHOLE MODEL
SCENARIO 1 COLUMNS: REMOVE 1963 HARVEST FAILURE ONLY MODEL

DATE	SIMULATION (a)	SCENARIO 1 (b)	TOTAL AGRICULTURAL OUTPUT (TIE = X)	DIFFERENCE (TIE = X)	GRAPH RANGE OF VALUES:	1965 MILES
1961	51556.0	51556.0	0.0	0.0		
1962	52259.3	52259.3	0.0	0.0		
1963	40224.0	53173.5	-6196.7	-13.19		
1964	54035.0	53707.5	377.5	0.70		
1965	57024.3	55914.0	1109.6	1.95		
1966	63107.0	61707.3	1395.7	2.22		
1967	61072.0	59790.0	1273.9	2.09		
1968	64599.4	65050.0	741.9	1.15		
1969	66044.7	65631.6	433.1	0.86		
1970	71047.2	70441.5	605.7	0.15		
1971	70006.7	69959.7	647.0	0.42		
1972	65703.9	65225.5	478.4	0.75		

CHART 1.1

SUMMARY STATISTICS: MEAN ABSOLUTE ERROR..... 1105.3
MEAN ABSOLUTE PERCENTAGE ERROR..... 2.04
ROOT MEAN SQUARED ERROR..... 1430.0
ROOT MEAN SQUARED PERCENTAGE ERROR..... 3.39

DATE	SIMULATION (a)	SCENARIO 1 (b)	DIFFERENCE (TIE = X)	PRODUCTIVE INVESTMENT IN AGRICULTURE	GRAPH RANGE OF VALUES:	1970 MILES
1961	51556.0	51556.0	0.0	0.0		
1962	52259.3	52259.3	0.0	0.0		
1963	40224.0	53173.5	-6196.7	-1.25		
1964	54035.0	53707.5	377.5	4.69		
1965	57024.3	55914.0	1109.6	4.54		
1966	63107.0	61707.3	1395.7	3.70		
1967	61072.0	59790.0	1273.9	4.00		
1968	64599.4	65050.0	741.9	3.09		
1969	66044.7	65631.6	433.1	3.16		
1970	71047.2	70441.5	605.7	3.25		
1971	70006.7	69959.7	647.0	3.35		
1972	65703.9	65225.5	478.4	3.42		

CHART 1.2

SUMMARY STATISTICS: MEAN ABSOLUTE ERROR..... 0.3
MEAN ABSOLUTE PERCENTAGE ERROR..... 2.00
ROOT MEAN SQUARED ERROR..... 0.4
ROOT MEAN SQUARED PERCENTAGE ERROR..... 3.26

SCENARIO I. ABSENCE OF 1963 HARVEST FAILURE
COMPARED WITH BASIC SIMULATED PATH

SIMULATION COLUMN: WHOLE MODEL
SCENARIO I COLUMN: REMOVE 1963 HARVEST FAILURE DYN. WHOLE

VARIABLE GRAPHED: GNP

GROSS NATIONAL PRODUCT

0.1970 RULES

DATE	SIMULATION (. .)	SCENARIO I (+)	DIFFERENCE (TIE = X)	DIFFERENCE	GRAPH RANGE OF VALUES:	210.2 TO	306.4
1961	210.2	210.2	0.0	0.0	X		
1962	225.9	225.9	0.0	0.0	X		
1963	235.3	241.6	-6.2	-2.05			
1964	250.0	256.0	0.0	0.0			
1965	271.0	271.0	0.0	0.0			
1966	293.4	292.4	1.0	0.53			
1967	305.2	304.3	0.9	0.10			
1968	323.8	324.2	-0.4	-0.12			
1969	330.9	339.3	-0.4	-0.13			
1970	350.2	356.4	-0.2	-0.06			
1971	375.1	375.4	-0.3	-0.09			
1972	365.9	366.4	-0.5	-0.14			

CHART 1.5

SUMMARY STATISTICS: MEAN ABSOLUTE ERROR.....: 0.9
MEAN ABSOLUTE PERCENTAGE ERROR.....: 0.33
ROOT MEAN SQUARED ERROR.....: 1.9
ROOT MEAN SQUARED PERCENTAGE ERROR.....: 0.73

VARIABLE GRAPHED: PAF670

NEGOTIATED AGRICULTURAL PRICE

1970=100.

DATE	SIMULATION (. .)	SCENARIO I (+)	DIFFERENCE (TIE = X)	DIFFERENCE	GRAPH RANGE OF VALUES:	60.6 TO	97.9
1961	60.0	60.0	0.0	0.0	X		
1962	69.6	69.6	0.0	0.0	X		
1963	72.1	71.1	1.0	1.32			
1964	76.6	73.3	3.3	6.84			
1965	81.5	76.2	5.3	6.42			
1966	83.0	79.1	3.9	5.41			
1967	84.5	80.9	3.6	4.25			
1968	87.9	85.1	2.8	3.17			
1969	91.4	89.1	2.3	2.44			
1970	94.3	92.3	2.0	2.10			
1971	95.0	93.5	1.5	1.56			
1972	97.9	96.4	1.5	1.00			

CHART 1.6

SUMMARY STATISTICS: MEAN ABSOLUTE ERROR.....: 2.4
MEAN ABSOLUTE PERCENTAGE ERROR.....: 2.08
ROOT MEAN SQUARED ERROR.....: 3.0
ROOT MEAN SQUARED PERCENTAGE ERROR.....: 3.07

36d

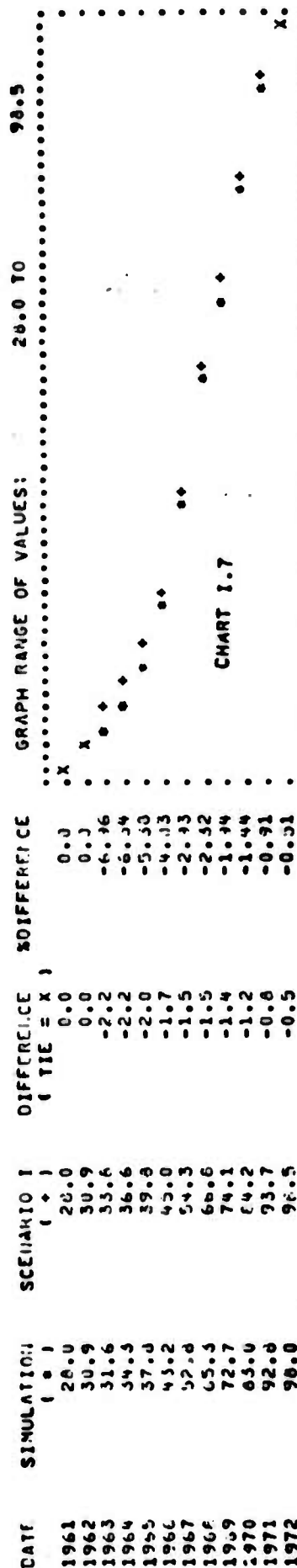
SCENARIO 1. ABSENCE OF 1963 HARVEST FAILURE
COMPARED WITH BASIC SIMULATED PATH

SIMULATION COLUMN: WHOLE MODEL
SCENARIO 1 COLUMN: REMOVE 1963 HARVEST FAILURE ONLY WHOLE

VARIABLE GRAPHED: ZPGS

GROSS PROFITS, NATIONAL ECONOMY

M. CURR. F. UNLES

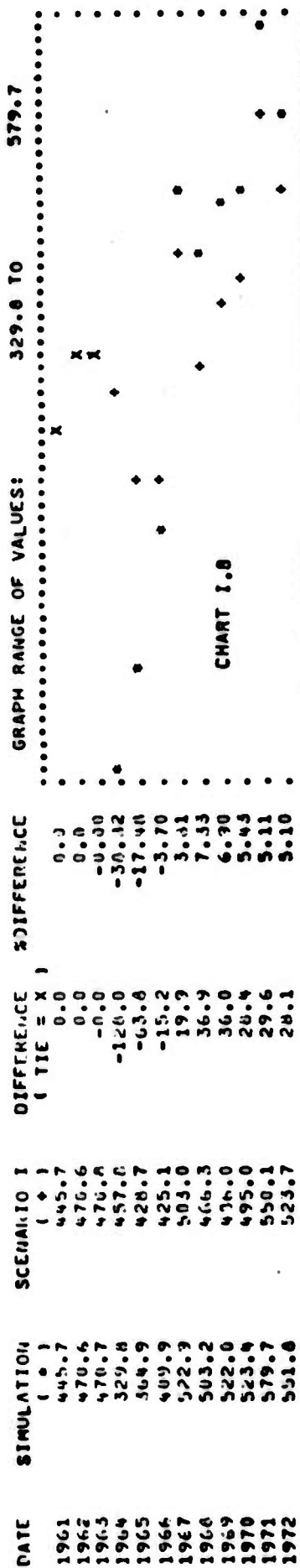


SUMMARY STATISTICS: MEAN ABSOLUTE ERROR..... 1.3
MEAN ABSOLUTE PERCENTAGE ERROR..... 2.75
ROOT MEAN SQUARED ERROR..... 1.5
ROOT MEAN SQUARED PERCENTAGE ERROR..... 3.82

VARIABLE GRAPHED: EEF

USSR EXPORTS, CHCA, FOOD

M. CURRENT USS



SUMMARY STATISTICS: MEAN ABSOLUTE ERROR..... 32.2
MEAN ABSOLUTE PERCENTAGE ERROR..... 7.01
ROOT MEAN SQUARED ERROR..... 46.7
ROOT MEAN SQUARED PERCENTAGE ERROR..... 12.39

36d

SCENARIO I. ABSENCE OF 1963 HARVEST FAILURE
COMPARED WITH BASIC SIMULATED PATH

SIMULATION COLUMN: WHOLE MODEL

SCENARIO I COLUMN: REMOVE 1963 HARVEST FAILURE DYE: WHOLE

VARIABLE GRAPHED: HMI

USSR IMPORTS, WEST WHEAT & WHEAT FLOUR M. CURRENT USS

DATE	SIMULATION (+)	SCENARIO I (+)	DIFFERENCE (TIE = X)	DIFFERENCE 30 DIFFERENCE	GRAPH RANGE OF VALUES:	20.9 TO	544.4
1961	23.1	23.1	0.0	0.0	0.0	X	
1962	20.9	20.9	0.0	0.0	0.0	X	
1963	40.9	40.9	-0.0	-0.0	-0.0		
1964	540.4	70.5	477.9	87.15	87.15		
1965	117.9	132.3	-14.3	-12.14	-12.14		
1966	111.1	154.2	-43.2	-36.03	-36.03		
1967	44.3	65.1	-20.7	-46.79	-46.79		
1968	167.7	241.2	-73.4	-43.77	-43.77		
1969	143.0	175.0	-32.0	-22.35	-22.35		
1970	194.0	212.1	-24.2	-12.47	-12.47		
1971	123.6	143.0	-20.2	-16.35	-16.35		
1972	202.3	331.8	-49.5	-17.34	-17.34		

CHART 1.9

SUMMARY STATISTICS: MEAN ABSOLUTE ERROR.....: 63.0
MEAN ABSOLUTE PERCENTAGE ERROR.....: 24.79
ROOT MEAN SQUARED ERROR.....: 141.6
ROOT MEAN SQUARED PERCENTAGE ERROR.....: 34.07

VARIABLE GRAPHED: HMI

USSR IMPORTS, WEST WHEAT & WHEAT FLOUR M. CURRENT USS

DATE	SIMULATION (+)	SCENARIO I (+)	DIFFERENCE (TIE = X)	DIFFERENCE 30 DIFFERENCE	GRAPH RANGE OF VALUES:	705.2 TO	1502.1
1961	711.2	711.2	0.0	0.0	0.0	X	
1962	744.0	744.0	0.0	0.0	0.0		
1963	612.0	612.0	-3.9	-0.40	-0.40		
1964	705.2	700.2	-03.0	-11.77	-11.77		
1965	700.1	701.7	6.3	0.40	0.40		
1966	722.3	710.0	11.5	1.60	1.60		
1967	907.3	808.4	14.9	2.09	2.09		
1968	1024.8	999.6	25.2	2.46	2.46		
1969	1274.0	1251.2	22.8	1.79	1.79		
1970	1453.8	1435.5	18.3	1.26	1.26		
1971	1450.9	1426.5	22.3	1.54	1.54		
1972	1502.1	1475.4	26.7	1.76	1.76		

CHART 1.10

SUMMARY STATISTICS: MEAN ABSOLUTE ERROR.....: 19.9
MEAN ABSOLUTE PERCENTAGE ERROR.....: 2.43
ROOT MEAN SQUARED ERROR.....: 29.2
ROOT MEAN SQUARED PERCENTAGE ERROR.....: 3.00

SCENARIO II. A SOVIET DEFEASE BUILDUP 1965-1967
COMPARED WITH BASIC SIMULATED PATH

SIMULATION COLUMN: WHOLE MODEL
SCENARIO II COLUMN: SOVIET MODEL

VARIABLE GRAPHED: TOTAL

INVESTMENT, NATIONAL ECONOMY

DATE	SIMULATION (+)	SCENARIO II (+)	DIFFERENCE (TIE = X)	GRAPH RANGE OF VALUES	R.1970 RULES
1961	44.3	44.3	0.0	0.0	
1962	46.5	46.5	0.0	0.0	
1963	48.7	48.7	0.0	0.0	
1964	53.4	53.4	0.0	0.0	
1965	57.4	55.5	1.9	5.25	
1966	61.2	59.3	1.9	3.10	
1967	65.9	64.0	1.9	2.10	
1968	70.2	70.1	0.0	0.05	
1969	75.7	75.6	0.0	0.05	
1970	82.0	82.0	0.0	0.05	
1971	86.1	86.0	0.0	0.05	
1972	93.5	93.5	0.0	0.05	

CHART II.1

SUMMARY STATISTICS: MEAN ABSOLUTE ERROR..... 0.0
MEAN ABSOLUTE PERCENTAGE ERROR..... 0.79
ROOT MEAN SQUARED ERROR..... 0.9
ROOT MEAN SQUARED PERCENTAGE ERROR..... 1.34

VARIABLE GRAPHED: IND

INVESTMENT, INDUSTRY

DATE	SIMULATION (+)	SCENARIO II (+)	DIFFERENCE (TIE = X)	GRAPH RANGE OF VALUES	R.1970 RULES
1961	15.9	15.9	0.0	0.0	
1962	16.9	16.9	0.0	0.0	
1963	17.9	17.9	0.0	0.0	
1964	19.9	19.9	0.0	0.0	
1965	20.9	20.0	0.9	4.26	
1966	21.7	20.0	0.9	4.09	
1967	23.0	22.1	0.9	3.00	
1968	24.5	24.5	0.0	0.17	
1969	26.8	26.8	0.0	0.16	
1970	29.5	29.4	0.0	0.16	
1971	31.1	31.0	0.0	0.16	
1972	34.0	33.9	0.1	0.16	

CHART II.2

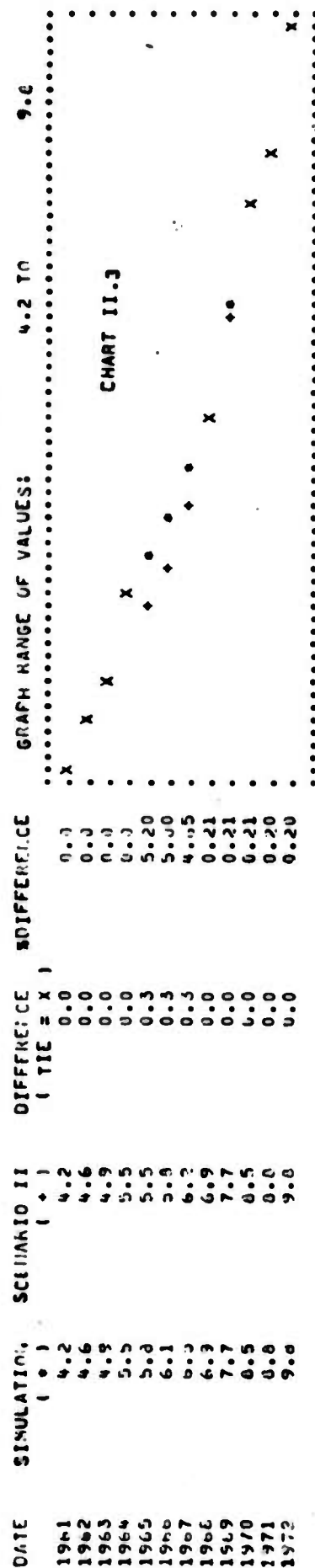
SUMMARY STATISTICS: MEAN ABSOLUTE ERROR..... 0.2
MEAN ABSOLUTE PERCENTAGE ERROR..... 1.06
ROOT MEAN SQUARED ERROR..... 0.4
ROOT MEAN SQUARED PERCENTAGE ERROR..... 2.03

SCENARIO II. A SOVIET DEFENSE BUILDUP 1965-1972
COMPARED WITH BASIC SIMULATED PATH

SIMULATION COLUMN: WHOLE MODEL
SCENARIO II COLUMN: SOVIET MODEL

VARIABLE GRAPHED: ITROR

INVESTMENT, TRANSPORT AND COMMUNICATIONS R. 1970 RUBLES

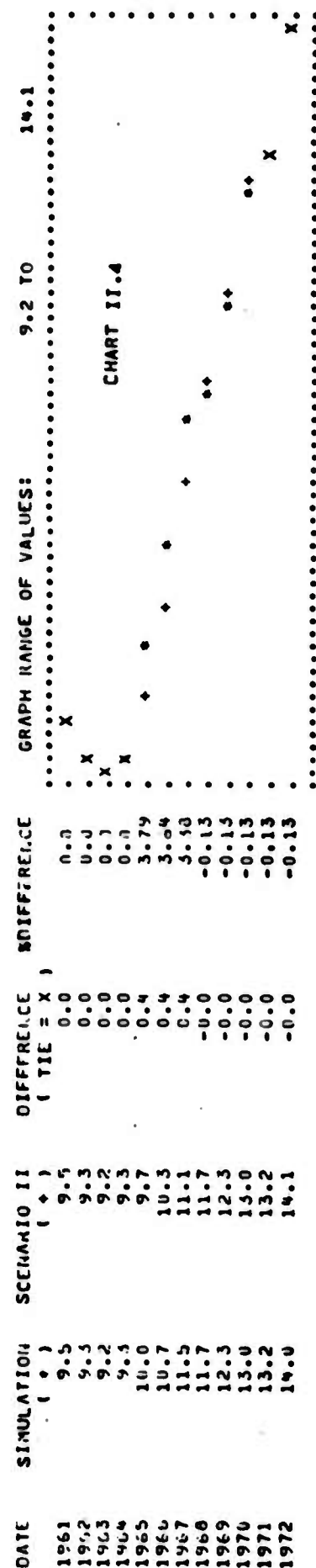


SUMMARY STATISTICS: MEAN ABSOLUTE ERROR..... 0.1
MEAN ABSOLUTE PERCENTAGE ERROR..... 1.52
ROOT MEAN SQUARED ERROR..... 0.2
ROOT MEAN SQUARED PERCENTAGE ERROR..... 2.40

VARIABLE GRAPHED: INS

INVESTMENT, HOUSING

R. 1970 RUBLES



SUMMARY STATISTICS: MEAN ABSOLUTE ERROR..... 0.1
MEAN ABSOLUTE PERCENTAGE ERROR..... 0.75
ROOT MEAN SQUARED ERROR..... 0.2
ROOT MEAN SQUARED PERCENTAGE ERROR..... 1.61

SCENARIO II. A SOVIET DEFENSE BUILDUP 1965-1967
COMPARED WITH BASIC SUPPLEMENTED PATH

SIMULATION COLUMN: WHOLE MODEL
SCENARIO II COLUMN: SOVIET MODEL

VARIABLE GRAPHED: ISER

INVESTMENT, SERVICES AND TRADE

B.1970 FUELLES

DATE	SIMULATION (+)	SCENARIO II (+)	DIFFERENCE (TIE = X)	GRAPH RANGE OF VALUES:	7.4 TO	15.4
1961	7.4	7.4	0.0	X		
1962	7.9	7.9	0.0			
1963	8.3	8.3	0.0	X		
1964	8.9	8.9	0.0			
1965	10.0	9.7	0.3			
1966	11.0	10.6	0.4			
1967	12.5	12.0	0.5			
1968	13.2	13.2	-0.0			
1969	13.6	13.6	-0.0			
1970	14.0	14.0	-0.0			
1971	14.3	14.3	-0.0			
1972	15.4	15.4	-0.0			

CHART II.5

SUMMARY STATISTICS: MEAN ABSOLUTE ERROR..... 0.1
MEAN ABSOLUTE PERCENTAGE ERROR..... 0.05
ROOT MEAN SQUARED ERROR..... 0.1
ROOT MEAN SQUARED PERCENTAGE ERROR: 1.23

VARIABLE GRAPHED: GUP

GROSS NATIONAL PRODUCT

B.1970 RUBLES

DATE	SIMULATION (+)	SCENARIO II (+)	DIFFERENCE (TIE = X)	GRAPH RANGE OF VALUES:	210.2 TO	305.9
1961	210.2	210.2	0.0	X		
1962	225.9	225.9	0.0			
1963	235.3	235.3	0.0	X		
1964	250.0	250.0	0.0			
1965	271.8	271.5	0.3			
1966	293.4	293.1	0.3			
1967	304.6	303.6	1.0			
1968	323.8	322.5	1.3			
1969	334.9	337.1	-2.2			
1970	350.2	350.7	-0.5			
1971	375.1	373.7	1.4			
1972	305.9	304.6	1.3			

CHART II.6

SUMMARY STATISTICS: MEAN ABSOLUTE ERROR..... 0.7
MEAN ABSOLUTE PERCENTAGE ERROR..... 0.21
ROOT MEAN SQUARED ERROR..... 1.0
ROOT MEAN SQUARED PERCENTAGE ERROR: 0.49

SCENARIO II. A SOVIET DEFENSE BUILDUP 1965-1967
COMPARED WITH BASIC SIMULATED PATH

SIMULATION COLUMN: BASIC MODEL
SCENARIO II COLUMN: SOVIET MODEL

VARIABLE GRAPHED: WIS		WAGE RATE, INDUSTRY		RUBLES/YEAR	
DATE	SIMULATION ()	SCENARIO II (+)	DIFFERENCE (TIE = X)	GRAPH RANGE OF VALUES:	1120.5 TO 1660.0
1961	1120.5	1120.5	0.0	X	
1962	1151.6	1151.6	0.0	X	
1963	1196.1	1196.1	0.0	X	
1964	1241.6	1241.6	0.0	X	
1965	1290.5	1290.5	0.0	X	
1966	1322.5	1321.6	0.7	X	
1967	1370.3	1394.6	3.7	X	
1968	1490.4	1486.6	7.0	X	
1969	1561.2	1550.3	10.9		
1970	1571.7	1560.7	11.1		
1971	1623.1	1615.0	10.1		
1972	1608.0	1658.4	9.6		

CHART 11.7

SUMMARY STATISTICS: MEAN ABSOLUTE ERROR.....
MEAN ABSOLUTE PERCENTAGE ERROR.....
ROOT MEAN SQUARED ERROR.....
ROOT MEAN SQUARED PERCENTAGE ERROR:

0.29
6.5
0.11

VARIABLE GRAPHED: CRU		CONSUMPTION, DURALLE WOODS		R. 1970 RUBLES	
DATE	SIMULATION ()	SCENARIO II (+)	DIFFERENCE (TIE = X)	GRAPH RANGE OF VALUES:	5.9 TO 15.8
1961	5.9	5.9	0.0	X	
1962	6.7	6.7	0.0	X	
1963	7.3	7.3	0.0	X	
1964	8.4	8.4	0.0	X	
1965	9.5	9.2	0.2		
1966	10.7	10.4	0.2		
1967	11.6	11.4	0.3		
1968	12.7	12.6	0.1		
1969	13.5	13.4	0.1		
1970	14.4	14.3	0.1		
1971	15.3	15.3	0.1		
1972	15.8	15.7	0.1		

CHART 11.8

SUMMARY STATISTICS: MEAN ABSOLUTE ERROR.....
MEAN ABSOLUTE PERCENTAGE ERROR.....
ROOT MEAN SQUARED ERROR.....
ROOT MEAN SQUARED PERCENTAGE ERROR:

0.1
0.02
0.1
1.22

36j

SCENARIO II. A SOVIET DEPRIVED MULTIPUR 1965-1977
COMPARED WITH BASIC SIMULATION PATH

SIMULATION COLUMN: WHOLE MODEL
SCENARIO II COLUMN: SOVIET MODEL

DATE	SIMULATION (. .)	SCENARIO II (. +)	DIFFERENCE (TIE = X)	TOTAL AGRICULTURAL EMPLOYMENT	GRAPH RANGE OF VALUES	T.HOUS.PERSONS
1961	57111.3	57111.3	0.0			
1962	60700.9	60700.9	0.0			
1963	63650.4	63650.4	0.0			
1964	66060.0	66060.0	0.0			
1965	68604.9	68604.9	0.0			
1966	71450.1	71450.1	0.0			
1967	73933.7	73933.7	0.0			
1968	75929.7	75929.7	0.0			
1969	76637.9	76637.9	0.0			
1970	60190.9	60190.9	0.0			
1971	62900.4	62900.4	0.0			
1972	64626.0	64626.0	0.0			

SUMMARY STATISTICS: MEAN ABSOLUTE ERROR.....
MEAN ABSOLUTE PERCENTAGE ERROR.....
ROOT MEAN SQUARED ERROR.....
ROOT MEAN SQUARED PERCENTAGE ERROR.....

30.0
0.05
64.4
0.00

DATE	SIMULATION (. .)	SCENARIO II (. +)	DIFFERENCE (TIE = X)	TOTAL AGRICULTURAL OUTPUT	GRAPH RANGE OF VALUES	M.1965 HUGLES
1961	51550.0	51550.0	0.0			
1962	52203.3	52203.3	0.0			
1963	46390.0	46390.0	0.0			
1964	54025.0	54025.0	0.0			
1965	57024.3	57024.3	0.0			
1966	63107.0	63107.0	0.0			
1967	61072.0	61072.0	0.0			
1968	64373.9	64373.9	0.0			
1969	66044.7	66044.7	0.0			
1970	71647.2	71647.2	0.0			
1971	70006.7	70006.7	0.0			
1972	65703.9	65703.9	0.0			

SUMMARY STATISTICS: MEAN ABSOLUTE ERROR.....
MEAN ABSOLUTE PERCENTAGE ERROR.....
ROOT MEAN SQUARED ERROR.....
ROOT MEAN SQUARED PERCENTAGE ERROR.....

4.0
0.01
8.6
0.01

SCENARIO II. A SOVIET DEFEASE BUILDUP 1965-1967
COMPARED WITH BASIC CALCULATED PATH

SIMULATION COLUMN: WHOLE MODEL
SCENARIO II COLUMN: SOVIET MODEL

DATE	SIMULATION ()	SCENARIO II (+)	USSR TOTAL IMPORTS DIFFERENCE (TIE = X)	DIFFERENCE %DIFFERENCE	GRAPH RANGE OF VALUES:	P. CURRENT USS
1961	5711.1	5711.1	0.0	0.0	.....	13406.2
1962	6137.9	6137.9	0.0	0.0	.....	5711.1 TO
1963	6767.2	6767.2	0.0	0.0	.....	13406.2
1964	7693.7	7693.7	0.0	0.0	.....	.....
1965	7847.9	7832.1	15.9	0.20	.....	.....
1966	8305.1	8282.7	22.4	0.27	.....	.....
1967	9045.9	8997.7	48.2	0.53	.....	.....
1968	9565.5	9290.2	73.3	0.74	.....	.....
1969	10041.4	10740.2	101.2	0.93	.....	.....
1970	11720.5	11616.7	111.9	0.75	.....	.....
1971	12400.3	12240.0	103.5	0.65	.....	.....
1972	13406.2	13304.6	101.6	0.76	.....	.....

CHART 11.11

SUMMARY STATISTICS: MEAN ABSOLUTE ERROR..... 43.2
MEAN ABSOLUTE PERCENTAGE ERROR..... 0.43
ROOT MEAN SQUARED ERROR..... 66.0
ROOT MEAN SQUARED PERCENTAGE ERROR..... 0.50

DATE	SIMULATION ()	SCENARIO II (+)	USSR TOTAL EXPORTS DIFFERENCE (TIE = X)	DIFFERENCE %DIFFERENCE	GRAPH RANGE OF VALUES:	P. CURRENT USS
1961	6227.2	6227.2	0.0	0.0	.....	14852.5
1962	6615.3	6615.3	0.0	0.0	.....	6227.2 TO
1963	7097.7	7097.7	0.0	0.0	.....	14852.5
1964	7553.1	7553.1	0.0	0.0	.....	.....
1965	8270.5	8277.3	1.3	0.02	.....	.....
1966	9077.7	9074.6	3.1	0.03	.....	.....
1967	9975.9	9961.7	12.3	0.12	.....	.....
1968	10679.8	10677.2	22.6	0.21	.....	.....
1969	11634.0	11603.9	30.1	0.25	.....	.....
1970	12023.2	12793.4	29.0	0.23	.....	.....
1971	13730.3	13703.1	27.2	0.20	.....	.....
1972	14852.5	14826.9	25.6	0.17	.....	.....

CHART 11.12

SUMMARY STATISTICS: MEAN ABSOLUTE ERROR..... 12.7
MEAN ABSOLUTE PERCENTAGE ERROR..... 0.10
ROOT MEAN SQUARED ERROR..... 17.4
ROOT MEAN SQUARED PERCENTAGE ERROR..... 0.14

SECTION FIVE: USE OF THE MODEL IN FORECASTING

Before using an econometric model in forecasting, one typically performs a variety of tests including mean squared error calculations, multiplier studies and ex post forecasting. Furthermore, a new model's forecasting performance is usually compared with that of previous models. In the case of our model, we have recently begun a series of tests that will continue through Fall 1974 in order to assess its characteristics. Though there are no earlier econometric models for the Soviet economy (except for the longer-run Niwa models), one may usefully compare our model's error properties with models for other economies and compare its forecasts with those non-econometric forecasts made by expert observers. In this section of the report we will first describe the necessary procedures in forecasting with the Model. Second, we will present a forecast for 1973, the year following the statistical sample for our model estimation. This is an ex post forecast since we have actual values for certain exogenous variables, such as Soviet weather. Third, we will discuss the steps which are necessary to bring the model to the operational level and a tentative annual schedule for forecasting the Soviet economy, both short and medium term.

Forecasting Procedure: Short and Medium-Term

A short-term forecast for our model extends through the latest year for which we have annual plan and plan budget data. A medium-term forecast will extend from one to four years beyond the short-term forecast. Because of the absence of budgetary data (investment and defense) for medium-term forecasting, a different version of the model must be employed and additional assumptions must be made.

For short-term forecasting, the user will typically use the basic version of the model with budgetary plan figures for investment and defense. Over the forecast period, assumptions are then made for four groups of exogenous variables:

- (1) Demographic variables
- (2) World Trade variables
- (3) Agricultural variables
- (4) Short-term policy variables

Demographic variables include the size of the population and the able-bodied population; assumed values for these variables will be obtained from the projections made by the Department of Commerce (Foreign Demographic Analysis Division).

There are eight trade variables which play a role as exogenous variables in the foreign trade sector of our model. Four of these variables are world trade variables for which extrapolations are typically made in WEFA econometric analysis of world trade and the U.S. economy:

- (1) P599, Import price deflator for manufactures, U.S.;
- (2) PWT9, Price deflator for world trade;
- (3) WTX9, Index of world trade in commodities in constant prices;
- (4) YCMEA9, Index of Net Material Product in the CMEA, excluding the USSR.

The other four variables in this category are specific to the USSR and the user must consult experts on Soviet foreign trade in forecasting their future values:

- (5) PREX9, Dollar/Ruble conversion ratio;
- (6) KGOLD\$9, Gold reserves of the USSR;
- (7) PTM9, Official Soviet price index for imports;
- (8) PTX9, Official Soviet price index for exports.

The third category of exogenous variables for short-term forecasting are agricultural variables. These include the two weather indexes used in the prediction of agricultural output and the level of sown acreage. Some long-range forecasts of Soviet weather are made in the Soviet Union and the

West; these may be used in setting the assumed values for summer-spring precipitation and winter temperature. Sown acreage is another variable for which expert opinion should be consulted; the Diamond-Krueger index has remained quite stable over the past five years but may soon rise with the recent Brezhnev emphasis upon land reclamation.

Finally, we may turn to the policy variables including tax and expenditure rates for budget categories and administrative reforms of prices and wages. In a "normal" forecasting year, the user may simply assume no exogenous shifts in policy instruments. However, the model has been constructed so that anticipated reforms may be incorporated in the forecasting procedure. Using official pronouncements on policy changes and price-wage reforms, one may introduce such instrument shifts through assumptions or adjustments before computing the forecast.

For medium-term forecasting, additional assumptions must be made about defense and investment expenditures over the forecast period. For defense, the user must specify both the official defense expenditure category and its distribution between personnel and nonpersonnel components. For investment in a medium-term forecast, one must supply sectoral investment levels for the six sectors of the capital stock: industry, agriculture, construction, transport and communications, housing, and services and trade. Assumptions for these variables may be constructed on the basis of five-year plans and the judgment of Western analysts.

Enough of the forecasting procedure has been described for the reader to recognize the importance of expert opinion in the preparation of a forecast with an econometric model. In forecasting experience for other economies, a

crucial element is the interaction between expert judgment and the econometric model. The model builder may recognize when a component of his system has been predicting badly over the sample period; but he needs the assistance of expert observers in anticipating poor performance of a model component because of structural or policy shifts. On the other side, the model represents a valuable new tool for the expert since it captures, at least to some extent, the complex of interdependencies and enables him to evaluate the sensitivity of the observed economic system to judgmental variables.

An "Ex Post" Forecast for 1973

In Table 1 below, we have provided an "ex post" forecast for 1973 computed using the SRI-WEFA Econometric Model of the USSR. For selected categories of production and use, the Table includes actual values for 1971-72 and predicted values for 1972-73; also included is a growth rate for 1973 calculated from the predicted values for 1972-1973. Before commenting upon the details of the forecast, it is important for the procedure used to be understood. Among the assumptions which are made for the forecast are the actual values for Soviet weather and the annual plan figures for sectoral financing and defense. Because we do not have complete trade statistics for 1972, the model solution must begin in that year using actual historical data for 1971 and earlier. Consequently, the model prediction for 1973 is actually a two-year forecast; however, actual 1972 data were used in estimating all equations of the model except those in the trade sector.

There are no forecasting models for the Soviet economy to serve as benchmarks for evaluating the first applications of the SRI-WEFA Model. However, there do exist evaluations of Soviet performance in 1973; unfor-

Unfortunately, these tend to be either more aggregative than our model or much more disaggregative (commodity outputs in physical units). The evaluation produced by the U.S. Government provides the clearest standard for judging our model's forecast since the underlying data used and the level of disaggregation are quite similar. This evaluation is not a forecast since it rests upon fulfillment reports published early in 1974: the only actual 1973 values incorporated in our forecast are the weather variables. In Table 2, we have presented for comparative purposes those preliminary 1973 growth rates published by the U.S. Government. Because of different valuations and slightly different classifications, Table 2 does not provide an exact standard: however, we should be concerned with significant discrepancies.

In general, we are quite pleased with this initial forecasting effort. The forecast is rather close to the U.S. evaluation, particularly on the production side. For all sectors other than construction, we predict sectoral growth rates that are slightly below Washington's rates. The 9.1% growth rate in construction activity appears because of the large increase in forecasted investment in the construction industry (17.9%). On the use side, we predict more investment and less consumption than are indicated in the Washington figures. Our low forecasts for food and soft goods consumption reflect the agricultural constraint from 1972; this constraint was not so severe in 1973, primarily because of expanded imports from the West. The sharp rise of investment (9.2%) predicted by the model is generated by the inertia of Official defense expenditures and a predicted 12% rise in gross profits.

In the foreign trade sector, we predict a high growth rate for both exports (12.9%) and imports (20.0%) in 1973, but those predictions fall short of the preliminary growth rates for Soviet foreign trade. Our errors in terms of the levels are even greater: our predicted values for 1973 are 5 Billion U.S.\$ below estimates of actual levels. Our model, not surprisingly, does not predict the effects of detente on Soviet trade in 1972 and 1973. In using the model to forecast Soviet trade, one will have to incorporate judgmental adjustments for several of the major categories in our system. We will also need to re-estimate this sector of the model using a dummy variable for detente; judgment of experts must then be enlisted in projecting the probable duration of this effect.

In the basic version of the model, one obtains predictions for both sector-of-origin GNP and end-use GNP, and, consequently, there is a simulation/forecast residual equal to the difference between the two. In the trial forecast, the model predicts a larger growth rate for sector-of-origin GNP (7.1%) than for end-use GNP (4.9%); there is a net change in the forecast residual of 8 billion 1970 rubles (from -2.6 to +5.4). As an alternative forecast, one may use the version where total consumption is the residual category. The only significant differences between the two forecasts are in consumption and its components are now much higher than the Washington estimates, particularly for food and soft goods. We have more confidence in the Table 1 forecast for consumption though we do recognize the need for model development to allow imports to ease domestic supply constraints on food and soft goods.

TABLE 1

SRI-WEFA MODEL FORECAST FOR 1973

Indicator	Units	Actual		Prediction		Predicted 1972 1973
		1971	1972	1972	1973	
Production						
GNP, Sector of Origin	B 1970 Rubles	375.4	386.7	384.3	411.4	7.1%
Gross Agricultural Output	B 1965 Rubles	71.5	66.4	65.2	75.0	15.0
Industrial Output	1970 = 100	106.0	112.0	112.1	117.9	5.2
State Construction Activity	B 1970 Rubles	47.6	50.8	50.6	55.2	9.1
Transport/Communication Output	1970 = 100	106.7	113.4	115.0	123.1	7.0
Government, Services, Domestic Trade	1970 = 100	104.0	107.9	104.9	108.5	3.3
Use						
Consumption -- Total						
Food	B 1970 Rubles	219.3	227.5	224.3	229.1	2.1
Softgoods	B 1970 Rubles	105.9	108.2	107.7	109.0	1.2
Durables	B 1970 Rubles	50.5	53.2	52.4	52.9	1.0
Services	B 1970 Rubles	15.2	16.1	16.0	17.0	6.3
	B 1970 Rubles	47.7	50.0	48.2	50.3	4.4
New Investment -- Total						
Agriculture	B 1970 Rubles	88.0	94.3	95.5	104.3	9.2
Industry	B 1970 Rubles	16.4	18.1	17.5	19.8	13.1
Construction	B 1970 Rubles	31.0	33.1	33.9	36.9	8.8
Transport/Communications	B 1970 Rubles	3.4	3.6	3.94	4.63	17.9
Housing	B 1970 Rubles	8.5	9.6	9.39	10.36	10.6
Services/Trade	B 1970 Rubles	14.1	14.6	15.00	15.85	6.0
	B 1970 Rubles	14.6	15.2	15.72	16.79	7.0
Capital Repair						
Inventory Change - Domestic Trade	1970 = 100	108.1	113.5	115.5	123.3	6.8
Nontrade, nonagriculture	B 1970 Rubles	2.6	1.4	1.86	3.19	71.5
Total Imports	B 1970 Rubles	10.1	10.1	8.38	8.25	-1.6
Total Exports	B Current U.S.\$	12.5	16.11	13.49	16.20	20.0
End-Use GNP	B Current U.S.\$	13.8	15.42	14.97	16.90	12.9
Forecast Residual	B 1970 Rubles	375.4	386.7	386.9	406.0	4.9
	B 1970 Rubles	0	0	-2.6	5.4	--

TABLE 2

Preliminary Data on Soviet Economic Performance in 1973
(U.S. Government Figures)

	1973 % <u>Growth</u>
<u>Production (Growth Rates measured at Factor Cost)</u>	
GNP	7.5
Agriculture	16.8
Industry	6.2
Construction	2.2
Transport/Communications	7.3
Domestic Trade	5.4
Services	3.7
 <u>Use</u>	
Consumption -- Total	4.3
Food	4.6
Softgoods	4.6
Durables	3.3
Services	6.3
Total New Investment	3.5
Capital Repair	10.0
Civilian R. & D.	6.6
Administration	4.3

Foreign Trade

Actual Level (B U.S.\$)

	<u>1972</u>	<u>1973</u>	
Total Imports	16.10	20.98	30.4
Total Exports	15.41	21.33	38.4

Table 3

Consumption Forecast When Consumption
Is the Residual End-Use Category

	Predicted 1972	Predicted 1973	Predicted 1973 Growth Rate	Prediction From Table 1
Consumption -- Total	221.5	235.6	6.3	2.1
Food	106.3	112.1	5.4	1.2
Softgoods	51.1	54.8	7.2	1.0
Durables	15.8	17.1	8.2	6.3
Services	48.3	51.5	6.6	4.4

Towards Operational Forecasting

In the past year, we enlisted expert opinion early in our specification of the model; in the current year, we intend to involve experts actively in the use of the model for both scenario analysis and forecasting. During 1975, we will conduct forecasting trials with the compact five-sector model; this should provide considerable experience in forecasting the Soviet economy that may be transferred to the second-stage sixteen-sector model.

With the budget statement in December 1974, we will issue our first control forecast for 1974 and 1975. Early in 1975 we will convene a seminar of experts to evaluate the performance of the forecasting procedure for 1973 and 1974 and to consider appropriate adjustments for our 1975 forecast. In the Fall of 1975, we will issue a revised forecast for 1975 on the basis of additional information on world trade and Soviet weather and prepare for the December control forecast of 1976. This will set the general pattern for operational forecasting on an annual cycle:

- (1) December-January, we issue a control forecast.
- (2) Early in the year, a session with econometric and Soviet specialists held to evaluate past forecasts and the current control forecast.
- (3) Then, an adjusted forecast will be issued in Spring with a possible revision in the fall.

In Fall 1975, we also anticipate preparing Model II with its Input-Output component for use in forecasting both short and medium term.

We will be experimenting with medium-term forecasts using the compact model in anticipation of the Tenth Five-Year-Plan for 1976-1980. We should then have enough experience to use the Model as an additional means for testing the feasibility of the Five-Year-Plan, as well as a tool for medium-term forecasting.

DOCUMENTATION FOR THE
SRI-WEFA
ECONOMETRIC MODEL OF THE SOVIET UNION

I. Sectors and Symbols

In its fully endogenous mode, the model consists of 81 stochastic (behavioral and technical, type B) relationships and 32 identities (type I) arranged in the sectors set out below. The sectors are identified by the letter shown; this is the initial symbol in the names of all variables determined in that sector, e.g. PII is a price variable (industrial investment deflator) determined in the P (price) sector.

SECTOR IDENTIFIER	SECTOR NAME	NO. OF RELATIONSHIPS	
		B-type	I-type
N	Population and Employment	10	2
I	Investment	8	5
K	Capital Formation	7	8
A	Other Agricultural Variables	2	
X	Production	5	
W	Wages	5	
Z	Incomes	4	3
P	Prices	11	2
C	Consumption	4	1
T	Budget Revenues	5	2
B	Budget Outlays	6	1
E	Exports	5	2
M	Imports	7	2
G	Aggregate Identities and Balances	2	4
TOTAL		81	32

II. Simulation

The model is encoded into a simulation program using the WEFA general model solution system SOLVEM.* This program has standard facilities to convert the status of any variable (e.g. from endogenous to exogenous) and to apply additive adjustments to any variable. In addition it has facility to change the status of BLOCKS of the model which has been utilized in the following way.

BLOCK NO.	DESCRIPTION	CONSISTING OF SECTORS
1	Foreign Trade	E, M
2	Supply	N, K, A, X
3	Incomes	W, Z, P
4	Investment	I (excl. I.10-I.13)
5	Consumption	C
6	Budget	T, B
7	Aggregates	G (plus I.10-I.13)

Block 2 is, of course, the central and largest one within which most of the simultaneity is to be found.

An example of the application of the BLOCK facility would be to change the status of BLOCK 4 (investment) from endogenous to exogenous.

A further facility to utilize different alternatives for a particular equation or set of equations, and thus produce different variants of the model, has been employed as follows (ZERO is the initial default option).

* We are indebted to George Schink and Bill Brown, the developers of SOLVEM, for guidance in using it for this model.

ALTERNATE SWITCH NO.	SETTING	ALTERNATIVE	EQUATION NUMBERS
1	ZERO	Non-agricultural investment by adding components	I.1a-6a
	ONE	Non-agricultural investment by direct function (components by exogenous ratios)	I.1b-6b
2	ZERO	Industrial output from Cobb-Douglas	X.1a
	ONE	Industrial output from C.E.S.	X.1b
3	ZERO	Consumption components by direct functions	C.2a-C.5a
	ONE	Consumption components by supply functions	C.2c-C.5c
	TWO	Consumption components by share functions	C.2b-C.5b
4	ZERO	Total consumption by adding components	C.1b
	ONE	Total consumption by direct function	C.1a
	TWO	Total consumption by supply function	C.1d
	THREE	Total consumption by residual function	C.1d

Except in the form in which total consumption is residually determined (Alt. 4=THREE), GNP is determined both from the side of production (equ. G.3) and from the side of use (by adding components). The difference is a simulation residual defined in equation G.6.

III. Variables

Variables in the model are contained in the attached alphabetical list; there are 113 endogenous and 65 exogenous variables.

The following naming conventions have been employed.*

SYMBOL	CONVENTION
<u>Initial Symbol</u>	
Sector symbols	Sector of model (see above list) in which endogenous variable is determined
Q	Dummy or time trend variables (figures following generally denote year(s), e.g. Q65 is a dummy variable for 1965)
<u>Final Symbol</u>	
9	Exogenous variable other than Q-type
<u>Embedded or Trailing Symbols</u>	
Industries	I industry
	C construction
	T transport and communications
	G government, trade, services, etc.
	A agriculture
Other	& current ruble value (always used)
	70 1970 price base (not always used)

NOTE: A variable is exogenous if and only if it ends in 9 or begins with Q; a variable is at current ruble value if and only if it has a &-sign in its name.

Data file management programs developed at WEFA were used to construct, maintain and utilize a databank for the model.** The structure of the list of variables is largely self-explanatory. Variable # refers to the number of the variable in the model (simulation program) which generally differs from the number on the data-

* The reader is urged to study these conventions prior to consulting the equations of the model as an understanding of them will greatly facilitate that process.

** We are indebted to Virginia Long for assistance in setting up these programs for our purposes.

bank. The set of model variables is a subset of the complete databank; a list for the latter is given separately in Appendix B.

ALPHABETICAL LISTING OF MODEL VARIABLES

DECLARATION

STATES	LEVEL	DESCRIPTION	QTR	MON	ANNU	UNITS	SOURCE	VARS	EQUB
27	FACE	FIELD OF AGRICULTURAL LANDS, CURRENT PURCHASES			67	1965=100.	TRAN	115R	A.2
360	ALVE	VALUE OF PRODUCTIVE LIVESTOCK, (MEAN YEAR 1955 PRICES)			560	R RUBLES	DIAPOND	113R	A.1
362	PAIP	STATE BUDGET EXPENDITURES, ADMINISTRATION			362	B CUR R	AKHOZ	153R	R.4
361	PAIP	STATE BUDGET EXPENDITURES, OFFICE			361	B CUR R	AKHOZ	152E	
361	PAIP	STATE BUDGET EXPENDITURES, OFFICE			361	B RUBLES	COMH73	123E	
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B CUR R	AKHOZ	150R	R.1
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B CUR R	AKHOZ	149I	R.6
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B RUBLES	COMH73	154R	R.3
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B RUBLES	COMH73	107R	R.7
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	R R	73JEC393	107R	R.7
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	R RUBLES	AKHOZ	155R	R.5
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	R CUR R	AKHOZ	151R	R.2
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B 1970R	TRAN	134I	C.1
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B 1970R	TRAN	132R	C.4
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B 1970R	TRAN	130R	C.2
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B 1970R	TRAN	131R	C.3
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B 1970R	TRAN	133R	C.5
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	MSUS	73JEC706	002R	F.1
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	TRAN	003R	003R	C.2
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	73JEC706	98	F.4	
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	TRAN	128	F.5	
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	TRAN	005R	E.3	
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	73JEC706	14I	E.4	
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	M 1970 R	TRAN	16I	E.7
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	1970=100.	OERT3	114R	6.4
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B RUBLES	TRAN	025I	6.3
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B RUBLES	TRAN	22R	6.2
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	1970=100	TRAN	079R	X.4
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B RUBLES	OERT3	080I	6.1
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B RUBLES	TRAN	170I	6.5
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	NOIE	NOIE	179I	6.6
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B 1972R	TRAN	111R	1.7
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B RUBLES	MARKHOZ	070R	1.2
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	NOIE	TRAN	049E	
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	NOIE	TRAN	059E	
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B RUBLES	TRAN	122I	1.8
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B CUR R	CUR DIG	121E	
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B CUR R	CUR DIG	119E	
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B CUR R	CUR DIG	120E	
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B CUR R	CUR DIG	119E	
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B RUBLES	MARKHOZ	083R	1.9
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B 72R	MARKHOZ	064R	1.1
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B RUBLES	TRAN	037I	1.6
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	NOIE	TRAN	092I	
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	NOIE	TRAN	051E	
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	NOIE	TRAN	091I	
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	NOIE	TRAN	117E	
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B RUBLES	MARKHOZ	086R	1.5
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B 1970 R	TRAN	174I	1.13
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B 1970 R	TRAN	173I	1.12
362	PAIP	STATE BUDGET EXPENDITURES, OFFICE			362	B RUBLES	TRAN	093I	1.9

ALPHABETICAL LISTING OF MODEL VARIABLES

DOCUMENTATION

SERIES LABEL	DESCRIPTION	QTR	MON	ANN	UNITS	SOURCE	VARS	EQUB
259	170PTA			259	B RURLER	MARKHOZ	0709	I.3
446	170PTA			546	B 1970 R	TRAH	1729	I.11
745	170T			545	B 1970 R	TRAH	1719	I.10
435	JMS9			435	CM	IMS	102E	
611	JMS9			611	NONE	D-G	104E	
592	PAP			592	B RURLER	DIAMOND	1109	K.10
444	PAP			404	B RURLER	TRAH	0601	K.4
152	PAP			152	MSUS	73JEC702	24E	
549	PAP			509	B RURLER	TRAH	0801	K.11
427	PAP			427	B RURLER	MARKHOZ	0811	K.10
355	PAP			355	M SO MET	73JEC422	031E	
507	PAP			507	M SO MET	73JEC422	030E	
507	PAP			507	B RURLER	TRAH	0601	K.2
506	PAP			506	B RURLER	TRAH	066E	
169	PAP			169	B 1955R	COMI70	0611	K.1
349	PAP			349	B RURLER	TRAH	065E	
505	PAP			514	B RURLER	TRAH	069E	K.5
516	PAP			516	B RURLER	TRAH	082E	K.13
511	PAP			511	B RURLER	TRAH	0629	K.3
515	PAP			515	B RURLER	TRAH	085R	K.12
513	PAP			513	B RURLER	TRAH	077R	K.8
547	PAP			547	B RURLER	TRAH	0871	K.9
508	PAP			508	B RURLER	TRAH	0741	K.7
423	PAP			423	KMS724MR	SVYAZ103	073E	K.15
441	PAP			441	B RURLER	TRAH	0761	K.6
106	PAP			106	PERCENT	MARKHOZ	140E	
141	PAP			141	MSUS	73JEC706	0010	M.1
138	PAP			138	TRAH	TRAH	78	M.4
119	PAP			119	TRAH	73JEC706	0068	M.5
123	PAP			123	TRAH	73JEC706	109	M.3
139	PAP			139	TRAH	73JEC706	110	M.7
133	PAP			133	TRAH	TRAH	004R	M.2
99	PAP			99	TRAH	73JEC706	131	M.8
386	PAP			386	M 1970 R	TRAH	151	M.9
517	PAP			517	000 PERS	TRAH	0369	N.8
52	PAP			52	000 PERS	73JEC508	0435	N.5
646	PAP			646	10001	NKHOZ	177E	
639	PAP			639	10001	NKHOZ	176E	
64	PAP			64	000 PERS	TRAH	0428	N.7
62	PAP			62	000 PERS	TRAH	040R	N.4
390	PAP			390	000 MEI	MARKHOZ	0589	N.11
548	PAP			548	000 PERS	TRAH	0893	N.3
279	PAP			279	000 PERS	73JEC520	090E	
356	PAP			356	M PERS	NKM 72.7	0291	N.2
354	PAP			354	M PERS	NKM 72.7	0248	N.1
466	PAP			466	M	TRAH	052E	
63	PAP			63	000PERS	TRAH	0410	N.6
245	PAP			245	000 PERS	73JEC520	0471	N.10
267	PAP			267	000 PERS	73JEC520	0300	N.9

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ALPHABETICAL LISTING OF MODEL VARIABLES

DOCUMENTATION

SERIES LABEL	DESCRIPTION	QTR	MON	ANN	UNITS	SOURCE	VARS	EQU
424	INDEX OF TRADES & COM SPECIALISTS, END OF YEAR			424	000 MEH	SVAZ236	0758	M.12
386	PRICE FARM SALES TO CO-OPERS CO-UPS AT NEGOTIATED PRICES, 1970 WEIGHTS			386	1970=100.	NKH+TRN	0598	P.3
418	CONSUMPTION, PRICE, FOOD (FROM PIRF 3 PAFCTU)			418	1970=100	TRAN	1291	P.4
407	INVESTMENT DEFLATOR, AGRICULTURE			407	1972=100.	NARKHOZ	978	P.13
405	INVESTMENT DEFLATOR, CONSTRUCTION SECTOR			405	1972=1009	NARKHOZ	1018	P.9
429	INVESTMENT DEFLATOR, HOUSING			429	1972=100.	NARKHOZ	1008	P.12
406	INDEX OF STATE RETAIL PRICES FOR FOOD GOODS (INFLATED)			406	1972=100.	NARKHOZ	0958	P.8
573	INDEX OF STATE RETAIL PRICES FOR FOOD GOODS (INFLATED)			573	1970=100	TRAN	1268	P.2
409	INVESTMENT DEFLATOR, SERVICES			409	1972=100.	NARKHOZ	990	P.11
400	INVESTMENT DEFLATOR, TRANSPORT AND COMMUNICATION			400	1972=100.	NARKHOZ	988	P.10
549	INDEX OF WHOLESALE INDUSTRIAL PRICES, HEAVY INDUSTRY (DEFLATED)			549	1970=100.	TRAN	0948	P.7
575	INDEX OF WHOLESALE INDUSTRIAL PRICES, LIGHT AND FOOD INDUSTRY (DEFLATED)			575	1970=100	TRAN	1288	P.6
416	CONSUMPTION PRICE, NON-FOOD (FROM PIRF)			416	1970=100	TRAN	1278	P.1
419	CONSUMPTION PRICE, TOTAL (FROM PIRF+PCC)			419	1970=100.	TRAN	0531	P.5
612	USSR DOLLAR CONVERSION RATE			612	R RUBLES	NKHOZ	192	
376	SOVIET TRADE WITH WORLD, IMPORTS, OFFICIAL PRICE INDEX			376	1970=100.	VH TOR M	024E	
375	SOVIET TRADE WITH WORLD, EXPORTS, OFFICIAL PRICE INDEX			375	1970=100.	VH TOR M	027E	
570	DEFLATOR, WORLD TRADE			570	1958=100	INDEX NEFA1AE		
439	PRICE DEFLATOR, CONSTRUCTION ACTIVITY			439	1972=100.	NARKHOZ	096E	
571	IMPORTS, PRICE DEFLATOR, MANUFACTURED GOODS			571	1958=100	INDEX NEFA17E		
432	FIVE YEAR FIVE YEAR (54-57, 63-66, 69-71, 74-76)			432	NONE	O-G	071E	
433	FIVE YEAR FIVE YEAR (1458-57, 62-64, 69-71, 74-76)			433	NONE	D-G	063E	
550	DUPY VARIABLE FOR 1954-1964 (PRIVATE AGRICULTURAL EMPLOYMENT)			550	NONE	C-H	108E	
581	SHIFT VARIABLE FOR 1967-1969 (WAGE REFORM)			581	NONE	D-G	125E	
604	DUPY VARIABLE FOR 1967-1969			604	NONE	C-H	109E	
562	DUPY VARIABLE FOR 1965			562	NONE	NONE	175E	
620	DUPY VARIABLE FOR 1958-59			620	NONE	NONE	163E	
619	DUPY VARIABLE FOR 1958-61			619	NONE	NONE	161E	
603	DUPY VARIABLE FOR 1959			603	NONE	NONE	160E	
468	DUPY VARIABLE FOR 1961			468	NONE	NONE	084E	
621	DUPY VARIABLE FOR 1962			621	NONE	NONE	162E	
626	DUPY VARIABLE FOR 1963			626	NONE	NONE	167E	
642	DUPY VARIABLE FOR 1963-68			642	NONE	NONE	169E	
623	DUPY VARIABLE FOR 1964-67			623	NONE	NONE	164E	
485	DUPY VARIABLE FOR 1965			485	NONE	NONE	056E	
648	DUPY VARIABLE FOR 1965-1967			648	NONE	NONE	181E	
577	DUPY VARIABLE FOR 1967			577	NONE	NONE	141E	
624	DUPY VARIABLE FOR 1967-68			624	NONE	NONE	165E	
520	DUPY VARIABLE FOR 1966, INDUSTRY WAGE			520	NONE	TRAN	054E	
645	DUPY VARIABLE FOR 1969 OF			645	NONE	NONE	160E	
625	INDEX OF AGRICULTURAL INVESTMENT, TRANSPORT AND COMMUNICATION			625	NONE	NONE	166E	
480	TAX RATE, ADJUSTMENT, SOCIAL REDUCTIONS			480	NONE	TRAN	048E	
614	ADJUSTMENT, SOCIAL REDUCTIONS			614	NONE	NONE	148E	
576	TAX RATE, ADJUSTMENT, OTHER SOCIAL SECTOR			576	NONE	NONE	159E	
616	TAX RATE, ADJUSTMENT, POPULATION			616	NONE	NONE	137E	
617	TAX RATE, ADJUSTMENT, POPULATION			617	NONE	NONE	157E	
615	TAX RATE, ADJUSTMENT, TROPICAL TAX			615	NONE	NONE	159E	
434	INDEX OF AGRICULTURAL INPUTS, SOVIET AREA			434	1965=100.	NONE	170E	

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ALPHABETICAL LISTING OF HOUSE VARIABLES

DOCUMENTATION

SERIES LABEL	DESCRIPTION	QTR	MON	ANN	UNITS	SOURCE	VARS	EQU
451	REVENUES, DEDUCTIONS FROM PROFIT, STATE ENTERPRISES			451	B RUBLES	IKHOZ	1440	T.1
506	REVENUES, OTHER SOCIAL FLOORS			506	B RUBLES	PRAVDA	1458	T.3
189	TOTAL STATE FUNCTIONS (1973 FIGURES)			189	B RUBLES	73JEC393	1381	T.6
441	ADJUSTMENT FOR LOCAL TAXES, ADMISSION FEES, AND LOTTERIES			441	B RUBLES	73JEC	160E	
453	REVENUES, POPULATION (HOUSE TAXES, STATE BONDS, LOTTERIES ETC)			453	B RUBLES	IKHOZ	1478	T.5
449	STATE FUNDS, TOTAL REVENUES (CURRENT RUBLES)			449	B RUBLES	IKHOZ	1421	T.7
454	REVENUES, SOCIAL INSURANCE DEDUCTIONS			454	B RUBLES	IKHOZ	1468	T.4
450	REVENUES, TAX-ADJUSTED TAX			450	B RUBLES	IKHOZ	1438	T.2
519	REVENUES, AGRICULTURE, STATE AND COLLECTIVE FARMS			519	RUBLES	TRAN	0338	M.2
265	REVENUES, COLLECTIVE			265	RUBLES	70JEC02	0468	M.3
401	REVENUES, GOVERNMENT, TRADE, SERVICES ECT.			401	RUBLES	TRAN	0450	M.5
264	REVENUES, INDUSTRY			264	RUBLES	70JEC02	0328	M.1
400	REVENUES, TRANSPORTATION AND COMMUN			400	RUBLES	TRAN	0448	M.4
143	COLLECTIVE VALUE			143	1958=100	WEFAHEW	23E	
252	VALUE OF FEED FED TO LIVESTOCK			252	M1968	SRI	116E	
503	AGRICULTURAL PRODUCTION TOTAL			503	M RUBLES	OER	1128	X.5
363	AGRICULTURAL PRODUCTION, TREN 1955-1972			363	M RUBLES	TRAN	21E	
243	AGRICULTURAL PRODUCTION, TOTAL			243	B RUBLES	NARKHOZ	0678	X.2
296	INDUSTRIAL PRODUCTION, TOTAL			296	1970=100	OER73	0578	X.1
380	TRANSPORTATION, TOTAL			380	1970=100	O-G	0725	X.3
148	TRANSPORTATION, TOTAL			148	1963=100	WUUCTAD	20E	
605	REVENUES, DISPOSABLE INCOME			605	B RUBLES	TRAN	1361	Z.6
181	TOTAL REVENUE (1973 FIGURES)			181	B RUBLES	73JEC393	0391	Z.4
579	HOUSEHOLD AND INDIVIDUAL INCOME IN KIND			579	B RUBLES	RAID/TRA	1358	Z.5
461	ACTUAL REVENUE, NATIONAL ECONOMY			461	B RUBLES	NARKHOZ	1248	Z.7
186	PROFITS, DISTRIBUTED TO COOPERATIVE MEMBERS (1973 FIGURES)			186	B R	73JEC393	105E	
183	PROFITS, DISTRIBUTED TO COOPERATIVE ARTISANS (1973 FIGURES)			183	B R	73JEC393	103F	
187	MILITARY PAY AND ALLOWANCES (1973 FIGURES)			187	B R	73JEC393	106E	
165	NET HOUSEHOLD INCOME FROM SALE OF FARM PRODUCTS (1973 FIGURE)			165	B RUBLES	73JEC393	0358	Z.3
518	WAGE PAYMENTS, AGRICULTURE, STATE AND COLLECTIVE FARMS			518	B RUBLES	TRAN	0341	Z.2
465	GROSS LABORING URBAN WORKERS			465	B RUBLES	TRAN	0508	Z.1

IV. Equations

Equations are arranged by sector in the sector-order given above. Behavioral equations are written in the form used for estimation with the sample mean value of the dependent variable shown in parentheses beneath it. In some cases auxiliary variables have been defined below the equation in which they appear. Such auxiliary variables serve only this presentation purpose and do not have model variable numbers.

Figures in parentheses under coefficients are t-statistics; absence thereof implies extraneous estimate. R^2 is the multiple correlation coefficient (unadjusted for degrees of freedom); S.E. is the standard error of estimate and D.W. the Durbin-Watson statistic; D is the normal variate devised by Durbin to test for first order serial correlation in the presence of a lagged dependent variable.

Final equations were estimated by ordinary least squares using T.S.P. (Time Series Processor).*

* We are indebted to Jean-Pierre LeMaitre for assistance in adapting this program to our data files.

N POPULATION AND EMPLOYMENT

(N.1) NPOFU Urban Population

$$\begin{aligned} \frac{100 \text{ NPOPU}}{\text{NPOP9}} &= 36.06531 \text{ QLT28} + 0.11493 (100 \frac{\text{KHU9/NPOPU}}{\text{KHR9/NPOPR}})_{-2} \\ &\quad (20.79) \quad (1.53) \\ (54.1) &+ 0.01447 \left(\frac{100 \text{ WI\&}}{(\text{ZPWSC\&} + \text{ZPWS\&}) 10.6 / (\text{NASC} + \text{NTAP})} \right)_{-2} \\ &\quad (4.32) \\ &- 93.27110 - 0.97486 \left(\frac{\text{XATOT}/1000}{\text{XATR9}} - 1 \right)_{-1} \\ &\quad (7.63) \quad (1.08) \end{aligned}$$

$$R^2 = .998 \quad \text{S.E.} = 0.137 \quad \text{D.W.} = 1.83$$

Sample Period 1960-1972

(N.2) NPOPR Rural Population

$$\text{NPOPR} = \text{NPOP9} - \text{NPOPU}$$

(N.3) NNAS Non-agricultural, Non-artisan Employment

$$\begin{aligned} \frac{\text{NNAS}}{\text{NPOPU} + \text{NPOP9}}_{-1} &= 5.68721 \text{ QT50} + 0.04875 \frac{\text{NPAB9}}{\text{NPOP9}} \\ &\quad (18.83) \quad (0.50) \\ (559.0) &+ 420.11182 \frac{\text{WI\&}/\text{PRC}}{(\text{WI\&}/\text{PRC})_{-1}} + 8.88542 \text{ QPL7} \\ &\quad (7.93) \quad (4.00) \end{aligned}$$

$$R^2 = .985 \quad \text{S.E.} = 3.761 \quad \text{D.W.} = 1.99$$

Sample Period 1959-1972

(N.4) NI Industrial Employment

$$\begin{aligned} \frac{100 \text{ NI}}{\text{NNAS}} &= - 2.17066 \text{ QLT28} - 0.07047 \text{ QPL7} - 0.22100 \text{ IRII}_{-1} \\ &\quad (1.20) \quad (0.54) \quad (2.39) \\ (40.6) &- 1.29640 \text{ IRII}_{-1} + 62.67984 \\ &\quad (4.46) \quad (19.69) \end{aligned}$$

$$R^2 = .968 \quad \text{S.E.} = 0.225 \quad \text{D.W.} = 1.59$$

Sample Period 1959-1972

(N.5) NC Construction Employment

$$\frac{100 \text{ NC}}{\text{NNAS}} = - 5.84034 \text{ QLT28} - 0.09236 \text{ QPL7} + 0.13683 \text{ IRII}_{-1}$$

(4.36) (0.96) (2.00)

$$(11.0) \quad + 1.30053 \text{ IRIC}_{-1} + 21.80510$$

(6.06) (9.27)

$$R^2 = .857 \quad \text{S.E.} = 0.167 \quad \text{D.W.} = 2.30$$

Sample Period 1959-1972

(N.6) NT Transport and Communications Employment

$$\frac{100 \text{ NT}}{\text{NNAS}} = - 6.19842 \text{ QLT28} + 0.06844 \text{ QPL7} + 0.10121 \text{ IRII}_{-1}$$

(8.53) (1.31) (2.73)

$$(12.0) \quad + 0.30293 \text{ IRIC}_{-1} + 29.16995$$

(2.60) (22.84)

$$R^2 = .975 \quad \text{S.E.} = 0.090 \quad \text{D.W.} = 1.34$$

Sample Period 1959-1972

(N.7) NG Government, Trade, Services, etc., Employment

$$\frac{100 \text{ NG}}{\text{NNAS}} = 14.20937 \text{ QLT28} + 0.09439 \text{ QPL7} - 0.01705 \text{ IRII}_{-1}$$

(19.37) (1.79) (0.45)

$$(36.35) \quad - 0.30704 \text{ IRIC}_{-1} - 13.65457$$

(2.61) (10.59)

$$R^2 = .997 \quad \text{S.E.} = 0.091 \quad \text{D.W.} = 1.68$$

Sample Period 1959-1972

Equations N.4 - N.7 identically exhaust NNAS from N.3

(N.8) NASC State and Collective Farm Employment

$$\begin{aligned} \frac{\text{NASC}}{1000 \text{ NPOPR}} = & \frac{0.91779}{(13.34)} \left(\frac{\text{NASC}}{1000 \text{ NPOPR}} \right)_{-1} + \frac{0.01993}{(1.10)} + \frac{0.00002771}{(0.94)} \text{ JPS9} \\ & - \frac{0.01885}{(1.56)} \left\{ \left(\frac{\text{XATOT}/1000}{\text{XATR9}} - 1 \right)_{-1} + \left(\frac{\text{XATOT}/1000}{\text{XATR9}} - 1 \right)_{-2} \right\} \end{aligned}$$

$$\begin{aligned} R^2 &= .931 & \text{S.E.} &= 0.004 & \text{D.W.} &= 2.00 \\ \text{Sample Period} &1955-1972 & \text{D.} &= 0.00 \end{aligned}$$

(N.9) NTAP Private Agricultural Employment

$$\begin{aligned} \frac{\text{NTAP}}{\text{NASC}} = & - \frac{0.03787}{(9.01)} \text{ QSH65} + \frac{0.43421}{(137.99)} \\ & - \frac{0.04014}{(1.54)} \left\{ \left(\frac{\text{XATOT}/1000}{\text{XATR9}} - 1 \right)_{-1} + \left(\frac{\text{XATOT}/1000}{\text{XATR9}} - 1 \right)_{-2} \right\} \end{aligned}$$

$$\begin{aligned} R^2 &= .846 & \text{S.E.} &= 0.009 & \text{D.W.} &= 1.81 \\ \text{Sample Period} &1955-1972 \end{aligned}$$

(N.10) NTA Total Agricultural Employment

$$\text{NTA} = \text{NASC} + \text{NTAP}$$

(N.11) NIET Engineering-Technical Manpower Employed in Industry

$$\begin{aligned} \text{NIET-NIET}_{-1} = & \frac{0.16902}{(14.94)} \left(\frac{\text{NEIND9}_{-1} + \text{NEIND9}_{-2}}{2} \right) - \frac{160.54225}{(5.22)} \text{ Q69ON} \\ & + \frac{288.97363}{(1.47)} \left(\frac{(\text{NIET}_{-1} - \text{NIET}_{-2}) * 2}{\text{NEIND9}_{-1} + \text{NEIND9}_{-2}} - 0.13589 \right) \end{aligned}$$

$$\begin{aligned} R^2 &= 0.798 & \text{S.E.} &= 30.82 & \text{D.W.} &= 1.91 \\ \text{Sample Period} &1958-1972 \end{aligned}$$

(N.12) NTSP Specialists Employed in Transport and Communications

$$\text{NTSP} - \text{NTSP}_{-1} = 0.47175 \left(\frac{\text{NETRA9}_{-1} + \text{NETRA9}_{-2}}{2} \right) \\ (41.70) \quad (36.26)$$

$$+ 42.85957 \left(\frac{(\text{NTSP}_{-1} - \text{NTSP}_{-2}) * 2}{\text{NETRA9}_{-1} + \text{NETRA9}_{-2}} - 0.49761 \right)$$

$$R^2 = 0.836 \quad \text{S.E.} = 4.54 \quad \text{D.W.} = 2.24 \\ \text{Sample Period 1958-1972}$$

I INVESTMENT(I.1) IIN Capital Investment in Industry

$$\begin{aligned}
 \text{a. } \frac{IIN - IIN_{-1}}{IIN_{-1}} &= 0.06745 - 0.05765 Q6567 - 0.19528 GDF \\
 &\quad (5.01) \quad (3.41) \quad (3.97) \\
 &\quad (0.076) \\
 &\quad + 0.18985 \left(\frac{IFAJ\&/PII_{-1} - IFAJ\&_{-1}/PII_{-2}}{IFAJ\&_{-1}/PII_{-2}} \right) \\
 &\quad \quad (1.28) \\
 &\quad + 0.18025 \left(\frac{ZPG\&/PII_{-1} - ZPG\&_{-1}/PII_{-2}}{ZPG\&_{-1}/PII_{-2}} \right) \\
 &\quad \quad (2.63)
 \end{aligned}$$

$$\begin{aligned}
 R^2 &= 0.751 & S.E. &= 0.022 & D.W. &= 2.31 \\
 \text{Sample Period} &1959-1972
 \end{aligned}$$

$$\text{Where } GDF = \frac{BDNP\&/PIWH70 - (BDNP\&/PIWH70)_{-1}}{(BDNP\&/PIWH70)_{-1}}$$

$$\text{b. } IIN \equiv YRII9.INA$$

(I.2) ICRUB Capital Investment in Construction

$$\begin{aligned}
 \text{a. } \frac{ICRUB - ICRUB_{-1}}{ICRUB_{-1}} &= - 0.06576 QPL7 + 0.00514 QT50 \\
 &\quad (1.93) \quad (2.44) \\
 &\quad (0.102) \\
 &\quad + 0.04428 \left(\frac{IFHK\&/PIHS_{-1} - IFHK\&_{-1}/PIHS_{-2}}{IFHK\&_{-1}/PIHS_{-2}} \right) \\
 &\quad \quad (0.48) \\
 &\quad + 0.55762 \left(\frac{IIN - IIN_{-1}}{IIN_{-1}} \right) \\
 &\quad \quad (1.50)
 \end{aligned}$$

$$\begin{aligned}
 R^2 &= .415 & S.E. &= 0.061 & D.W. &= 2.18 \\
 \text{Sample Period} &1959-1972
 \end{aligned}$$

(I.2) ICRUB Continued

b. ICRUB = IRIC9.INA

(I.3) ITRUB Capital Investment in Transport and Communications

$$\begin{aligned}
 \text{a. } \frac{\text{ITRUB} - \text{ITRUB}_{-1}}{\text{ITRUB}_{-1}} &= -0.00882 \text{ QPL7} - 0.03694 \text{ GDF} \\
 &\quad (0.54) \quad (0.51) \\
 &\quad (0.093) \\
 &\quad + 0.13608 \left(\frac{\text{IFTR\&9/PIT}_{-1} - \text{IFTR\&9}_{-1}/\text{PIT}_{-2}}{\text{IFTR\&9}_{-1}/\text{PIT}_{-2}} \right) \\
 &\quad (1.69) \\
 &\quad + 1.03504 \left(\frac{\text{IIN} - \text{IIN}_{-1}}{\text{IIN}_{-1}} \right) \\
 &\quad (6.23)
 \end{aligned}$$

$R^2 = .687$ S.E. = 0.032 D.W. = 1.22
 Sample Period 1959-1972

b. ITRUB = IRIT9.INA

(I.4) IHS Capital Investment in Housing

$$\begin{aligned}
 \text{a. } \frac{\text{IHS} - \text{IHS}_{-1}}{\text{IHS}_{-1}} &= 0.05873 - 0.03956 \text{ QPL7} - 0.17929 \text{ GDF} \\
 &\quad (3.48) \quad (1.79) \quad (2.22) \\
 &\quad (0.040) \\
 &\quad + 0.09430 \left(\frac{\text{IFHK\&9/PIHS}_{-1} - \text{IFHK\&9}_{-1}/\text{PIHS}_{-2}}{\text{IFHK\&9}_{-1}/\text{PIHS}_{-2}} \right) \\
 &\quad (1.57)
 \end{aligned}$$

$R^2 = .506$ S.E. = 0.041 D.W. = 2.09
 Sample Period 1959-1972

(I.4) IHS Continued

b. IHS = IRIH9.INA

(I.5) ISER Capital Investment in Government, Trade, Services,
etc. (excl. Housing)

$$\begin{aligned}
 \frac{ISER - ISER_{-1}}{ISER_{-1}} &= 0.21313 - 0.06021 QPL7 - 0.00632 QT50 \\
 &\quad (0.085) \quad (3.30) \quad (3.14) \quad (2.30) \\
 &\quad - 0.10566 GDF + 0.10947 \left(\frac{IIN - IIN_{-1}}{IIN_{-1}} \right) \\
 &\quad (1.19) \quad (0.33)
 \end{aligned}$$

$$\begin{aligned}
 R^2 &= .719 & S.E. &= 0.034 & D.W. &= 1.89 \\
 \text{Sample Period} &= 1959-1972
 \end{aligned}$$

b. ISER = IRIS9.INA

(I.6) INA Capital Investment, Total Non-Agriculturala. Identity Determination

$$INA = IIN + ICRUB + ITRUB + IHS + ISER$$

b. Direct Determination

$$\begin{aligned}
 \frac{INA - INA_{-1}}{INA_{-1}} &= 0.02972 - 0.13948 GDF \\
 &\quad (0.071) \quad (1.54) \quad (3.16) \\
 &\quad + 0.10351 \left(\frac{ZPG\&/PII_{-1} - ZPG\&_{-1}/PII_{-2}}{ZPG\&_{-1}/PII_{-2}} \right) \\
 &\quad (1.1)
 \end{aligned}$$

(I.6) b. Direct Determination, Continued

$$+ 1.67690 \left(\frac{\text{IFAJ\&}/\text{PII}_{-1} + \text{IFTR\&9}/\text{PIT}_{-1} + \text{IFHK\&9}/\text{PIHS}_{-1}}{\text{IFAJ\&}_{-1}/\text{PII}_{-2} + \text{IFTR\&9}_{-1}/\text{PIT}_{-2} + \text{IFHK\&9}_{-1}/\text{PIHS}_{-2}} - 1. \right)$$

(2.15)

$$R^2 = .631 \quad \text{S.E.} = 0.022 \quad \text{D.W.} = 2.24$$

Sample Period 1959-1972

(I.7) IA Capital Investment in Agriculture

$$\frac{\text{IA} - \text{IA}_{-1}}{\text{IA}_{-1}} = 0.07676 + 0.02632 \text{ QPL7} + 0.11862 \frac{\text{.001XATOT} - \text{XATR9}}{\text{XATR9}}$$

(6.17) (1.28) (0.70)

$$(0.098) - 0.59362 \left(\frac{\text{.001XATOT}_{-1} - \text{XATR9}_{-1}}{\text{XATR9}_{-1}} - \left| \frac{\text{.001XATOT}_{-1} - \text{XATR9}_{-1}}{\text{XATR9}_{-1}} \right| \right) / 2.$$

(2.53)

$$R^2 = .530 \quad \text{S.E.} = 0.035 \quad \text{D.W.} = 2.09$$

Sample Period 1959-1972

(I.8) IFAJ\& Adjusted Finance for Industry and Construction

$$\text{IFAJ\&} \equiv \text{IFIN\&9} - 4.9 \text{ QSH68}_{-1}$$

(I.9) ITOTAL Total New Capital Investment in the National Economy

$$\text{ITOTAL} \equiv \text{INA} + \text{IA}$$

(I.10) I7OT Change in Inventories, Domestic Trade

$$\text{I7OT} = 2.88277 - 0.17462 \text{ S7OT}_{-1} + 0.10871 (\text{CR} - \text{CRS} - \text{CRF})^*$$

(4.61) (1.54) (1.32)

$$(2.25) + 0.19459 \{ (\text{CR} - \text{CRS} - \text{CRF})^* - (\text{CR} - \text{CRS} - \text{CRF}) - 0.45295 \}$$

(0.88)

$$+ 0.06300 \left(\frac{\text{XATOT}}{1000} - \text{XATR9} - 0.11439 \right)$$

(1.10)

$$- 0.10766 \left(\frac{\text{XATOT}_{-1}}{1000} - \text{XATR9}_{-1} - 0.51467 \right)$$

(1.74)

$$- 0.25627 \left(\frac{100 \text{ BDNP}\&9}{\text{PIWH70}} - \frac{100 \text{ BDNP}\&9_{-1}}{\text{PIWH70}_{-1}} - 0.50432 \right) \\ (1.42)$$

$$R^2 = .740 \quad \text{S.E.} = 0.589 \quad \text{D.W.} = 1.93 \\ \text{Sample Period 1958-1972}$$

$$\text{Where } ()^* = ()_{-1} (.1 ()_{-1} / ()_{-2} + .4 ()_{-2} / ()_{-3} \\ + .4 ()_{-3} / ()_{-4} + .1 ()_{-4} / ()_{-5})$$

i.e., () projected from (.1, .4, .4, .1) moving
average of previous four growth rates

(I.11) I70NTA Change in Inventories, Non-trade, Non-agricultural

$$\text{I70NTA} = - 4.08647 - 3.50049 \text{ Q55} - 0.50651 \text{ IS70NTA}_{-1} \\ (1.08) \quad (3.18) \quad (1.99) \\ (5.54) \\ + 0.22720 \text{ GNPNA}^* - 0.23743 (\text{GNPNA}^* - \text{GNPNA} - .50769) \\ (2.14) \quad (0.71)$$

$$R^2 = .475 \quad \text{S.E.} = 2.594 \quad \text{D.W.} = 1.92 \\ \text{Sample Period 1955-1972}$$

(I.12) IS70T Stock of Inventories, Domestic Trade

$$\text{IS70T} = \text{IS70T}_{-1} + \text{I70T}$$

(I.13) IS70NTA Stock of Inventories, Non-trade, Non-agricultural

$$\text{IS70NTA} = \text{IS70NTA}_{-1} + \text{I70NTA}$$

K CAPITAL FORMATION(K.1) KITOT Industrial Basic Funds (Capital Stock) (at Jan. 1)

$$KITOT_{+1} \equiv KITOT + KNDI$$

(K.2) KIA Adjusted Industrial Capital Stock (at Jan. 1)

$$KIA_{+1} \equiv KITOT_{+1} - KIT589 - KJH629$$

(K.3) KNDI Industrial Capital Formation

$$KNDI + 0.05 KITOT = 1.78923 QPL7$$

(21.23) (3.19)

$$+ \sum_{i=0}^3 w_i IIN_{-i}$$

(2, none)

	w_i	
0	.01473	(0.04)
1	.66683	(2.28)
2	.57577	(2.05)
3	-.25845	(0.63)
SUM	.99887	

$$R^2 = .984 \quad S.E. = 0.934 \quad D.W. = 1.95$$

Sample Period 1959-1972

(K.4) KCR Construction Basic Funds (Capital Stock) (at Jan. 1)

$$KCR_{+1} \equiv KCR + KNDC$$

(K.5) KNDC Construction Capital Formation

$$\text{KNDC} + 0.06 \text{ KCP} = 0.44919 \text{ QPL5} + 0.88031 \text{ ICRUB}$$

(1.88) (2.80) (16.81)

$$R^2 = .900 \quad \text{S.E.} = 0.306 \quad \text{D.W.} = 1.61$$

Sample Period 1958-1972

(K.6) KTR Transport and Communications Basic Funds (Capital Stock)
(at Jan. 1)

$$\text{KTR}_{+1} = \text{KTR} + \text{KNDT}$$

(K.7) KTA Adjusted Transport and Communications Basic Funds
(at Jan. 1)

$$\text{KTA}_{+1} = \text{KTR}_{+1} + \text{KIT589}$$

(K.8) KNDT Transport and Communications Capital Formation

$$\text{KNDT} + 0.025 \text{ KTR} = 2.41486 \text{ Q65} + 0.62535 (\text{ITRUB} + \text{ITRUB}_{-1})$$

(7.28) (4.74) (53.1)

$$R^2 = .948 \quad \text{S.E.} = 0.495 \quad \text{D.W.} = 1.85$$

Sample Period 1959-1972

(K.9) KST Government, Trade, Services, etc. (excl. Housing)
Basic Funds (Capital Stock) (at Jan. 1)

$$\text{KST}_{+1} = \text{KST} + \text{KNDS}$$

(K.10) KHBF Housing Basic Funds (Capital Stock) (at Jan. 1)

$$\text{KHBF}_{+1} = \text{KHBF} + \text{KNDH}$$

(K.11) KHA Adjusted Housing Basic Funds (at Jan. 1)

$$KHA_{+1} = KHBF_{+1} + \frac{7.84}{1.74} KIH629$$

(K.12) KNDS Government, Trade, Services, etc. (excl. Housing) Capital Formation

$$KNDS + 0.02 KST = 0.39754 (ISER_{-2} + ISER_{-3} + ISER_{-4})$$

(10.55) (17.14)

$$R^2 = .603 \quad S.E. = 2.29 \quad D.W. = 1.72$$

Sample Period 1960-1972

(K.13) KNDH Housing Capital Formation

$$KNDH + 0.02 KHBF = - 0.32494 QPL7 + 7.84119 Q62$$

(10.81) (0.80) (10.45)

$$+ 0.47519 (IHS + IHS_{-1})$$

(40.53)

$$R^2 = .923 \quad S.E. = 0.683 \quad D.W. = 1.79$$

Sample Period 1960-1972

(K.14) KAIR Agricultural Capital Stock (excl. Productive Live-stock) (mid-year)

$$KAIR - 0.95 KAIR_{-1} = 0.55756 QPL7 + 0.67846 \left(\frac{IA + IA_{-1}}{2} \right)$$

(6.45) (2.65) (48.16)

$$R^2 = .976 \quad S.E. = 0.430 \quad D.W. = 1.82$$

Sample Period 1957-1972

(K.15) KTCUS Freight Car Utilization Rate

$$\text{KTCUS} = 157.89569 + 3.18346 \text{ QT50} - 0.16930 (\text{QT50})^2$$

(241.0) (15.63) (6.29) (4.19)

$$- 18.40742 \left(\frac{\text{BDNP\&9/PIWH7C}}{(\text{BDNP\&9/PIWH7C}) - 1} - 1 \right)$$

(3.49)

$$R^2 = .973 \quad \text{S.E.} = 2.59 \quad \text{D.W.} = 2.03$$

Sample Period 1958-1972

A OTHER AGRICULTURAL VARIABLES(A.1) ALVR Livestock (constant price value)

$$\frac{ALVR - ALVR_{-1}}{ALVR_{-1}} = -0.08358 - 0.00738 QT50 + 0.10603 \frac{XACTOAL9_{-1}}{1000 ALVR_{-1}} + 0.52321 \frac{KWAL9_{-1}}{100} + 0.10728 \left(\frac{XATOT_{-1}}{1000 XATR9_{-1}} + \frac{XATOT_{-2}}{1000 XATR9_{-2}} - 2 \right)$$

(0.064) (0.75) (2.48) (0.70) (2.10)

(1.31)

$R^2 = .760$ S.E. = 0.014 D.W. = 2.29
Sample Period 1959-1972

(A.2) AACI Current Purchases Index

$$\frac{AACI - AACI_{-1}}{AACI_{-1}} = 0.09838 - 0.00206 QT50 + 0.13612 \left(\frac{XATOT/1000}{XATR9} - 1 \right) - 0.29641 XAN12$$

(0.074) (5.44) (1.97) (1.82)

(44.30)

$R^2 = 0.725$ S.E. = 0.016 D.W. = 1.61
Sample Period 1959-1972

Where $XAN12 = \frac{1}{2} \left(\frac{XATOT_{-1}/1000}{XATR9_{-1}} + \frac{XATOT_{-2}/1000}{XATR9_{-2}} - 2 \right) - \frac{1}{2} \left\{ \left| \frac{XATOT_{-1}/1000}{XATR9_{-1}} - 1 \right| + \left| \frac{XATOT_{-2}/1000}{XATR9_{-2}} - 1 \right| \right\}$

X PRODUCTION(X.1) XITOT Industrial Output Indexa. Cobb-Douglas Constrained

$$\begin{aligned} \ln \text{XITOT} = & - 3.56029 + 1.08975 \left(0.535 \ln \left(\frac{\text{KIA}_{+1} + \text{KIA}}{2} \right) \right. \\ & (3.94) \quad (44.92) \quad (94.90) \\ & \left. + 0.465 [0.845 \ln (\text{NI-NIET}) + 0.155 \ln \text{NIET}] \right) \end{aligned}$$

$$R^2 = .998 \quad \text{S.E.} = 0.026 \quad \text{D.W.} = 0.29$$

Sample Period 1950-1972

b. C.E.S. Constrained

$$\begin{aligned} \ln \text{XITOT} = & - 0.43702 - 0.02082 \text{QT50} \\ & (3.94) \quad (1.26) \quad (2.09) \\ & - 0.48073 \ln \left\{ 0.535 \frac{(\text{KIA}_{+1} + \text{KIA})^{-2.0}}{2} \right. \\ & (9.93) \\ & \left. + 0.465 [(\text{NI-NIET})^{0.845} \text{NIET}^{0.155}]^{-2.0} \right\} \end{aligned}$$

$$R^2 = .999 \quad \text{S.E.} = 0.021 \quad \text{D.W.} = 0.46$$

Sample Period 1950-1972

(X.2) XCRUB Construction Activity

$$\begin{aligned} \ln \text{XCRUB} = & - 7.38464 + 1.16892 \ln \text{NC} \\ & (3.443) \quad (4.14) \quad (5.32) \\ & + 0.18027 \ln \left(\frac{\text{KCR}_{+1} + \text{KCR}}{2} \right) \\ & (2.39) \end{aligned}$$

$$R^2 = .997 \quad \text{S.E.} = 0.019 \quad \text{D.W.} = 1.46$$

Sample Period 1958-1972

(X.3) XT7R Transport and Communications Index

$$\ln XT7R = - 3.22571 + 0.68888 \ln \left(\frac{KTA_{+1} + KTA}{2} \right) \\ (4.13) \quad (5.78) \quad (10.50) \\ + 0.21616 \ln \frac{(NTSP + NTSP_{-1})}{2} + 0.58947 \ln KTCUS \\ (3.16) \quad (4.49)$$

$$R^2 = .999 \quad S.E. = 0.011 \quad D.W. = 1.10 \\ \text{Sample Period 1956-1972}$$

(X.4) XGNPGEP Government, Trade, Services, etc. Production Index

$$\ln XGNPGEP = - 3.33267 + 0.83317 (0.8241 \ln NG \\ (4.41) \quad (14.00) \quad (32.51) \\ + 0.1759 \ln \frac{(KST_{+1} + KHA_{+1} + KST + KHA)}{2})$$

$$R^2 = .989 \quad S.E. = 0.020 \quad D.W. = 0.97$$

(X.5) XATOT Agricultural Output

$$\ln \frac{XATOT}{1000} = \ln XATPK + LPRES$$

Where $\ln XATPK$ is capacity output (linked peak) in agriculture obtained from:

$$\ln XATPK = 0.54275 + 0.40856 \ln KAIR + 0.53310 \ln (.001NTA) \\ (4.09) \quad (0.33) \quad (11.04) \quad (1.27)$$

$$R^2 = .965 \quad S.E. = 0.028 \quad D.W. = 0.65 \\ \text{Sample Period 1959-1972}$$

Actual LPRES is defined as

$$\ln \frac{XATOT}{1000} - (\text{fitted}) \ln XATPK \text{ and obtained from:}$$

(X.5) XATOT Continued

$$\text{LPRES} = -0.03348 + 0.00106 \text{ JPS9} + 0.00464 \text{ JTW9}$$

(-0.034) (4.92) (4.70) (3.13)

$$+ 2.82309 \left(\frac{0.0557 \text{ AACI}}{\text{KAIR}} - 0.10532 \right)$$

(1.68)

$$+ 1.10760 \left(\frac{.001 \text{ NTA}}{\text{SAI9}} - .39076 \right)$$

(2.13)

$$R^2 = .866 \quad \text{S.E.} = 0.026 \quad \text{D.W.} = 2.63$$

Sample Period 1959-1972

W WAGES(W.1) WI& Industrial Average Wage

$$\begin{aligned}
 DVWI - DVWIL &= 0.25780 \text{ (DHWI - DVWIL)} - 0.40993 \\
 &\quad (3.06) \qquad\qquad\qquad (5.22) \\
 &(-0.078) \\
 &\quad + 1.53100 (1.06807)Q68 + 1.26517 Q61 \\
 &\quad\quad\quad (7.06) \qquad\qquad\quad (4.79)
 \end{aligned}$$

$$\begin{aligned}
 R^2 &= 0.882 \qquad S.E. = 0.252 \qquad D.W. = 1.44 \\
 \text{Sample Period } &1959-1972
 \end{aligned}$$

$$\text{Where } DVWI = \frac{100WI\&/ (0.01PRC_{-1})}{1766.28XITOT/(NI/10^3)} \quad \left(\frac{\text{real wage}}{\text{average product}} \right)$$

$$DVWIL = \frac{100WI\&_{-1}/ (0.01PRC_{-1})}{1766.28XITOT_{-1}/(NI_{-1}/10^3)}$$

$$DHWI = 30.71635 - 0.57927 QLT28 \text{ (trend value of DVWI)}$$

(W.2) WASC& State and Collective Farm Average Wage

$$\begin{aligned}
 DVWA - DVWA_{-1} &= 0.80684 \text{ DHWA} - 0.76936 \text{ DVWA}_{-1} - 1.20073 \\
 &\quad (2.64) \qquad\qquad\quad (2.60) \qquad\qquad\quad (0.35) \\
 &(2.44)
 \end{aligned}$$

$$\begin{aligned}
 R^2 &= .388 \qquad S.E. = 2.67 \qquad D.W. = 1.66 \\
 \text{Sample Period } &1959-1972
 \end{aligned}$$

$$\text{where } DVWA = \frac{100 WASC\&/ (0.01 PRC_{-1})}{XATOT/(NTA/10^3)} \quad \left(\frac{\text{real wage}}{\text{average product}} \right)$$

$$\begin{aligned}
 DHWA &= - 288.72900 + 91.07028 QLT28 \\
 &\quad \text{(trend value of DVWA)}
 \end{aligned}$$

(W.3) WC& Construction Average Wage

$$\frac{WC\&}{WI\&} = 0.36080 \text{ QLT28} - 0.24725$$

(13.48) (2.54)

(1.063)

$$R^2 = .933 \quad S.E. = 0.012 \quad D.W. = 1.81$$

Sample Period 1958-1972

(W.4) WT& Transport and Communications Average Wage

$$\frac{WT\&}{WI\&} = 0.85189 \left(\frac{WT\&}{WI\&} \right)_{-1} + 0.15026$$

(7.72) (1.41)

(0.975)

$$R^2 = .833 \quad S.E. = 0.012 \quad D.W. = 1.34$$

Sample Period 1959-1972 D. = 1.36

(W.5) WG& Government, Trade, Services, etc., Average Wage

$$\frac{WG\&}{WI\&} = 0.86122 \left(\frac{WG\&}{WI\&} \right)_{-1} + 0.08483 \text{ Q65} + 0.10195$$

(11.26) (8.43) (1.70)

(0.781)

$$R^2 = .939 \quad S.E. = 0.010 \quad D.W. = 1.99$$

Sample Period 1959-1972 D. = 0.02

Z INCOMES
(Z.1) ZWU& Urban Workers Gross Earnings

$$\text{ZWU\&} = 1.02919 \text{ ZWH\&} - 8.00359 \text{ QLT28} + 27.22865$$

$$(91.48) (169.42) \quad (4.90) \quad (5.01)$$

$$R^2 = 1.000 \quad \text{S.E.} = 0.092 \quad \text{D.W.} = 1.96$$

Sample Period 1960-1972

$$\text{WHERE ZWH\&} = \text{NI.WI\&} + \text{NC.WC\&} + \text{NT.WT\&} + \text{NG.WG\&}$$

(Z.2) ZPWSC& State and Collective Farm Wage Payments

$$\text{ZPWSC\&} = \text{NASC.WASC}/10.^6$$

(Z.3) ZPWS& Income from Sale of Farm Products

$$\ln \text{ZPWS\&} = 0.88832 \ln \text{PAFC70} + 0.55867 \ln \frac{\text{XATOT}}{1000} - 4.17838$$

$$(1.953) \quad (2.32) \quad (1.79) \quad (4.78)$$

$$R^2 = .803 \quad \text{S.E.} = 0.114 \quad \text{D.W.} = 1.31$$

Sample Period 1955-1972

(Z.4) ZP& Total Money Income

$$\text{ZP\&} = \text{ZWU\&} + \text{ZPWSC\&} + \text{ZPWS\&} + \text{ZPW\&}_9 + \text{ZPPC\&}_9 + \text{ZPWM\&}_9 + \text{BPS\&}$$

(Z.5) ZPAK& Agricultural Income in Kind

$$\ln \text{ZPAK\&} = 0.73023 (\ln \text{PAFC70} + \ln \frac{\text{XATOT}}{1000}) - 0.00671 \text{ QT50}$$

$$(2.397) \quad (1.89) \quad (0.33)$$

$$- 3.40076$$

$$(1.31)$$

$$R^2 = .626 \quad \text{S.E.} = 0.093 \quad \text{D.W.} = 1.25$$

Sample Period 1956-1966

(Z.6) ZD Real Disposable Income

$$ZD = (ZP\& + ZPAK\& - TP\&)/PRC$$

(Z.7) ZPG& Gross Profits

$$\begin{array}{rccccccc} ZPG\&/ZPG\&_{-1} & = & 1.10300 & + & 0.11796 & Q6768 & + & 0.61951 & (\frac{.001 \text{ XATOT}}{\text{XATR9}} - 1) \\ & & (73.46) & & (2.92) & & & & & (2.48) & \\ (1.119) & & & & & & & & & & \end{array}$$

$$R^2 = .628 \quad S.E. = 0.052$$

Sample Period 1959-1972

$$D.W. = 2.64$$

P PRICES(P.1) PNF70 State Retail Price, Non-food Goods

$$\frac{PNF70}{1+RTTD9} - \left(\frac{PNF70}{1+RTTD9} \right)_{-1} = 0.75891 + 2.39128 Q67 \\ (0.354) \quad (1.72) \quad (2.24) \\ + 0.15939 (PWIQN - \left(\frac{PNF70}{1+RTTD9} \right)_{-1}) \\ (1.57)$$

$$R^2 = .353 \quad S.E. = 1.02 \quad D.W. = 2.16 \\ \text{Sample Period 1958-1972}$$

WHERE $PWIQN = WIQN/K$ (normally marked-up industrial wage)

$$WIQN = \frac{100 WI\&}{1766.28 XITOT / (.001 NI)}$$

$$K = 30.71635 - 0.57927 QLT28$$

(P.2) PIRF70 State Retail Price, Food Goods

$$\frac{PIRF70}{1+RTTD9} - \left(\frac{PIRF70}{1+RTTD9} \right)_{-1} = 1.57128 + 1.80819 Q67 \\ (1.326) \quad (5.03) \quad (1.57) \\ + 0.15688 (.85 PWIQN + .15 PAFC70_{-1}) \\ (2.63) \\ - \left(\frac{PIRF70}{1+RTTD9} \right)_{-1}$$

$$R^2 = .395 \quad S.E. = 1.08 \quad D.W. = 2.59 \\ \text{Sample Period 1958-1972}$$

(P.3) PAFC70 Price of Food Sold to Co-ops at Negotiated Prices

$$\ln PAFC70 - \ln PAFC70_{-1} = 0.29615 + 0.53322 \ln CFD \\ (0.026) \quad (0.83) \quad (1.96) \\ - 0.66879 \ln \left(\frac{.2 XATOT + .8 XATOT_{-1}}{1000} \right) \\ (1.93)$$

$$R^2 = .215 \quad S.E. = 0.056 \quad D.W. = 1.90 \\ \text{Sample Period 1956-1972}$$

(P.3) PAFC70 Continued

$$\text{WHERE } \text{CFD} = 1(-0.37166 \left(\frac{Z}{Z_{-1}}\right) + 0.29492 \text{ XATR9} + 0.19534 \text{ XATR9}_{-1} \\ - 0.93662 \text{ PRFH} + 1.79493) \text{ (desired food consumption)}$$

$$\text{PRFH} = \exp(-0.24647 + 0.01212 \text{ QT50})$$

(Trend relative food price)

(P.4) PFCC Consumption Price, Food

$$\text{PFCC} = .875 \text{ PIRF70} + .125 \text{ PAFC70}$$

(P.5) PRC Consumption Price, Total

$$\text{PRC} = .60 \text{ PFCC} + .40 \text{ PNF70}$$

(P.6) PIWL70 Wholesale Price, Light Industry

$$\begin{aligned} \text{PIWL70} - \text{PIWL70}_{-1} &= 0.19492 - 1.50740 \text{ Q67} \\ &\quad (-0.056) \quad (0.94) \quad (1.95) \\ &\quad + 0.11793 (\text{PWIQN} - \text{PIWL70}_{-1}) \\ &\quad (2.10) \end{aligned}$$

$$R^2 = .442 \quad \text{S.E.} = 0.739 \quad \text{D.W.} = 2.11$$

Sample Period 1958-1972

(P.7) PIWH70 Wholesale Price, Heavy Industry

$$\begin{aligned} \text{PIWH70} - \text{PIWH70}_{-1} &= -0.92370 + 13.69345 \text{ Q67} \\ &\quad (0.505) \quad (1.08) \quad (7.49) \\ &\quad + 0.08150 (\text{PWIQN} - \text{PIWH70}_{-1}) \\ &\quad (0.68) \end{aligned}$$

$$R^2 = .846 \quad \text{S.E.} = 1.682 \quad \text{D.W.} = 2.53$$

Sample Period 1958-1972

(P.8) PII Investment Deflator, Industry

$$\begin{aligned} \text{PII} &= 0.81500 \text{ PXCON9} + 0.20588 \text{ PIWH70} \\ (87.9) \quad (13.42) \quad &\quad (3.73) \end{aligned}$$

$$R^2 = .934 \quad \text{S.E.} = 1.62 \quad \text{D.W.} = 0.36$$

Sample Period 1957-1972

(P.9) PIC Investment Deflator, Construction

$$\begin{aligned} \text{PIC} &= 0.32125 \text{ PXCON9} + 0.68619 \text{ PIWH70} \\ (91.1) \quad (2.40) \quad &\quad (5.64) \end{aligned}$$

$$R^2 = .727 \quad \text{S.E.} = 3.56 \quad \text{D.W.} = 2.13$$

Sample Period 1957-1972

(P.10) PIT Investment Deflator, Transport and Communications

$$\text{PIT} = 0.67878 \text{ PXCON9} + 0.32086 \text{ PIWH70}$$

(87.0) (4.10) (2.13)

$$R^2 = .699 \quad \text{S.E.} = 4.40 \quad \text{D.W.} = 0.34$$

Sample Period 1957-1972

(P.11) PIS Investment Deflator, Government, Trade, Services, etc. (excl. Housing)

$$\text{PIS} = 0.78015 \text{ PXCON9} + 0.24469 \text{ PIWH70}$$

(88.6) (11.04) (3.81)

$$R^2 = .899 \quad \text{S.E.} = 1.88 \quad \text{D.W.} = 0.36$$

Sample Period 1957-1972

(P.12) PIHS Investment Deflator, Housing

$$\text{PIHS} = 0.82329 \text{ PXCON9} + 0.19220 \text{ PIWH70}$$

(87.3) (19.76) (5.08)

$$R^2 = .971 \quad \text{S.E.} = 1.11 \quad \text{D.W.} = 0.53$$

Sample Period 1957-1972

(P.13) PIA Investment Deflator, Agriculture

$$\text{PIA} = 0.34481 \text{ PXCON9} + 0.06897 \text{ PIWH70} + 58.03934$$

(93.5) (22.12) (3.00) (30.86)

$$R^2 = .983 \quad \text{S.E.} = 0.410 \quad \text{D.W.} = 1.16$$

Sample Period 1957-1972

C CONSUMPTION(C.1) CR Totala. Direct Determination

$$\begin{aligned}
 \frac{CR}{ZD} = & 0.45644 - 1.85219 \frac{QT50}{100} + 4.11458 \left(\frac{QT50}{100} \right)^2 \\
 & (1.246) \quad (0.97) \quad (1.33) \quad (1.51) \\
 & + 0.21715 \frac{XATOT}{1000 ZD} + 0.42949 \frac{XATOT_{-1}}{1000 ZD} \\
 & (0.72) \quad (1.80) \\
 & + 0.50341 \frac{1.76628 XITOT + .60907 XGNPGEP}{ZD} \\
 & (3.61)
 \end{aligned}$$

$$\begin{aligned}
 R^2 = .980 \quad S.E. = 0.0176 \quad D.W. = 1.84 \\
 \text{Sample Period 1956-1972}
 \end{aligned}$$

b. Identity Determination

$$CR = CRF + CRND + CRD + CRS$$

c. Supply Determination

$$\begin{aligned}
 \ln CR = & -0.69350 + 1.24319 \ln CST - 1.31318 \ln \frac{PFCC}{PNF70} \\
 & (5.03) \quad (2.10) \quad (18.10) \quad (4.28) \\
 & - 0.32724 \ln \left(\frac{XATOT}{1000 XATR9} \right) + 0.10335 \ln \left(\frac{XATOT}{1000 XATR9} \right)_{-1} \\
 & (5.42) \quad (2.04)
 \end{aligned}$$

$$\begin{aligned}
 R^2 = .999 \quad S.E. = 0.011 \quad D.W. = 1.41 \\
 \text{Sample Period 1956-1972}
 \end{aligned}$$

Where $CST = CSF + CSN + CSD + CSS$ (see C.2.c-C.5.c, below)

(C.2) CRF Fooda. Share of Total

$$\begin{aligned}
 \frac{CRF}{ZD} = & -0.15501 \frac{PFCC}{PNF70} - 0.01328 \frac{1.76628 XITOT}{ZD} \\
 & (1.80) \quad (0.36) \\
 & (0.511) \\
 & - 0.06181 \frac{100 BDNP49}{(PIWH70)(ZD)} + 0.51745 \left(\frac{CRF}{CR}\right)_{-1} \\
 & (0.53) \quad (3.90) \\
 & + 0.84089 \left(\frac{CRND}{CR}\right)_{-1} - 1.09810 \left(\frac{CRD}{CR}\right)_{-1} + 1.32616 \left(\frac{CRS}{CR}\right)_{-1} \\
 & (3.90) \quad (2.13) \quad (5.21)
 \end{aligned}$$

$$\begin{aligned}
 R^2 &= .986 & S.E. &= 0.0035 & D.W. &= 2.11 \\
 \text{Sample Period } &1957-1972 & D. &= 0.26
 \end{aligned}$$

b. Direct Determination

$$\begin{aligned}
 \frac{CRF}{ZD} = & 1.56124 - 0.81390 \frac{PFCC}{PNF70} - 0.32954 \frac{ZD}{ZD_{-1}} \\
 & (2.91) \quad (2.18) \quad (2.09) \\
 & (0.642) \\
 & + 0.27529 \frac{XATOT}{1000ZD} + 0.15763 \frac{XATOT_{-1}}{1000 ZD} \\
 & (1.67) \quad (0.82)
 \end{aligned}$$

$$\begin{aligned}
 R^2 &= .978 & S.E. &= 0.0143 & D.W. &= 1.75 \\
 \text{Sample Period } &1956-1972
 \end{aligned}$$

c. Supply Determination

$$\begin{aligned}
 \ln CRF = & -0.22320 + 1.13792 \ln CSF - 1.28952 \ln \frac{PFCC}{PNF70} \\
 & (0.49) \quad (10.59) \quad (2.87) \\
 & (4.36) \\
 & - 0.38005 \ln \left(\frac{XATOT}{1000XATR9}\right) + 0.13040 \ln \left(\frac{XATOT}{1000XATR9}\right)_{-1} \\
 & (3.84) \quad (1.73)
 \end{aligned}$$

$$\begin{aligned}
 R^2 &= .996 & S.E. &= 0.016 & D.W. &= 1.92 \\
 \text{Sample Period } &1956-1972
 \end{aligned}$$

(C.2) c. Supply Determination, Continued

WHERE

$$\begin{bmatrix} \text{CSF} \\ \text{CSN} \\ \text{CSD} \\ \text{CSS} \\ \text{ITS} \end{bmatrix} = \begin{bmatrix} .28379 & .48151 & .19344 & .29892 & .0 \\ .18789 & .10655 & .12931 & .26301 & .0 \\ .05081 & .02902 & .05862 & .23474 & .0 \\ .05532 & .04155 & .05563 & .01715 & .0 \\ .42219 & .34317 & .56300 & .18618 & 1.0 \end{bmatrix} \begin{bmatrix} 87.770\text{XITOT}/77.0 \\ 55.654\text{XATOT}/61671.0 \\ 15.524\text{XT7R}/75.099 \\ 13.973\text{XGNPGEF}/83.061 \\ 21.101\text{XCRUB}/33.0 \end{bmatrix}$$

are synthetic measures of supply based on 1966 Input-Output and delivery matrices:

CSF = consumption, food
 CSN = consumption, soft goods
 CSD = consumption, durables
 CSS = consumption, services
 ITS = all other end uses

(C.3) CRND Soft Goodsa. Share of Total

$$\begin{aligned}
 \frac{\text{CRND}}{\text{CR}} &= 0.03940 \frac{\text{PFCC}}{\text{PNF70}} - 0.03086 \frac{1.76628\text{XITOT}}{\text{ZD}} \\
 &\quad (0.90) \quad (1.62) \\
 &\quad (0.222) \\
 &\quad - 0.11033 \frac{100\text{DNP49}}{(\text{PIWH70})(\text{ZD})} + 0.27856 \left(\frac{\text{CRF}}{\text{CR}}\right)_{-1} \\
 &\quad (1.85) \quad (4.13) \\
 &\quad + 0.58998 \left(\frac{\text{CRND}}{\text{CR}}\right)_{-1} + 0.6990 \left(\frac{\text{CRD}}{\text{CR}}\right)_{-1} \\
 &\quad (5.37) \quad (2.67) \\
 &\quad - 0.42023 \left(\frac{\text{CRS}}{\text{CR}}\right)_{-1} \\
 &\quad (3.24)
 \end{aligned}$$

$R^2 = .949$ S.E. = 0.0018
 Sample Period 1957-1972

D.W. = 2.30
 D. = 0.67

(C.3) b. Direct Determination

$$\begin{aligned}
 \frac{CRND}{ZD} = & 0.86313 - 0.48561 \frac{PFCC}{PNF70} - 0.21556 \frac{ZD}{ZD}_{-1} \\
 & (3.57) \quad (2.40) \quad (3.06) \\
 (0.276) & \\
 & + 0.06009 \frac{XATOT}{1000ZD} + 0.05221 \frac{XATOT_{-1}}{1000 ZD} \\
 & (0.60) \quad (0.57) \\
 & + 0.29550 \frac{QT50}{100} + 0.18024 \left(\frac{QT50}{100} \right)^2 \\
 & (0.54) \quad (0.18)
 \end{aligned}$$

$$\begin{aligned}
 R^2 &= .939 & S.E. &= 0.0062 & D.W. &= 1.19 \\
 \text{Sample Period} &1956-1972
 \end{aligned}$$

c. Supply Determination

$$\begin{aligned}
 \ln CRND = & - 2.08094 + 1.66978 \ln CSN - 2.14558 \ln \frac{PFCC}{PNF70} \\
 & (3.58) \quad (10.15) \quad (3.21) \\
 (3.52) & \\
 & - 1.48064 \ln \left(\frac{PFCC}{PNF70} \right)_{-1} - 0.31050 \ln \left(\frac{XATOT}{1000XATR9} \right) \\
 & (2.59) \quad (2.61) \\
 & + 0.18535 \ln \left(\frac{XATOT}{1000XATR9} \right)_{-1} \\
 & (1.71)
 \end{aligned}$$

$$\begin{aligned}
 R^2 &= .996 & S.E. &= 0.022 & D.W. &= 1.05 \\
 \text{Sample Period} &1956-1972
 \end{aligned}$$

(C.4) CRD Durable Goodsa. Share of Total

$$\begin{aligned}
 \frac{CRD}{CR} = & 0.02484 \frac{PFCC}{PNF70} + 0.02323 \frac{1.76628 XITOT}{ZD} \\
 & (1.27) \quad (2.75) \\
 (0.055) & \\
 & - 0.02875 \frac{100BDNP\&9}{(PIWH70)(ZD)} + 0.05453 \left(\frac{CRF}{CR} \right)_{-1} \\
 & (1.09) \quad (1.82)
 \end{aligned}$$

(C.4) a. Share of Total, Continued

$$- 0.16623 \left(\frac{CRND}{CR} \right)_{-1} + 1.04621 \left(\frac{CRD}{CR} \right)_{-1}$$

(3.41) (8.98)

$$- 0.16574 \left(\frac{CRS}{CR} \right)_{-1}$$

(2.88)

$$R^2 = .998 \quad S.E. = 0.0008$$

Sample Period 1957-1972

$$D.W. = 2.37$$

$$D. = 0.84$$

b. Direct Determination

$$\frac{CRD}{ZD} = - 0.02884 + 0.04322 \frac{1.76628 \text{ XITOT}}{ZD}$$

(3.53) (3.69)

$$(0.067) - 0.10504 \frac{100BDNP\&/PJ\&H70}{ZD} + 0.64085 \frac{QT50}{100}$$

(2.87) (9.87)

$$- 1.42135 \left(\frac{QT50}{100} \right)^2$$

(6.92)

$$R^2 = .993 \quad S.E. = 0.0010$$

Sample Period 1957-1972

$$D.W. = 1.53$$

c. Supply Determination

$$\ln CRD = - 3.23206 + 2.62125 \ln CSD - 0.17132 \frac{QT50^2}{100}$$

(4.59) (7.81) (4.14)

$$(2.07) + 0.79544 \ln \left(\frac{PFCC}{PIF70} \right)_1$$

(0.99)

$$R^2 = .996 \quad S.E. = 0.034$$

Sample Period 1957-1972

$$D.W. = 1.59$$

(C.5) CRS Servicesa. Share of Total

$$\begin{aligned}
 \frac{CRS}{CR} = & 0.09078 \frac{PFCC}{PNF70} + 0.02092 \frac{1.76628XITOT}{ZD} \\
 & (1.68) \quad (0.89) \\
 & (0.212) \\
 & + 0.20088 \frac{100BDNP49}{(FTWH70)(ZD)} + 0.14946 \left(\frac{CRF}{CR}\right)_{-1} \\
 & (2.73) \quad (1.79) \\
 & - 0.26463 \left(\frac{CRND}{CR}\right)_{-1} + 0.35198 \left(\frac{CRD}{CR}\right)_{-1} \\
 & (1.95) \quad (1.09) \\
 & + 0.25978 \left(\frac{CRS}{CR}\right)_{-1} \\
 & (1.62)
 \end{aligned}$$

$$\begin{aligned}
 R^2 = .961 \quad S.E. = 0.0022 \quad D.W. = 1.97 \\
 \text{Sample Period 1957-1972} \quad D. = 0.08
 \end{aligned}$$

b. Direct Determination

$$\begin{aligned}
 \frac{CRS}{ZD} = & 0.01632 + 0.45799 \frac{.60907 XGNPGE}{ZD} + 0.79519 \frac{QT50}{100} \\
 & (0.263)(0.49) \quad (7.76) \quad (6.23) \\
 & - 1.98105 \left(\frac{QT50}{100}\right)^2 \\
 & (5.88)
 \end{aligned}$$

$$\begin{aligned}
 R^2 = .965 \quad S.E. = 0.0029 \quad D.W. = 1.80 \\
 \text{Sample Period 1956-1972}
 \end{aligned}$$

c. Supply Determination

$$\begin{aligned}
 \ln CRS = & 1.63064 + 0.94947 \ln CSS + 0.15428 \ln \frac{PFCC}{PNF70} \\
 & (12.51) \quad (17.55) \quad (0.60) \\
 & (3.47) \\
 & - 0.19929 \ln \left(\frac{XATOT}{10^{10}XATR9}\right) - 0.01594 \ln \left(\frac{XATOT}{1000XATR9}\right)_{-1} \\
 & (4.34) \quad (0.35) \\
 & + 0.02462 \ln \frac{IT_{t-1}}{CST+ITS} \\
 & (2.32)
 \end{aligned}$$

$$\begin{aligned}
 R^2 = .999 \quad S.E. = 0.009 \quad D.W. = 1.86 \\
 \text{Sample Period 1956-1972}
 \end{aligned}$$

$$\text{ITA} = \text{ITOTAL} + \text{BNAUK}_t / (.2\text{WG}_t / 1246.8 + .8 \text{PIWH70} / 100.) \\ + 100 \text{BDNP}_t / \text{PIWH70}$$

(investment plus science and defence non-personnel)

T BUDGET REVENUES

DDF, DPRC and ZW& are defined below (T.7).

(T.1) TDP& Deductions from Profit

$$\frac{TDP\&}{ZPG\&} = 1.02798 \text{ RTDP9} + 1.60217 \text{ DDF} - 0.10076 \text{ Q67}_{-1}$$

(69.84) (2.49) (2.46)

(0.732)

$$R^2 = 0.780 \quad S.E. = 0.039 \quad D.W. = 1.30$$

Sample Period 1958-1972

(T.2) TT& Turnover Tax

$$\frac{TT\&}{ZW\&} = 0.83810 - 0.04101 \text{ QT50} + 0.00078689 \text{ (QT50)}^2$$

(15.52) (5.38) (3.09)

(0.400)

$$+ 1.00843 \text{ DPRC}_{-1} - 0.73170 \text{ DDF}$$

(2.92) (1.85)

$$R^2 = 0.973 \quad S.E. = 0.013 \quad D.W. = 1.28$$

Sample Period 1958-1972

(T.3) TOSS& Other Revenues from Social Sector

$$\frac{TOSS\&}{ZPG\&} = 0.47410 + 0.34287 \text{ Q5861} + 0.19473 \text{ Q6265}$$

(35.99) (15.69) (8.91)

(0.618)

$$R^2 = 0.956 \quad S.E. = 0.035 \quad D.W. = 2.06$$

Sample Period 1958-1972

(T.4) TSD& Social Insurance Deductions

$$\frac{TSD\&}{ZW\&} = 0.05724 + 0.00241 \text{ Q59}$$

(313.92) (3.42)

(0.057)

$$R^2 = 0.475 \quad S.E. = 0.001 \quad D.W. = 1.28$$

Sample Period 1958-1972

(T.5) TPOP& Taxes on the Population

$$\frac{\text{TPOP}\&}{\text{ZW}\&} = 0.09193 + 0.02019 \text{ Q5859} - 0.01174 \text{ Q6467}$$

(85.03) (7.96) (6.02)

(0.092)

$$R^2 = 0.915 \quad \text{S.E.} = 0.003 \quad \text{D.W.} = 1.52$$

Sample Period 1958-1972

(T.6) TP& Personal Taxes (for Disposable Income)

$$\text{TP}\& = \text{TPOP}\& + \text{TPA}\&9$$

(T.7) TR& Total Revenues, State Budget

$$\text{TR}\& = \text{TDP}\& + \text{TT}\& + \text{TOSS}\& + \text{TPOP}\&$$

Where:

$$\text{DDF} = \frac{\text{BD}\&9}{\text{BGN}\&} - 0.132 \quad \text{Defense Share, Deviation from Mean}$$

$$\text{DPRC} = \frac{\text{PRC}}{\text{PRC}_{-1}} - 1. \quad \text{Consumption Price Deflator, Rate of Change}$$

$$\text{ZW}\& = \text{ZWU}\& + \text{ZPWSC}\& + \text{ZPWC}\&9 \quad \text{Total Money Wage Income}$$

B BUDGET OUTLAYS

DDF is defined in (T.7) above. DWG is defined below in (B.7).

(B.1) BF& Financing of the National Economy

$$\frac{BF&}{BF&_{-1}} = 1.07077 - 0.11476 Q61 + 0.06917 Q6768 + 0.12474 Q70$$

(98.06) (3.17) (2.59) (3.44)

(1.081)

$$R^2 = 0.755 \quad S.E. = 0.035 \quad D.W. = 2.88$$

Sample Period 1959-1972

(B.2) BSC& Social and Cultural Measures (includes Science)

$$\frac{BSC&}{BSC&_{-1}} = 1.08046 + 0.56558 DWG + 0.00751 Q68$$

(350.84) (6.06) (0.62)

(1.081)

$$R^2 = 0.802 \quad S.E. = 0.011 \quad D.W. = 1.39$$

Sample Period 1959-1972

(B.3) BNAUK& Science

$$\frac{BNAUK&}{BNAUK&_{-1}} = 1.24905 - 0.00841 QT50$$

(58.14) (6.65)

(1.110)

$$R^2 = 0.786 \quad S.E. = 0.019 \quad D.W. = 2.50$$

Sample Period 1959-1972

(B.4) BAD& Administration

$$\frac{BAD&}{BAD&_{-1}} = 1.02926 + 1.33383 DWG - 0.78772 DDF + 0.01831 Q6768$$

(88.09) (4.09) (1.16) (0.58)

(1.031)

$$R^2 = 0.672 \quad S.E. = 0.040 \quad D.W. = 2.28$$

Sample Period 1959-1972

(B.5) BRES& Expenditure Residual

$$\frac{BRES\&}{BGN\&} = 0.08431 - 0.002623 QT50 - 0.01670 Q63 - 0.01086 Q6768$$

(12.97) (6.62) (3.48) (3.65)

(0.039)

$$+ 0.00622 DWG - 0.18515 DDF$$

(1.49) (1.65)

$$R^2 = 0.934 \quad S.E. = 0.004 \quad D.W. = 2.80$$

Sample Period 1958-1972

(B.6) BGN& Total Expenditures

$$BGN\& = BF\& + BSC\& + BAD\& + BRES\& + BD\&9$$

(B.7) BPS& Transfer Payments (for Disposable Income)

$$\frac{BPS\&}{BSC\&-BNAUK\&} = 0.49375 + 0.01005 Q5861 - 0.02438 Q6368$$

(0.487) (129.34) (1.75) (4.72)

$$R^2 = 0.787 \quad S.E. = 0.009 \quad D.W. = 2.32$$

Sample Period 1958-1972

$$DWG = \frac{WG\&}{WG\&_{-1}} - 1.03536 \quad \text{Government Wage, Deviation of Rate of Change from Mean}$$

(E.1) EEF\$ To CMEA, Food

$R^2 = .904$ S.E. = 0.065 D.W. = 2.03
Sample Period 1961-1971 D. = 0.06

(E.2) EFOS To CMEA, Other

$$\ln \text{ EEO\$} = 1.18216 + 0.50021 \ln \text{ YCMEA9} + 0.61935 \ln \text{ MET\$}$$

(8.41)
(2.20)
(2.42)
(4.06)

- 0.06886 ln EEF\$
(1.24)

$R^2 = .991$ S.E. = 0.030 D.W. = 2.18
Sample Period 1961-1971

(E.3) EOT\$ To Other CPE's, Total

$$\ln \text{EOT} = -2.24923 + 0.38445 \ln \text{EOT\$}_{-1} + 0.39018 \ln \text{WTX9}$$

(7.09)
(0.29)
(2.85)
(2.79)

$$\begin{array}{cc} + 1.85216 \ln \text{PWT9}_{-1} & - 0.86051 \ln \text{PTX9}_{-1} \\ (1.54) & (1.21) \end{array}$$

$R^2 = .980$ S.E. = 0.046 D.W. = 2.12
Sample Period 1961=1971 D. = 0.22

(E.4) EIT\$ To Developed West, Total

$$\ln \text{EIT\$} = 1.46842 + 1.14170 \ln \text{WTX9}$$

(7.41) (5.73) (23.06)

$$+ 0.44890 \ln \left(\frac{\text{XATOT}_{-1}}{1000} - \ln \text{XATR9}_{-1} \right)$$

(1.98)

$$+ 0.07184 \{ \ln(\text{MIT\$} - \text{MIW\$}) - \ln(\text{MIT\$} - \text{MIW\$})_{-1} \}$$

(0.50)

$$R^2 = .990 \quad \text{S.E.} = 0.040 \quad \text{D.W.} = 1.63$$

Sample Period 1960-1971

(E.5) ELUT\$ To LDC's, Total

$$\ln \text{ELUT\$} = 0.47876 + 1.28155 \ln \text{WTX9}$$

(7.14) (0.64) (8.99)

$$+ 0.33328 \left(\ln \frac{\text{XATOT}_{-1}}{1000} - \ln \text{XATR9}_{-1} \right)$$

(0.57)

$$R^2 = .921 \quad \text{S.E.} = 0.116 \quad \text{D.W.} = 2.12$$

Sample Period 1960-1971

(E.6) EWT\$ To World, Total

$$\text{EWT\$} = \text{EEF\$} + \text{EEO\$} + \text{EOT\$} + \text{EIT\$} + \text{ELUT\$}$$

(E.7) EWT70 To World, Total (at domestic constant prices)

$$\text{EWT70} = 1.3 \frac{100 \text{ EWT\$}}{(\text{PREX9})(\text{PTX9})}$$

M IMPORTS(M.1) METS From CMEA, Total

$$\ln \text{METS} = 2.14589 + 0.65611 \ln \text{XITOT} + 0.4159 \ln \text{METS}_{-1}$$

(8.49) (2.30) (1.94) (1.51)

$$R^2 = .971 \quad \text{S.E.} = 0.050 \quad \text{D.W.} = 1.61$$

Sample Period 1961-1971 D. = 1.63

(M.2) MOTS From Other CPE's, Total

$$\ln \text{MOTS} = 4.91866 + 0.29205 \ln \text{MOTS}_{-1} - 0.00750 \text{QT50}$$

(6.78) (1.91) (0.84) (0.43)

$$R^2 = .231 \quad \text{S.E.} = 0.39 \quad \text{D.W.} = 2.05$$

Sample Period 1961-1971 D. = 0.14

(M.3) MIW\$ From Developed West, Wheat and Wheat Flour

$$\ln \text{MIW\$} = -13.34513 + 4.10408 \ln \text{XITOT}$$

(4.54) (1.35) (1.80)

$$- 16.58510 \left(\ln \frac{\text{XATOT}_{-1}}{1000} - \ln \text{XATR9}_{-1} \right)$$

(2.15)

$$R^2 = .427 \quad \text{S.E.} = 1.506 \quad \text{D.W.} = 2.13$$

Sample Period 1961-1971

(M.4) MIEM\$ From Developed West, Machines, Equipment, Metals and Manufactures

$$\ln \text{MIEM\$} = -7.96068 + 0.61031 \ln \text{ITOTAL} - 0.05485 \ln \text{MIW\$}$$

(6.80) (3.74) (1.84) (4.49)

(M.4) MIEM\$ Continued

$$+ 0.60705 \ln \text{KGOLD\$9}_{-1} \\ (6.63)$$

$$- 1.79987 (.9 \ln \text{P599}_{-1} - 1.2 \ln \text{WI\$}_{-1}) \\ (2.60)$$

$$R^2 = .980 \quad \text{S.E.} = 0.058 \quad \text{D.W.} = 2.81 \\ \text{Sample Period 1961-1971}$$

(M.5) MIO\$ From Developed West, Other

$$\ln \text{MIO\$} = - 2.49916 + 2.13407 \ln \text{XI}_{-1} - 0.01747 \ln \text{MIW\$} \\ (6.54) \quad (7.50) \quad (26.43) \quad (1.72)$$

$$R^2 = .990 \quad \text{S.E.} = 0.054 \quad \text{D.W.} = 1.28 \\ \text{Sample Period 1961-1971}$$

(M.6) MLF\$ From LDC's, Food

$$\ln \text{MLF\$} = - 4.70594 + 2.35611 \ln \text{XITOT} \\ (5.52) \quad (4.62) \quad (10.06)$$

$$- 1.07449 \left(\ln \frac{\text{XATOT}_{-1}}{1000} - \ln \text{XATR9}_{-1} \right) \\ (1.35)$$

$$R^2 = .930 \quad \text{S.E.} = 0.155 \quad \text{D.W.} = 1.66 \\ \text{Sample Period 1961-1971}$$

(M.7) MLUO\$ From LDC's, Other

$$\ln \text{MLUO\$} = - 1.56951 + 1.20931 \ln \text{XITOT} + 0.36475 \ln \text{KGOLD\$9}_{-1} \\ (6.40) \quad (0.92) \quad (6.47) \quad (2.34)$$

$$R^2 = .843 \quad \text{S.E.} = 0.113 \quad \text{D.W.} = 1.89 \\ \text{Sample Period 1961-1971}$$

(M.8) MWT\$ From World, Total

$$MWT\$ \equiv MET\$ + MOT\$ + MIW\$ + MIEM\$ + MIO\$ + MLF\$ + MLUO\$$$

(M.9) MWT70 From World, Total (at domestic constant prices)

$$MWT70 = 2.03 \frac{100 MWT\$}{(PREX9)(PTM9)}$$

G AGGREGATE IDENTITIES AND BALANCES

(G.1) GNPNA Non-agricultural Gross National Product

$$\text{GNPNA} = 1.76628 \text{ XITOT} + 0.59943 \text{ XCRUB} + 0.34390 \text{ XT7R} \\ + 0.60907 \text{ XGNPGEP}$$

(B.2) GNPA Agricultural Gross National Product

$$\text{GNPA} = \frac{\text{XATOT}}{1000} - 11.230 \frac{\text{AACI}}{135}$$

(G.3) GNP Gross National Product

$$\text{GNP} = \text{GNPNA} + \text{GNPA}$$

(G.4) GIKREP Capital Repair

$$0.17391 \frac{\text{GIKREP}}{\text{KSUM}} = 0.02942 - 0.00021 \text{ QT50} \\ (52.21) \quad (6.48)$$

$$R^2 = .792 \quad \text{S.E.} = 0.0004 \quad \text{D.W.} = 1.60 \\ \text{Sample Period 1960-1972}$$

$$\text{WHERE } \text{KSUM} = \text{KAIR} + \frac{1}{2}(\text{KIA} + \text{KCR} + \text{KTA} + \text{KHA} + \text{KST})_{+1} \\ + \frac{1}{2}(\text{KIA} + \text{KCR} + \text{KTA} + \text{KHA} + \text{KST})$$

APPENDIX B: DATA SOURCES AND THE USSR DATABANK

One of the major tasks of our research was the collection of a data base for the Soviet economy sufficient for the construction of a econometric model. After an intensive effort in the Fall of 1973, data collection for the project continued until mid-summer 1974.* The result is a Databank for the Soviet economy designed in WEFA standard format that includes description, units and source. The databank presently includes over 650 variables, including direct source data, transformations of source data, and project defined variables (dummy variables, etc.). An alphabetical list of the USSR Databank variables has been included at the end of this appendix. In the remainder of this appendix, we will comment upon the data sources used for the Model and particular problems which have arisen during our research.

Data Choices in an Econometric Model of the USSR

In a model designed for a supply-oriented economic system such as the Soviet Union, there are definite advantages to using physical and real (deflated) variables whenever possible. In the Niwa models of Soviet growth, for example, there are no price variables and the urban real wage is simply aggregate urban consumption divided by urban employment. While our model does use variables with current ruble values and numerous price and wage variables, our behavioral relationships for production, consumption and investment are all estimated in real terms.

* We want to thank the Office of Economic Research, U.S. Government, for its extensive and invaluable help in making available to us its expertise on Soviet economic statistics. We also wish to acknowledge the valuable assistance provided by Anne Lieberman, Michael Marrese, and Mark Schwartz in building the databank for this project.

In production function estimation, where real variables are essential, one still faces a critical choice between official data for sectoral output and Western reconstructed data. For the principal Soviet sectors, industry and agriculture, the choice is between the official series for gross value of output at constant prices and a Western series based upon a sample of commodity series using base-year prices as weights. While most econometric research on Soviet production functions has used the official GVO series (directly or indirectly), we chose to go the other route. Soviet growth rates computed from official data are always higher than growth rates computed from Western reconstructed series. Thus, we expect to find lower estimates for the rate of technical progress (or lower estimates for returns to scale) than those obtained with official data. More importantly, we wanted to link our sectoral outputs to a constant ruble measure of GNP that would be consistent with the estimates of Soviet GNP produced in the West. We will return to this point later in this discussion.

Consequently, we chose the Greenslade-Wallace series for our measure of Industrial Output and the Diamond-Krueger series for our measure of Agricultural Output. Using Kaplan's methodology, we constructed our own output series for Soviet transport and communications. For the construction sector, we adopted the official series for construction-installation work in constant estimate prices. For the "unproductive" sector of the model, we used a value-added measure constructed by the U.S. Government for their estimates for Soviet GNP. For sectoral input data, we used the Soviet series for basic funds in 1955 prices for our capital measures and the Feshbach-Rapawy series for our labor measures.

The introduction of current ruble statistics becomes of greater importance as soon as the modeller wishes to explore the income-expenditure balance relationships for both government and household sectors. If one were to reduce all such flows to real terms, he would have either to choose a uniform but misleading deflator to maintain consistency or handle a multitude of category deflators which would perhaps provide a truer real value for each category but also introduce serious inconsistencies. Consequently, we have linked the real production subsystem to the nominal income-expenditure subsystem through a limited number of nominal wage rates and price variables. A similar real-nominal transform was also necessary to link Soviet production to the foreign trade subsystem of the macroeconomic model.

Supposing that one has specified the appropriate links between the production subsystem and the income-expenditure and foreign-trade subsystems, there is still a choice to be made concerning the accounting basis and the data to be used. Here the choice seems quite clear given the confusion and obscurity in Soviet statistics on incomes and the final use of net material product. With the extensive effort made by Western economists to reconstruct Soviet national accounts on a GNP basis during the past twenty years, any aspiring modeller should regard himself as particularly fortunate. Thus, there is an additional reason for using Western data for the estimation of production functions since those output series have been directly linked to the reconstructed GNP accounts which provide the framework for the nominal subsystems of the econometric model.

Our task has been facilitated by structuring the model upon the estimates of 1970 GNP prepared by the U.S. Government following Bergsonian methods. Using price

variables based with 1970 = 100, we are able to deflate current ruble series (gross profits, defense expenditures, etc.) and compute real GNP on both a sector-of-origin and an end-use basis. Thus, in contrast to Niwa's models of Soviet growth, our model adheres to the discipline imposed by national income identities and maintains the real/nominal interface standard in models of Western economies.

Data Construction Necessary for the Model

Beyond the collection of available Soviet economic data, we have had to construct certain variables for the particular needs of the Model. We will describe briefly the major tasks of data construction completed during the past year.

(1) An Output Index for Soviet Transport and Communications*

We essentially replicated the work done by Norman Kaplan for 1928-1963. The transportation index was constructed from six official series for freight transportation and five series for passenger transportation. These eleven series were aggregated using 1970 ruble-cost weights to derive an output index for Soviet transportation. Two communications indexes were constructed, one using the official ruble-value series and the other using employment in communications. The transport and communications indexes were combined with 1970 value-added weights.

(2) "Negotiated" Agricultural Price

In our consumption price index, there are two food price components, one for retail sales and one for direct transactions in the collective farm market. Initially, we planned to use the official index for "extrarural collective farm market" prices. Vladimir Trembl suggested that an alternative

*See Project Working Paper #14 for a more complete discussion, a list of weights, and the computed output series.

indicator for free market food prices could be obtained from official price and quantity data for 16 food commodities sold to consumer cooperatives at negotiated prices (for resale on commission). Price indexes were computed using 1968 and 1970 quantity weights and current-year quantity weights. After comparison, we selected the 1970-weighted index for further analysis. Using both this negotiated agricultural price and the official collective farm market price in a standard adjustment specification, we chose the former as a proxy for "free" agricultural prices for two reasons. First, its movement over the sample period was more consistent with our adjustment model based upon "normal" food consumption and agricultural output.* Second, data on negotiated agricultural sales are based upon transaction statistics monitored by the banking system in contrast to the sampling procedure used for collective farm market sales.

(3) Inventory Data**

Inventory data for two categories, trade/supply network and non-trade agricultural enterprises and organizations, were constructed through 1972 using the methodology of Moorsteen and Powell. This procedure provides estimates for Soviet inventories in current prices by sector, which were then deflated by official wholesale price indexes to generate constant ruble inventory stock estimates. The major category of inventories not included in our data is the State grain reserve. Presently, the State grain reserves fall within the residual category which we have endogenized in the Model.

* See W.P. #20 for a description of the estimation procedure.

** See W.P. #24 for a discussion of data construction and the estimation of inventory equations for the Model.

(4) Weather Indexes*

Weather indexes for Soviet agriculture were constructed to measure weighted deviations from monthly normal values for precipitation and temperature. The spring-summer precipitation measure is based on April-September deviations for five representative regions. A representative region serves as a proxy for a larger area with similar weather characteristics, and its deviation is weighted by the properly normalized average crop output during 1969-1971 for the larger areas. The regions included in the five groups account for almost 96% of the total harvested grain in 1969-1971. The winter temperature index is based upon only one region, the Southern Ukraine, and is designed to capture weather impact upon winter wheat. Obviously the impact of weather on the Soviet harvest is more complex than suggested by these simple indexes. Further experimentation with other weather indicators in our agricultural production function might further reduce our prediction errors.

* See Appendix A of W.P. #21 for the construction of spring-summer weather variables. A discussion of the winter temperature index is in W.P. #26.

FINAL DATA BANK LISTING ALPHABETICAL

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AUGUST 30, 1974

DOCUMENTATION

SERIES LABEL	DESCRIPTION	QTR	MON	APR	UNITS	SOURCE	VAR	EQU
229 AAC	AGRICULTURAL INPUTS, CURRENT PURCHASES	229	01954M			M-P		
67 AAC1	INDEX OF AGRICULTURAL INPUTS, CURRENT PURCHASES	67	1945=100, TRAN				115R	A.2
65 APL1	INDEX OF AGRICULTURAL INPUTS, LIVESTOCK	65	1965=100, 0					
72 AAS	SOAN AREA, ALL CROPS	72	M HECT					
74 AASF	SOAN AREA, FODDER CROPS	74	M HECT					
73 AASG	SOAN AREA, ALL GRAINS	73	M HECT					
560 ALVR	VALUE OF PRODUCTIVE LIVESTOCK, YEAR YEAR 1955 PRICES)	560	0 COWLES		DIAMOND		1139	A.1
362 EADR	STATE BUDGET EXPENDITURES, ADMINISTRATION	362	0 COW R		RMH02		153R	A.4
361 ADR9	STATE BUDGET EXPENDITURES, DEFENSE	361	0 COW R		RMH02		152C	
564 FAPM9	DEFENSE NONPERSONNEL EXPENDITURES (CURRENT PRICES)	564	0 COWLES		CO-0173		123C	
564 FAPM92	DEFENSE OUTLAYS FOR PERSONNEL (CURRENT PRICES)	564	0 COWLES		CO-0173		73	
359 FFA	STATE OUTLAYS FOR ADMINISTRATION, FINANCING THE NATIONAL ECONOMY, TOTAL	359	0 COW R		RMH02		150R	A.1
609 EFAR1	EXPENDITURES ON ADMINISTRATION, ANNUAL PLAN	609	0 COWLES		PRAVNA			
606 EF091	OFFENSE EXPENDITURES, ANNUAL PLAN	606	0 COWLES		PRAVNA			
607 FFER	FINANCING OF THE NATIONAL ECONOMY, ANNUAL PLAN	607	0 COWLES		PRAVNA			
606 FFER1	TOTAL BUDGET EXPENDITURES, ANNUAL PLAN	606	0 COWLES		PRAVNA			
358 FGR	STATE BUDGET EXPENDITURES, GOVT SPENDING, NATL ACCOUNTS BASIS	358	0 COW R		RMH02		1491	A.6
563 FGRK1	SCIENCE FUND LITURES, BUDGET PURCHASE (CURRENT PRICES)	563	0 COWLES		CO-0173		154R	A.3
202 FGR1	TRANSFER PAYMENTS (1966 FIGURES)	202	0 R		73JEC520			
16A FPR1	STATE BUDGET EXPENDITURES (1973 FIGURES)	16A	0 R		73JEC520			
613 FPR1	STATE BUDGET EXPENDITURES, SOCIAL CULTURAL MEASURES	613	0 COWLES		RMH02		107R	A.7
360 FPCR	STATE BUDGET EXPENDITURES, BUDGET SURPLUS	360	0 COW R		RMH02		125R	B.3
263 FSR1	CONSUMPTION, TOTAL	263	0 COW R		RMH02		151R	B.2
214 C	CONSUMPTION, TOTAL	214	0 COW R		RMH02			
210 CD	CONSUMPTION, CONSUMER DURABLES, TOTAL	210	0 COW R		RMH02			
204 CF	CONSUMPTION, FODDER, TOTAL	204	0 COW R		RMH02			
209 CHD	CONSUMPTION, SOFT GOODS, TOTAL	209	0 COW R		RMH02			
415 CR	CONSUMPTION, OER BASIS, TOTAL	415	0 COW R		73JEC399		1341	C.1
413 CHL	CONSUMPTION, OER BASIS, CONSUMER DURABLES	413	0 COW R		73JEC399		132R	C.4
411 CRF	CONSUMPTION, OER BASIS, FOOD	411	0 COW R		73JEC399		130R	C.2
412 CRD	CONSUMPTION, OER BASIS, SOFT GOODS	412	0 COW R		73JEC399		131R	C.3
414 CRF	CONSUMPTION, OER BASIS, SERVICES	414	0 COW R		73JEC399		133R	C.5
227 CHAL1	OFFICIAL SALES	227	0 R		RMH02			
215 CS	CONSUMPTION, SERVICES, PERSONAL & HEALTH AND EDUC.	215	0 R		73JEC399			
212 CSHE	CONSUMPTION, HEALTH AND EDUCATION, TOTAL	212	0 R		73JEC399			
211 CSFS	CONSUMPTION, PERSONAL SERVICES, TOTAL	211	0 R		73JEC399			
112 FATT	EXPORTS, OTHER (EX-FOOD) COMMUNIST, TOTAL	112	0 R		73JEC399			
110 FCT1	EXPORTS, CHINA, TOTAL	110	0 R		73JEC399			
177 FUCT1	EXPORTS, CEEA, TOTAL	177	0 R		73JEC399			
179 FULT1	EXPORTS, LCC'S, TOTAL	179	0 R		73JEC399			
100 FCT1	EXPORTS, LCC'S, TOTAL	100	0 R		73JEC399			
17A FCT1	EXPORTS, CEEA, TOTAL	17A	0 R		73JEC399			
176 FCT1	EXPORTS, YUGOSLAVIA, TOTAL	176	0 R		73JEC399			
105 FCT1	EXPORTS, CEEA, FOOD	105	0 R		73JEC399			
120 FCT1	EXPORTS, CEEA, OTHER (EX-FOOD)	120	0 R		73JEC399			
115 FCT1	EXPORTS, DEVELOPED WEST, FOOD	115	0 R		73JEC399			
131 FCT1	EXPORTS, DEVELOPED WEST, OTHER (EX-FOOD)	131	0 R		73JEC399			
114 FCT1	EXPORTS, DEVELOPED WEST, TOTAL	114	0 R		73JEC399			
121 FCT1	EXPORTS, LCC'S, FOOD	121	0 R		73JEC399			

FINAL DATA BOOK LISTING ALPHABETICAL

C O C C U L A T I O N

SERIES LABEL

DESCRIPTION

QTR	MON	UNIT	SOURCE	VAR	EQUS
120	120	USUS	73JEC711		
132	132	USUS	THAI		
125	125		THAI	129	E-3
127	127		THAI	6058	E-3
125	125	USUS	73JEC711		
96	96	USUS	73JEC705		
129	129	USUS	THAI		
97	97		73JEC705	141	E-6
365	365	1970	THAI	161	E-7
442	442	1970	THAI		
63	63	1970=100.0	73JEC725		
92	92	1970=100.0	73JEC727		
592	592	1970=100.0	6073		
599	599	1970=100.0	6073		
593	593	1970=100.0	6073		
591	591	1970=100.0	6073		
591	591	1970=100.0	6073		
01	01	1970=100.0	73JEC725		
90	90	1970=100.0	73JEC727		
597	597	1970=100.0	6073		
594	594	1970=100.0	6073		
595	595	1970=100.0	6073		
595	595	1970=100.0	6073		
600	600	1970=100.0	6073		
91	91	1970=100.0	73JEC727		
595	595	1970=100.0	6073		
595	595	1970=100.0	6073		
70	70	1970=100.0	73JEC725		
87	87	1970=100.0	73JEC727		
507	507	1970=100.0	73JEC725		
77	77	1970=100.0	73JEC725		
75	75	1970=100.0	73JEC725		
75	75	1970=100.0	73JEC725		
64	64	1970=100.0	73JEC727		
404	404	1970=100.0	73JEC725		
76	76	1970=100.0	73JEC725		
65	65	1970=100.0	73JEC727		
551	551	1970=100.0	6073		
560	560	1970=100.0	6073		
60	60	1970=100.0	73JEC725		
69	69	1970=100.0	73JEC725		
79	79	1970=100.0	73JEC725		
88	88	1970=100.0	73JEC727		
602	602	1970=100.0	73JEC727		
120	120	USUS	73JEC711		
132	132	USUS	THAI		
125	125		THAI	129	E-3
127	127		THAI	6058	E-3
125	125	USUS	73JEC711		
96	96	USUS	73JEC705		
129	129	USUS	THAI		
97	97		73JEC705	141	E-6
365	365	1970	THAI	161	E-7
442	442	1970	THAI		
63	63	1970=100.0	73JEC725		
92	92	1970=100.0	73JEC727		
592	592	1970=100.0	6073		
599	599	1970=100.0	6073		
593	593	1970=100.0	6073		
591	591	1970=100.0	6073		
591	591	1970=100.0	6073		
01	01	1970=100.0	73JEC725		
90	90	1970=100.0	73JEC727		
597	597	1970=100.0	6073		
594	594	1970=100.0	6073		
595	595	1970=100.0	6073		
595	595	1970=100.0	6073		
600	600	1970=100.0	6073		
91	91	1970=100.0	73JEC727		
595	595	1970=100.0	6073		
595	595	1970=100.0	6073		
70	70	1970=100.0	73JEC725		
87	87	1970=100.0	73JEC727		
507	507	1970=100.0	73JEC725		
77	77	1970=100.0	73JEC725		
75	75	1970=100.0	73JEC725		
75	75	1970=100.0	73JEC725		
64	64	1970=100.0	73JEC727		
404	404	1970=100.0	73JEC725		
76	76	1970=100.0	73JEC725		
65	65	1970=100.0	73JEC727		
551	551	1970=100.0	6073		
560	560	1970=100.0	6073		
60	60	1970=100.0	73JEC725		
69	69	1970=100.0	73JEC725		
79	79	1970=100.0	73JEC725		
88	88	1970=100.0	73JEC727		
602	602	1970=100.0	73JEC727		

AUGUST 30, 1974

FINAL DATABASE LISTING ALPHABETICALLY

C O M P U T A T I O N

SERIES LABEL	DESCRIPTION	QTR	MON	DAY	UNITS	SOURCE	VAPR	EQUR
601	GRK					TRAM		
607	ESTIMATES					IO-C		
608	ESTIMATES					TRAM	1791	6.6
609	ESTIMATES					TRAM		
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843	ESTIMATES				</			

FINAL DATA LISTING ALPHABETICAL

DOCUMENTATION

AUGUST 30, 1974

SERIES LABEL	DESCRIPTION	QTR	MON	ADJ	UNITS	SOURCE	VARB	EQUA
352	CAPITAL INVESTMENT IN CONSTRUCTION, CUR R			352	N CUR R	LAR KH02		
151	FIXED CAPITAL FORMATION IN CONSTANT PRICES, CMAA			151	1969=100.0	SIU0CTAD		
262	CAPITAL INVESTMENT IN CONSTRUCTION			262	B BUNLES	LARKHOZ	0709	1.2
463	LOG TIME TRENDS 1920=0			463	LOG E	THAN	049E	
462	TIME TRENDS 1920=1			462	NO E	THAN		
382	TIME VARIANCE WITH 1950=1 AND 1973=24			382	NO E	NO E	055E	
340	AGRICULTURE, BUDGET			340	N CUR R	CUR D1G		
339	AGRICULTURE, STATE AND POLHOZY			339	B CUR R	CUR D1G		
500	FINANCIAL INVESTMENT IN CONSTRUCTION			500	N CUR R	CUR D1G		
342	CAPITAL INVESTMENT IN AGRICULTURAL PRODUCTION			342	N CUR R	THAN	1221	1.0
341	AGRICULTURE, PROFITS AND OTHER FUNDS			341	N CUR R	CUR D1G		
344	RESIDENTIAL AND COMMERCIAL HOUSING			344	D CUR R	CUR D1G	121E	
336	INDUSTRY AND CONSTRUCTION, BUDGET			336	D CUR R	CUR D1G		
335	INDUSTRY AND CONSTRUCTION			335	N CUR R	CUR D1G	110E	
237	INDUSTRY AND CONSTRUCTION, PROFITS, AMPT., ETC.			237	N CUR R	CUR D1G		
334	FINANCIAL INVESTMENT IN INDUSTRIAL, PRODUCTIVE SECTORS			334	N CUR R	CUR D1G		
243	SOCIAL AND CULTURAL MEASURES			243	N CUR R	CUR D1G	120E	
495	FINANCIAL INVESTMENT IN INDUSTRIAL, PRODUCTIVE SECTORS			495	N CUR R	THAN		
334	TRANSPORTATION AND COMMUNICATION			334	N CUR R	CUR D1G	119E	
37	CHANGE IN INVESTMENT, GOVERNMENT, GOODS INDUS.			37	N 1937R	THAN		
428	INVESTMENT IN HOUSING, ADJ TO 1970 PRICES			428	N BUNLES	MARKHOZ	0030	1.4
39	CHANGE IN INVESTMENT, GOVERNMENT, FORESTIC TRADE			39	N 1937R	THAN		
347	CAPITAL INVESTMENT IN INDUSTRY, 72R			347	N 72R	MARKHOZ	064R	1.1
340	CAPITAL INVESTMENT IN INDUSTRY, CUR R			340	N CUR R	MARKHOZ		
34	CHANGE IN INVESTMENT, LIVESTOCK			34	N 1937R	THAN		
35	CHANGE IN INVESTMENT, GOVERNMENT, FORESTIC			35	N 1937R	THAN		
503	INVESTMENT IN AGRICULTURE			503	N BUNLES	THAN	0371	1.6
345	CAPITAL INVESTMENT IN NATIONAL ECONOMY (INCLUDING KOLKHOZY), 72 R			345	N 72 R	MARKHOZ		
346	CAPITAL INVESTMENT IN NATIONAL ECONOMY (INCLUDING KOLKHOZY), CUR R			346	N CUR R	MARKHOZ		
36	CHANGE IN INVESTMENT, GOVERNMENT, FORESTIC			36	N 1937R	THAN		
471	INVESTMENT, PRODUCTIVE			471	N BUNLES	THAN		
471	INVESTMENT, PRODUCTIVE			471	N BUNLES	THAN	0021	
471	INVESTMENT, PRODUCTIVE			471	N BUNLES	THAN	051E	
471	INVESTMENT, PRODUCTIVE			471	N BUNLES	THAN	0911	
471	INVESTMENT, PRODUCTIVE			471	N BUNLES	THAN	117E	
371	CAPITAL INVESTMENT IN SERVICES, 72R			371	N 72R	MARKHOZ	0060	1.5
372	CAPITAL INVESTMENT IN SERVICES, CUR R			372	N CUR R	MARKHOZ		
40	CHANGE IN INVESTMENT, GOVERNMENT, DOMESTIC TRADE			40	N 1937R	THAN		
544	INVESTMENT STOCK, END YEAR AT 1970 PRICES, GOV-TRADE, NON-AGRIC			544	N 1970 R	THAN	1741	1.13
541	INVESTMENT STOCK, END YEAR AT 1970 PRICES, DOMESTIC TRADE			541	N 1970 R	THAN	1731	1.12
470	INVESTMENT, NATIONAL ECONOMY			470	N BUNLES	THAN	0931	1.9
351	CAPITAL INVESTMENT IN TRANSPORTATION AND COMMUNICATIONS, CUR R			351	N CUR R	MARKHOZ	070R	1.3
259	CAPITAL INVESTMENT IN TRANSPORTATION AND COMMUNICATIONS			259	N BUNLES	MARKHOZ		
472	INVESTMENT, COMMERCIAL			472	N BUNLES	THAN	172R	1.11
546	CHANGE IN INV. STOCK, END YEAR AT 1970 PRICES, GOV-TRADE, NON-AGRIC			546	N 1970 R	THAN	171R	1.10
545	CHANGE IN INV. STOCK, END YEAR AT 1970 PRICES, DOMESTIC TRADE			545	N 1970 R	THAN	102E	
435	SUM OF INVESTMENTS FROM MONTHLY PRECIPITATION VALUES			435	N	THAN		
156	TOTAL PASSENGER TRANSPORT			156	B PASS-KM	SVYAZ19		
157	GROWTH OF TOTAL FREIGHT TRAFFIC			157	N R	70JEC48		

FINAL DATAFILE LISTING ALPHABETICAL

DESCRIPTION

SERIES LABEL

SERIES LABEL	DESCRIPTION	QTR	MON	DAY	UNITS	SOURCE	VARM	EQUM
155	TOTAL TRANSPORTATION	155	R	TOTAL	SVYAZ17			
611	WEATHER INDEX, WINTER TEMP INDEX FOR SOUTHERN URAINE	611	R	WINTER	W-G		104E	
228	AGRICULTURAL LANDS, FIXED CAPITAL	228	R	1955	M-P			
469	EASIC FUND, AGRICULTURE (INC. LIVESTOCK) JAN. 1, 1955 PRICES	469	R	1955	W-MOZ			
66	INDEX OF AGRICULTURAL LANDS, FIXED CAPITAL	66	R	1955	W-MOZ			
582	AGRICULTURAL FIRST CAPITAL, YEAR YEAR 1955 PRICES	582	R	1955	W-MOZ			
260	TEMP OF BASIC FUND, IN CONSTRUCTION SECTION (END OF YEAR)	260	R	1955	W-MOZ			
255	CONSTRUCTION, FACTORIES, COLLOIDERS	255	R	1955	W-MOZ			
256	CONSTRUCTION, FACTORIES, CHANES	256	R	1955	W-MOZ			
253	CONSTRUCTION, FACTORIES, EXCAVATORS	253	R	1955	W-MOZ			
426	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	426	R	1955	W-MOZ			
484	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	484	R	1955	W-MOZ			
261	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	261	R	1955	W-MOZ			
254	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	254	R	1955	W-MOZ			
153	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	153	R	1955	W-MOZ			
30	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	30	R	1955	W-MOZ			
4	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	4	R	1955	W-MOZ			
6	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	6	R	1955	W-MOZ			
31	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	31	R	1955	W-MOZ			
32	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	32	R	1955	W-MOZ			
5	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	5	R	1955	W-MOZ			
9	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	9	R	1955	W-MOZ			
7	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	7	R	1955	W-MOZ			
152	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	152	R	1955	W-MOZ			
509	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	509	R	1955	W-MOZ			
427	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	427	R	1955	W-MOZ			
355	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	355	R	1955	W-MOZ			
353	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	353	R	1955	W-MOZ			
207	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	207	R	1955	W-MOZ			
165	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	165	R	1955	W-MOZ			
164	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	164	R	1955	W-MOZ			
159	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	159	R	1955	W-MOZ			
150	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	150	R	1955	W-MOZ			
161	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	161	R	1955	W-MOZ			
163	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	163	R	1955	W-MOZ			
506	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	506	R	1955	W-MOZ			
170	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	170	R	1955	W-MOZ			
166	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	166	R	1955	W-MOZ			
162	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	162	R	1955	W-MOZ			
160	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	160	R	1955	W-MOZ			
160	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	160	R	1955	W-MOZ			
224	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	224	R	1955	W-MOZ			
167	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	167	R	1955	W-MOZ			
169	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	169	R	1955	W-MOZ			
505	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	505	R	1955	W-MOZ			
94	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	94	R	1955	W-MOZ			
225	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	225	R	1955	W-MOZ			
226	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	226	R	1955	W-MOZ			
154	BASIC FUND, IN CONSTRUCTION SECTION (JAN 1)	154	R	1955	W-MOZ			

NOT FOR REPRODUCTION

AUGUST 30, 1974

FINAL DATABASE LISTING ALPHABETICAL

DOCUMENTATION

SERIES LABEL	DESCRIPTION	QTR	MON	AMT	UNITS	SOURCE	VER	EQU
512	NET CHANGE IN BASIC FUNDS, AGRICULTURE			512	B RULLES	TRAN	0690	K.5
514	NET CHANGE IN BASIC FUNDS, CONSTRUCTION			514	B RULLES	TRAN	0820	K.13
516	NET CHANGE IN BASIC FUNDS, MANUFACTURING			516	B RULLES	TRAN	0620	K.3
511	NET CHANGE IN BASIC FUNDS, INDUSTRY			511	B RULLES	TRAN	0850	K.12
515	NET CHANGE IN BASIC FUNDS, TRADE AND SERVICES			515	B RULLES	TRAN	0770	K.8
513	NET CHANGE IN BASIC FUNDS, TRAVEL & COMMUN.			513	B RULLES	TRAN		
407	BASIC FUNDS, PRODUCTION (JAN. 1, 1955 PRICES)			407	B RULLES	TRAN		
425	UNPRODUCTIVE BASIC FUNDS, JANUARY 1, 1955 PRICES			425	B RULLES	TRAN		
2	NET CAPITAL STOCK, U.S. AGRIC.			2	B. 1937	TRAN		
510	BASIC FUNDS, TRADE AND SERVICES (JAN. 1, 1955 PRICES)			510	B RULLES	TRAN		
547	NET CAPITAL STOCK, U.S. AGRIC. (JAN. 1, 1955 PRICES)			547	B RULLES	TRAN	0771	K.9
508	BASIC FUNDS IN SERVICES AND TRADE (JAN. 1, 1955 PRICES)			508	B RULLES	TRAN	0741	K.7
257	ADJUSTED BASIC FUNDS, TRANSPORT AND COMMUNICATION (JAN. 1, 1955 PRICES)			257	19% C-100.0	TRAN		
423	TEMPO OF BASIC FUNDS IN TRANSPORTATION AND COMMUNICATION (END OF YEAR)			423	19% C-100.0	TRAN		
423	RAILROAD CAR UTILIZATION, AVE 2-YEAR DISTANCE PER FREIGHT CAR			423	19% C-100.0	TRAN		
446	BASIC FUNDS, TOTAL (JAN. 1, 1955 PRICES)			446	B RULLES	TRAN	0761	K.6
443	BASIC FUNDS, TRANSPORT AND COMMUNICATION (JAN. 1)			443	B RULLES	TRAN		
422	RAILROAD TRACK OPERATED (FIRST YEAR) (END OF YEAR)			422	000 MFS	TRAN		
446	UNCOMPLETED CONSTRUCTION (FIRST YEAR) (END OF YEAR)			446	B RULLES	TRAN		
443	BASIC FUNDS, U.S. AGRICULTURE (JAN. 1, 1955 PRICES)			443	B RULLES	TRAN		
447	UNCOMPLETED CONSTRUCTION (FIRST YEAR) (END OF YEAR)			447	B RULLES	TRAN		
440	UNCOMPLETED CONSTRUCTION (FIRST YEAR) (END OF YEAR)			440	B RULLES	TRAN		
441	UNCOMPLETED CONSTRUCTION (FIRST YEAR) (END OF YEAR)			441	B RULLES	TRAN		
215	SAVINGS-BANK ACCOUNTS, TOTAL DEPOSITS, TOTAL			215	B RULLES	TRAN		
221	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, TOTAL			221	B RULLES	TRAN		
210	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, RURAL			210	B RULLES	TRAN		
223	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, URBAN			223	B RULLES	TRAN		
217	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, RURAL			217	B RULLES	TRAN		
222	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, URBAN			222	B RULLES	TRAN		
219	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, URBAN			219	B RULLES	TRAN		
216	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, URBAN			216	B RULLES	TRAN		
113	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, URBAN			113	B RULLES	TRAN		
111	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, URBAN			111	B RULLES	TRAN		
172	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, URBAN			172	B RULLES	TRAN		
174	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, URBAN			174	B RULLES	TRAN		
175	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, URBAN			175	B RULLES	TRAN		
173	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, URBAN			173	B RULLES	TRAN		
171	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, URBAN			171	B RULLES	TRAN		
107	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, URBAN			107	B RULLES	TRAN		
140	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, URBAN			140	B RULLES	TRAN		
109	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, URBAN			109	B RULLES	TRAN		
108	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, URBAN			108	B RULLES	TRAN		
137	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, URBAN			137	B RULLES	TRAN		
106	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, URBAN			106	B RULLES	TRAN		
117	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, URBAN			117	B RULLES	TRAN		
141	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, URBAN			141	B RULLES	TRAN		
110	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, URBAN			110	B RULLES	TRAN		
130	SAVINGS-BANK ACCOUNTS, AVERAGE SIZE, URBAN			130	B RULLES	TRAN		

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AUGUST 30, 1974

FINAL DATA BOOK LISTING ALPHABETICAL

DOCUMENTATION

SERIES LABEL	DESCRIPTION	QTR	POW	ACT	UNITS	SOURCE	VAR#	EQ#
116	IMPORTS, DEVELOPED TEST, TOTAL			116	MSUS	73JEC701		
119	IMPORTS, DEVELOPED TEST, CONSUMER GOODS, WHEAT AND WHEAT FLOUR			119		73JEC706	006R	M.3
123	IMPORTS, LCC'S, CONSUMER GOODS, FOOD			123		73JEC706	10R	M.6
124	IMPORTS, LCC'S, RETALS AND MANUFACTURES			124	MSUS	73JEC711		
122	IMPORTS, LCC'S, TOTAL			122	MSUS	73JEC711		
129	IMPORTS, LCC'S AND UNSPECIFIED, OTHER (EX.FOOD)			129		73JEC711	11R	M.7
134	IMPORTS, LCC'S AND UNSPECIFIED, TOTAL			134	MSUS	73JEC711		
133	IMPORTS, LCC'S AND UNSPECIFIED, TOTAL			133		73JEC711	004B	M.2
126	IMPORTS, UNSPECIFIED, TOTAL			126	MSUS	73JEC711		
100	IMPORTS, WORLD, AGRICULTURE AND EQUIPMENT			100	MSUS	73JEC706		
102	IMPORTS, WORLD, CONSUMER GOODS, FOOD			102	MSUS	73JEC707		
101	IMPORTS, WORLD, RETALS AND MANUFACTURES			101	MSUS	73JEC706		
135	IMPORTS, WORLD, OTHER (EX. FOOD, MACHINERY AND MANUFACTURES)			135	MSUS	73JEC706		
136	IMPORTS, WORLD, OTHER (EX. WHEAT, MACHINERY AND MANUFACTURES)			136	MSUS	73JEC706		
290	IMPORTS, WORLD, TOTAL, DOMESTIC 1970 PRICES			290		73JEC706		
103	IMPORTS, WORLD, TOTAL, CONSUMER GOODS, WHEAT AND WHEAT FLOUR			103	MSUS	73JEC707		
46	EMPLOYMENT, TOTAL			46		73JEC707	151	M.9
47	EMPLOYMENT, AGRICULTURE			47		73JEC707		
24	EMPLOYMENT, AGRICULTURE			24		73JEC707		
60	INDEX OF AGRICULTURAL INPUTS, LABOR			60		73JEC707		
517	EMPLOYMENT, AGRICULTURE, STATE AND COLLECTIVE FARMS.			517	000 PERS	73JEC707	036D	M.8
357	AGRICULTURE, 200 TECHNICIANS AND VETERINARIANS			357	000 PERS	73JEC707		
52	EMPLOYMENT, CONSTRUCTION			52	000 PERS	73JEC707	042B	M.5
242	PERSONNEL, ENGINEERING AND TECHNICAL			242	K PER	73JEC707		
241	PERSONNEL, CONSTRUCTION			241	K PER	73JEC707		
467	DAYS WORKED PER AGRICULTURAL EMPLOYEE			467	DAYS/AN	73JEC707		
640	HIGH.ED.EMP / AGRICULTURE AND FORESTRY			640	(000)	73JEC707		
637	HIGH.ED.EMP / CONSUMER GOODS			637	(000)	73JEC707		
634	HIGH.ED.EMP / CHEMICAL			634	(000)	73JEC707		
629	HIGH.ED.EMP / CONSTRUCTION			629	(000)	73JEC707		
632	HIGH.ED.EMP / ELECTRICAL			632	(000)	73JEC707		
636	HIGH.ED.EMP / FOOD PRODUCTS			636	(000)	73JEC707		
635	HIGH.ED.EMP / FORESTRY AND WOOD			635	(000)	73JEC707		
627	HIGH.ED.EMP / GEOLOGY AND EXPLORATION			627	(000)	73JEC707		
646	HIGH.ED.EMP / ALL INDUSTRIAL CATEGORIES			646	(000)	73JEC707	177E	
96	INDUSTRIAL LIGHTING AND ECONOMIC HANDBOOK			96	000 PER	73JEC707		
630	HIGH.ED.EMP / INSTRUMENT BUILDING			630	(000)	73JEC707		
631	HIGH.ED.EMP / MACHINE AND INSTRUMENT BUILDING			631	(000)	73JEC707		
628	HIGH.ED.EMP / RADIO AND COMMUNICATIONS			628	(000)	73JEC707		
633	HIGH.ED.EMP / TRANSPORT			633	(000)	73JEC707		
639	HIGH.ED.EMP / GOVERNMENT, TRADE, SERVICES, ETC			639	(000)	73JEC707	176E	
64	EMPLOYMENT, TRADE, ETC.			64	000 PERS	73JEC707	042B	M.7
53	EMPLOYMENT, TOURISM, COMMUNAL ECONOMY, PERSONAL SERVICES			53	000 PERS	73JEC707		
54	EMPLOYMENT, HEALTH SERVICES			54	000 PERS	73JEC707		
55	EMPLOYMENT, EDUCATION AND CULTURE			55	000 PERS	73JEC707		
56	EMPLOYMENT, ART			56	000 PERS	73JEC707		
57	EMPLOYMENT, SCIENCE AND SCIENTIFIC SERVICES			57	000 PERS	73JEC707		
58	EMPLOYMENT, CREDIT AND INSURANCE ORGANIZATIONS			58	000 PERS	73JEC707		
59	EMPLOYMENT, CREDIT AND INSURANCE ORGANIZATIONS			59	000 PERS	73JEC707		

FILED IN: A LISTING ALPHABETICAL

DECLARATION

SERIES LABEL	DESCRIPTION	QTR	MON	ALG	U-ITS	SOURCE	VAR#	EQUS
60	EMPLOYMENT, GOVERNMENT ADMINISTRATION	60	000	PERS	73JEC508			
61	EMPL YEMP. UTILS	61	000	PERS	73JEC508			
62	EMPLOYMENT, INDUSTRIAL	62	000	PERS	73JEC508			
403	AVERAGE DAYS WORKED PER YEAR IN INDUSTRY	403	DAYS	000	PERS	FESBACH	0408	N.4
390	ENGINEERING-TECHNICAL WORKERS IN INDUSTRY	390	000	PERS	73JEC508			
430	AVERAGE WAGE/DAY IN INDUSTRY, ADJUSTED 1960-1965 TO LINEAR STEPS	430	HOURS	000	PERS	73JEC508	0508	N.11
402	AVERAGE WEEKS WORKED PER WORKING DAY IN INDUSTRY	402	HOURS	000	PERS	FESBACH		
95	INDUSTRIAL WORKERS	95	A	WKS	70-127			
48	EMPLOYMENT, INDUSTRY	48	000	PERS	73JEC508			
49	EMPLOYMENT, FORESTRY	49	000	PERS	73JEC508			
25	EMPLOYMENT, NON-AGRIC.	25	N.	PERS	73JEC508			
548	EMPLOYMENT, NON-AGRIC. (16-59/34)	548	000	PERS	73JEC508			
279	POPULATION, ALL NON-AGS (16-59/34)	279	000	PERS	73JEC508			
356	POPULATION, ALL (END YEAR)	356	000	PERS	73JEC508			
354	POPULATION, TOTAL (END YEAR)	354	000	PERS	73JEC508			
446	POPULATION, TOTAL	446	000	PERS	73JEC508			
278	POPULATION, AGES 16 AND OVER, FEMALE	278	000	PERS	73JEC508			
277	POPULATION, AGES 16 AND OVER, MALE	277	000	PERS	73JEC508			
276	POPULATION, AGES 16 AND OVER	276	000	PERS	73JEC508			
26	EMPLOYMENT, TOTAL	26	000	PERS	73JEC508			
63	EMPLOYMENT, TRANSPORTATION	63	000	PERS	73JEC508			
285	EMPLOYMENT, AGRICULTURAL SECTIONS	285	000	PERS	73JEC508			
206	EMPLOYMENT, AGRICULTURAL SECTIONS, COLLECTIVE FARM	206	000	PERS	73JEC508			
201	EMPLOYMENT, ARMY FORCES	201	000	PERS	73JEC508			
207	EMPLOYMENT, AGRICULTURAL SECTIONS PRIVATE	207	000	PERS	73JEC508			
204	EMPLOYMENT, INDUSTRIAL ARTISANS	204	000	PERS	73JEC508			
202	EMPLOYMENT, CIVILIAN	202	000	PERS	73JEC508			
203	EMPLOYMENT, NON-AGRICULTURAL SECTIONS	203	000	PERS	73JEC508			
200	EMPLOYMENT, TOTAL	200	000	PERS	73JEC508			
424	NUMBER OF TRADE & COMP SPECIALISTS, END OF YEAR	424	000	PERS	73JEC508			
50	EMPLOYMENT, NON-AGRIC	50	000	PERS	73JEC508			
111	EMPLOYMENT, TOTAL	111	000	PERS	73JEC508			
112	EMPLOYMENT, TOTAL	112	000	PERS	73JEC508			
99	EMPLOYMENT, TOTAL	99	000	PERS	73JEC508			
29	1957 MAN YEAR EMPLOYMENT, TOTAL	29	000	PERS	73JEC508			
27	1957 MAN YEAR EMPLOYMENT, AGRIC.	27	000	PERS	73JEC508			
28	1957 MAN YEAR EMPLOYMENT, NON-AGRIC.	28	000	PERS	73JEC508			
367	PRICE FOOD SOLD TO CONSUMER CO-OPS AT NEGOTIATED PRICES, 1968 WEIGHTS	367	000	PERS	73JEC508			
308	PRICE FOOD SOLD TO CONSUMER CO-OPS AT NEGOTIATED PRICES, 1970 WEIGHTS	308	000	PERS	73JEC508			
309	PRICE FOOD SOLD TO CONSUMER CO-OPS AT NEGOTIATED PRICES, CONUR YR WTS	309	000	PERS	73JEC508			
410	PRICE FOOD, EXCEPT COLLECTIVE FARM, MARKET	410	000	PERS	73JEC508			
154	CONSUMER PRICE INDEX (1940=100)	154	000	PERS	73JEC508			
410	CONSUMER PRICE, FOOD (1940=100)	410	000	PERS	73JEC508			
417	CONSUMER PRICE, FOOD (1940=100)	417	000	PERS	73JEC508			
407	INVESTMENT INFLATION, AGRICULTURE	407	000	PERS	73JEC508			
405	INVESTMENT INFLATION, CONSTRUCTION SECTOR	405	000	PERS	73JEC508			
364	INDEX OF WHOLESALE ENTERPRISE PRICES FOR INDUSTRY	364	000	PERS	73JEC508			
429	INVESTMENT INFLATION, INDUSTRY	429	000	PERS	73JEC508			
406	INVESTMENT INFLATION, INDUSTRY	406	000	PERS	73JEC508			
368	INDEX OF STATE RETAIL PRICES FOR ALL GOODS	368	000	PERS	73JEC508			
573	INDEX OF STATE RETAIL PRICES FOR FOOD GOODS (INFLATED)	573	000	PERS	73JEC508			

FINAL DATAWARK LISTING ALPHABETICAL

DESCRIPTION

SERIES LABEL	QTR	MON	UNIT	SOURCE	VAR#	EQUM
369			1940=100.0	BAR KNOZ		
370			1940=100.0	BAR KNOZ		
409			1972=100.	BAR KNOZ	99R	P.11
408			1972=100.	BAR KNOZ	99R	P.10
365			1949=100.0	BAR KNOZ	094R	P.7
349			1970=100.	TRAD		
366			1949=100.0	BAR KNOZ		
375			1970=100.	TRAD	125R	P.6
367			1949=100.0	BAR KNOZ		
374			1970=100.	TRAD		
1			1949=100.0	BAR KNOZ		
416			1970=100.	TRAD	127R	P.1
419			1970=100.	TRAD	0531	P.5
436			1970=100.	TRAD		
612			1970=100.	TRAD	19E	
421			1970=100.	TRAD		
535			1970=100.	TRAD		
532			1970=100.	TRAD		
531			1970=100.	TRAD		
534			1970=100.	TRAD		
535			1970=100.	TRAD		
533			1970=100.	TRAD		
376			1970=100.	TRAD		
375			1970=100.	TRAD		
570			1970=100.	TRAD		
439			1970=100.	TRAD		
571			1970=100.	TRAD		
304			1970=100.	TRAD		
431			1970=100.	TRAD		
432			1970=100.	TRAD		
433			1970=100.	TRAD		
550			1970=100.	TRAD		
581			1970=100.	TRAD		
604			1970=100.	TRAD		
562			1970=100.	TRAD		
622			1970=100.	TRAD		
620			1970=100.	TRAD		
619			1970=100.	TRAD		
603			1970=100.	TRAD		
621			1970=100.	TRAD		
626			1970=100.	TRAD		
642			1970=100.	TRAD		
623			1970=100.	TRAD		
6467			1970=100.	TRAD		
405			1970=100.	TRAD		
665			1970=100.	TRAD		
66567			1970=100.	TRAD		
667			1970=100.	TRAD		

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FINAL DATA/ALPHABETICAL

DOCUMENTATION

SERIES LABEL	DESCRIPTION	QTR	MON	APR	UNITS	SOURCE	VAR#	EQU#
624	DUMMY VARIABLE FOR 1967-68			624	LORE	LORE	165F	
620	DUMMY VARIABLE FOR 1968, INDUSTRY WAGE			523	LORE	TRAN	054E	
645	DUMMY VARIABLE FOR 1969, G			645	LORE	LORE	100E	
625	DUMMY VARIABLE FOR 1970			525	LORE	LORE	166E	
499	PERCENTAGE FINANCING, AGRICULTURE			499	LORE	TRAN		
500	PERCENTAGE FINANCING, HOUSING AND COLLECTIVE			500	LORE	TRAN		
496	PERCENTAGE FINANCING, INDUSTRY			496	LORE	TRAN		
497	PERCENTAGE FINANCING, SOCIAL-CULTURAL			497	LORE	TRAN		
497	PERCENTAGE FINANCING, TRANSPORT AND COMMUNICATIONS			497	LORE	TRAN		
492	PERCENTAGE OF CAPITAL INVESTMENT, CONSTRUCTION-INSTALLATION (69 PRICES)			492	LORE	TRAN	1472.475	
443	PERCENTAGE OF CAPITAL INVESTMENT, INDUSTRY			443	LORE	TRAN	1472.475	
444	PERCENTAGE OF CAPITAL INVESTMENT, HOUSING			444	LORE	TRAN	1472.475	
445	PERCENTAGE OF CAPITAL INVESTMENT, CAPITAL REPAIR (1969 PRICES)			445	LORE	TRAN		
474	PERCENTAGE INVESTMENT, AGRICULTURE			474	LORE	TRAN		
476	PERCENTAGE INVESTMENT, CONSTRUCTION			476	LORE	TRAN		
476	PERCENTAGE INVESTMENT, INDUSTRY			476	LORE	TRAN		
473	PERCENTAGE INVESTMENT, TRANSPORT AND SERVICES			473	LORE	TRAN		
477	PERCENTAGE INVESTMENT, TRANSPORT AND COMMUNICATIONS			477	LORE	TRAN		
475	PERCENTAGE INVESTMENT, TRANSPORT AND COMMUNICATIONS			475	LORE	TRAN		
440	PERCENTAGE INVESTMENT, TRANSPORT AND COMMUNICATIONS			440	LORE	TRAN	048E	
490	PERCENTAGE BASIC FUNDS, AGRICULTURE			490	LORE	TRAN		
492	PERCENTAGE BASIC FUNDS, CONSTRUCTION			492	LORE	TRAN		
494	PERCENTAGE BASIC FUNDS, HOUSING			494	LORE	TRAN		
499	PERCENTAGE BASIC FUNDS, INDUSTRY			499	LORE	TRAN		
493	PERCENTAGE BASIC FUNDS, TRADE AND SERVICES			493	LORE	TRAN		
491	PERCENTAGE BASIC FUNDS, TRANSPORT AND COMMUNICATIONS			491	LORE	TRAN		
614	TAX RATE PROFITS			614	LORE	TRAN	149E	
616	TAX RATE, ADJUSTMENT, SOCIAL REDUCTIONS			616	LORE	TRAN	154E	
576	TAX RATE, ADJUSTMENT, TAXATION, TAXATION, 1.10 (SMOOTHED)			576	LORE	TRAN		
578	LEVATIONS FROM YEAR OF RT			578	LORE	TRAN	137E	
616	TAX RATE, ADJUSTMENT, OTHER SOCIAL SECTOR			616	LORE	TRAN	137E	
617	TAX RATE, ADJUSTMENT, POPULATION			617	LORE	TRAN	159E	
615	TAX RATE, ADJUSTMENT, TOWN OVER TAX			615	LORE	TRAN	156E	
464	RATIO OF UNITS TO TOTAL POPULATION			464	LORE	TRAN		
561	PERCENTAGE PROFITS OBTAINED FOR INVESTING, ALL STATE ENTERPRISES			561	LORE	TRAN		
10	INVENTORY STOCK, TOTAL CURES			10	LORE	TRAN		
529	INVENTORY STOCK, YEAR, CURRENT PRICES, TOTAL			529	LORE	TRAN		
526	INVENTORY STOCK, YEAR, CURRENT PRICES, STATE AGRICULTURE			526	LORE	TRAN		
434	INDEX OF AGRICULTURAL INVESTMENT, SOVIET AREA			434	LORE	TRAN		
526	INVENTORY STOCK, YEAR, CURRENT PRICES, CENTRAL CONSTRUCTION			526	LORE	TRAN		
331	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES, SOVIET			331	LORE	TRAN		
333	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES, TOTAL			333	LORE	TRAN		
307	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES, FLOUR AND GRAIN			307	LORE	TRAN		
303	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES, FLOUR AND GRAIN			303	LORE	TRAN		
303	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES, BEANS, ETC.			303	LORE	TRAN		
324	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES, BEANS, ETC.			324	LORE	TRAN		
309	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES, BEANS, ETC.			309	LORE	TRAN		
325	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES, BEANS, ETC.			325	LORE	TRAN		
310	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES, BEANS, ETC.			310	LORE	TRAN		
326	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES, BEANS, ETC.			326	LORE	TRAN		

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FINAL DATABASE LISTING ALPHABETICAL

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DOCUMENTATION

SERIES LABEL	DESCRIPTION	QTR	MON	UNIT	SOURCE	VAR#	COUN
311	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: VEGETABLES	311	000	TONS	UAR KM02		
317	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: VEGETABLES	327	M R		UAR KM02		
312	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: FRUITS AND NUTS	312	000	TONS	UAR KM02		
320	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: FRUITS AND NUTS	320	M R		UAR KM02		
313	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: WINE, GRAPE AND FRUIT	313	000	TONS	UAR KM02		
329	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: WINE, GRAPE AND FRUIT	329	M R		UAR KM02		
310	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: OTHER	330	M R		UAR KM02		
332	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: OTHER	332	M R		UAR KM02		
298	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: MEAT AND POULTRY	298	000	TONS	UAR KM02		
314	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: MEAT AND POULTRY	314	M R		UAR KM02		
299	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: MEAT AND POULTRY	299	000	TONS	UAR KM02		
315	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: MEAT AND POULTRY	315	M R		UAR KM02		
300	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: MEAT AND POULTRY	300	000	TONS	UAR KM02		
316	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: MEAT AND POULTRY	316	M R		UAR KM02		
301	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: MEAT AND POULTRY	301	000	TONS	UAR KM02		
317	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: MEAT AND POULTRY	317	M R		UAR KM02		
302	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: MEAT AND POULTRY	302	000	TONS	UAR KM02		
318	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: MEAT AND POULTRY	318	M R		UAR KM02		
203	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: MEAT AND POULTRY	203	000	TONS	UAR KM02		
319	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: MEAT AND POULTRY	319	M R		UAR KM02		
304	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: MEAT AND POULTRY	304	000	TONS	UAR KM02		
305	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: MEAT AND POULTRY	305	000	TONS	UAR KM02		
321	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: MEAT AND POULTRY	321	M R		UAR KM02		
306	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: MEAT AND POULTRY	306	000	TONS	UAR KM02		
322	SALE OF FOODSTUFFS TO CONSUMER COOPERATIVES: MEAT AND POULTRY	322	M R		UAR KM02		
14	INVENTORY STOCK, ON HAND, CEREALS, GRAIN, FEEDS	14	R	1937R	UAR KM02		
16	INVENTORY STOCK, ON HAND, AGRICULTURAL TRACTORS	16	R	1937R	UAR KM02		
522	INVENTORY STOCK, END YEAR, CURRENT PRICES, CONSUMER GOODS INDUSTRIES	522	U	1970	UAR KM02		
521	INVENTORY STOCK, END YEAR, CURRENT PRICES, CONSUMER GOODS INDUSTRIES	521	U	1970	UAR KM02		
11	INVENTORY STOCK, END YEAR, CURRENT PRICES, PRODUCER GOODS INDUSTRIES	11	U	1970	UAR KM02		
12	INVENTORY STOCK, END YEAR, CURRENT PRICES, PRODUCER GOODS INDUSTRIES	12	U	1970	UAR KM02		
13	INVENTORY STOCK, END YEAR, CURRENT PRICES, PRODUCER GOODS INDUSTRIES	13	U	1970	UAR KM02		
530	INVENTORY STOCK, END YEAR, CURRENT PRICES, AGRICULTURE	530	U	1970	UAR KM02		
527	INVENTORY STOCK, END YEAR, CURRENT PRICES, AGRICULTURE	527	U	1970	UAR KM02		
524	INVENTORY STOCK, END YEAR, CURRENT PRICES, AGRICULTURE	524	U	1970	UAR KM02		
15	INVENTORY STOCK, END YEAR, CURRENT PRICES, AGRICULTURE	15	U	1970	UAR KM02		
17	INVENTORY STOCK, END YEAR, CURRENT PRICES, AGRICULTURE	17	U	1970	UAR KM02		
525	INVENTORY STOCK, END YEAR, CURRENT PRICES, AGRICULTURE	525	U	1970	UAR KM02		
523	INVENTORY STOCK, END YEAR, CURRENT PRICES, AGRICULTURE	523	U	1970	UAR KM02		
542	INVENTORY STOCK, END YEAR, CURRENT PRICES, AGRICULTURE	542	U	1970	UAR KM02		
530	INVENTORY STOCK, END YEAR, CURRENT PRICES, AGRICULTURE	530	U	1970	UAR KM02		
537	INVENTORY STOCK, END YEAR, CURRENT PRICES, AGRICULTURE	537	U	1970	UAR KM02		
543	INVENTORY STOCK, END YEAR, CURRENT PRICES, AGRICULTURE	543	U	1970	UAR KM02		
540	INVENTORY STOCK, END YEAR, CURRENT PRICES, AGRICULTURE	540	U	1970	UAR KM02		
539	INVENTORY STOCK, END YEAR, CURRENT PRICES, AGRICULTURE	539	U	1970	UAR KM02		
379	INDEX ADJUSTED TO 1966=100.0 D-G	379	1970=100.0	D-G	UAR KM02		
378	INDEX ADJUSTED TO 1966=100.0 D-G	378	1970=100.0	D-G	UAR KM02		
804	INDEX ADJUSTED TO 1966=100.0 D-G	804	1970=100.0	D-G	UAR KM02		

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permit fully legible reproduction

B-17

TECHNICAL LISTING: 01-15-17

DOCL. L. TAYLOR

SERIES LABEL	DESCRIPTION	QTR	MON	AMT	UNITS	SOURCE	VARM	COUN
451	REVENUES, REDUCTIONS FROM PROFIT, STATE ENTERPRISES			451	B	MOBILES	1448	7.1
452	SUM OF ABSOLUTE VALUE OF DEVIATIONS FROM HOURLY TEMPERATURE VALUES			452	B	MOBILES	1450	7.3
453	FREIGHT TRANSPORT, AIR			453	B	MOBILES	1361	7.6
454	PLAN BUDGET REVENUES, DEDUCTIONS FROM PROFIT, STATE ENTERPRISES			454	B	MOBILES	160E	
455	FREIGHT TRANSPORT, INTERNAL WATERWAY			455	B	MOBILES	160E	
456	FREIGHT TRANSPORT, MARITIME			456	B	MOBILES	160E	
457	FREIGHT TRANSPORT, MOTOR, GENERAL USE			457	B	MOBILES	160E	
458	FREIGHT TRANSPORT, MOTOR			458	B	MOBILES	160E	
459	PLAN BUDGET REVENUES, FROM OTHER SOCIAL ORGANIZATIONS			459	B	MOBILES	160E	
460	FREIGHT TRANSPORT, PIPELINE			460	B	MOBILES	160E	
461	PLAN BUDGET REVENUES, FROM POPULATION			461	B	MOBILES	160E	
462	PLAN BUDGET REVENUES TOTAL			462	B	MOBILES	160E	
463	FREIGHT TRANSPORT, RAILROAD			463	B	MOBILES	160E	
464	PLAN BUDGET REVENUES, SOCIAL SECTOR (CURRENT RUBLES)			464	B	MOBILES	160E	
465	PLAN BUDGET REVENUES, TURNOVER TAX			465	B	MOBILES	160E	
466	Y'S ADJUSTED SO 1966-TREML VALUE			466	B	MOBILES	160E	
467	Y'S ADJUSTED SO 1966-TREML VALUE			467	B	MOBILES	160E	
468	Y'S ADJUSTED SO 1966-TREML VALUE			468	B	MOBILES	160E	
469	Y'S ADJUSTED SO 1966-TREML VALUE			469	B	MOBILES	160E	
470	Y'S ADJUSTED SO 1966-TREML VALUE			470	B	MOBILES	160E	
471	Y'S ADJUSTED SO 1966-TREML VALUE			471	B	MOBILES	160E	
472	Y'S ADJUSTED SO 1966-TREML VALUE			472	B	MOBILES	160E	
473	Y'S ADJUSTED SO 1966-TREML VALUE			473	B	MOBILES	160E	
474	Y'S ADJUSTED SO 1966-TREML VALUE			474	B	MOBILES	160E	
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477	Y'S ADJUSTED SO 1966-TREML VALUE			477	B	MOBILES	160E	
478	Y'S ADJUSTED SO 1966-TREML VALUE			478	B	MOBILES	160E	
479	Y'S ADJUSTED SO 1966-TREML VALUE			479	B	MOBILES	160E	
480	Y'S ADJUSTED SO 1966-TREML VALUE			480	B	MOBILES	160E	
481	Y'S ADJUSTED SO 1966-TREML VALUE			481	B	MOBILES	160E	
482	Y'S ADJUSTED SO 1966-TREML VALUE			482	B	MOBILES	160E	
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617	Y'S ADJUSTED SO 1966-TREML VALUE			617	B	MOBILES	160E	
618								

FINDAL DATABASE LISTING ALPHABETICAL
N O C C U M L A T I O N

AUGUST 30, 1974

SERIES LABEL	DESCRIPTION	QTR	MON	ANN	UNITS	SOURCE	VARM	EQUH
004	INDEX ADJUSTED SO 1968=TREND VALUE							
377	TRANSPORTATION INDEX, 1970 HORSE COST WEIGHTS				377 1970=100.0	0-G		
42	WAGES, TOTAL				263 RUMLES	70JEC92		
519	WAGES, AGRICULTURE, STATE AND COLLECTIVE FARMS				519 RUMLES	70JEC92	0338	4.2
265	WAGES, CONSTRUCTION				265 RUMLES	70JEC92	0460	W.3
401	WAGES, CONSTRUCTION, TRADE SERVICES ECT.				401 RUMLES	70JEC92	0458	W.5
269	WAGES, TRADE, ETC.				269 RUMLES	70JEC92		
428	WAGES, INDUSTRIAL-COMMERCIAL ECONOMY				270 RUMLES	70JEC92		
270	WAGES, HEALTH SERVICES				271 RUMLES	70JEC92		
271	WAGES, EDUCATION AND CULTURE				272 RUMLES	70JEC92		
272	WAGES, SCIENCE AND SCIENTIFIC SERVICES				273 RUMLES	70JEC92		
273	WAGES, GOVERNMENT AND ADMINISTRATION				274 RUMLES	70JEC92		
274	WAGES, GOVERNMENT AND ADMINISTRATION				275 RUMLES	70JEC92		
275	WAGES, INDUSTRY				264 RUMLES	70JEC92	0320	W.1
264	WAGES, STATE FARMS AND SUBSIDIARY STATE AGRICULTURAL ENTERPRISES				264 RUMLES	70JEC92		
266	WORLD TRADE, CONSTANT PRICES				145 DSEBUS	70JEC92		
145	WORLD TRADE, CONSTANT PRICES				145 DSEBUS	70JEC92		
400	WORLD TRADE, CURRENT PRICES				400 RUMLES	70JEC92	0440	W.4
146	WORLD TRADE, REFLATOR				146 RUMLES	70JEC92		
147	WORLD TRADE, REFLATOR				147 1968=1	70JEC92		
148	WORLD TRADE, REFLATOR				148 RUMLES	70JEC92		
149	WORLD TRADE, REFLATOR				149 RUMLES	70JEC92		
150	WORLD TRADE, REFLATOR				150 RUMLES	70JEC92		
151	WORLD TRADE, REFLATOR				151 RUMLES	70JEC92		
152	WORLD TRADE, REFLATOR				152 RUMLES	70JEC92		
153	WORLD TRADE, REFLATOR				153 RUMLES	70JEC92		
154	WORLD TRADE, REFLATOR				154 RUMLES	70JEC92		
155	WORLD TRADE, REFLATOR				155 RUMLES	70JEC92		
156	WORLD TRADE, REFLATOR				156 RUMLES	70JEC92		
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158	WORLD TRADE, REFLATOR				158 RUMLES	70JEC92		
159	WORLD TRADE, REFLATOR				159 RUMLES	70JEC92		
160	WORLD TRADE, REFLATOR				160 RUMLES	70JEC92		
161	WORLD TRADE, REFLATOR				161 RUMLES	70JEC92		
162	WORLD TRADE, REFLATOR				162 RUMLES	70JEC92		
163	WORLD TRADE, REFLATOR				163 RUMLES	70JEC92		
164	WORLD TRADE, REFLATOR				164 RUMLES	70JEC92		
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APPENDIX C

WHARTON ECONOMETRIC FORECASTING ASSOCIATES INC.



SRI-WEFA ECONOMETRIC MODEL: LIST OF WORKING PAPERS

0. Green, Donald W. and Higgins, Christopher I., "A Preliminary Specification of an Econometric Model for the Soviet Union," (Oct. 1973).
1. Green, D.W., and Higgins, C.I., "The Use of Annual Plan Targets in an Econometric Model of the Soviet Economy: The Concept of an Implicit Plan," Appendices: List of Equations, List of Variables, Selected Bibliographies (Dec. 1973).
2. Green, D.W., "Data and Accounting Issues Arising in the Construction of an Econometric Model of the Soviet Union," (Dec. 1973; Revised, Jan. 1974).
3. Marrese, Michael, "A Preliminary Specification of a Soviet Agricultural Model," (Dec. 1973).
4. Green, D.W., and Higgins, C.I., "Some Considerations in the Specification of a Plan-Behavioral Model of the Soviet Union," (Feb. 1974).
5. Higgins, C.I., "The Effects of Habit Persistence and Supply Constraints on Soviet Consumption: Some Preliminary Notes," (Feb. 1974).
6. Saito, Mitsuo, "The Estimation of Soviet Production Functions," (March 1974).
7. Higgins, C.I., "Notes on Trade Equations for the Soviet Model," (April 1974).
8. Green, D.W., "An Addendum to the Plan-Behavioral Model of the Soviet Union," (April 1974).
9. Green, D.W., "The Soviet Construction Sector: Production Functions and Capital Formation," (April 1974).
10. Green, D.W., "Capital Formation in Soviet Industry," (April 1974).
11. Higgins, C.I., "Urban Labor Force, Non-Agricultural Wage Bill and Agricultural Employment," (April 1974).
12. Marrese, M., "The Soviet Agricultural Sector: An Initial Glance," (May 1974).

13. Green, D.W., "Capital Formation in Soviet Transport and Communications," (May 1974).
14. Green, D.W., "Soviet Transport and Communications, 1955-1972: Production Function Estimations," (May 1974).
15. Green, D.W., "The Soviet Services Sector: Capital Formation and Production," (May 1974).
16. Green, D.W., "Production Function Estimations for Soviet Industry," (May 1974).
17. Green, D.W., "Nonagricultural Employment: Total and Sectoral Composition," (June 1974).
18. Green, D.W., "Capital Formation and Employment in the Non-agricultural Sectors of the USSR: The Implications for Production Function Estimates," (June 1974).
19. Higgins, C.I., "Average Wages: Can They be Endogenous?" (June 1974).
20. Higgins, C.I., "Choice of Market Determined Price for Agricultural Products," (June 1974).
21. Marrese, M., "An Econometric Model of the Soviet Agricultural Sector," (July 1974).
22. Green, D.W., "Investment Determination in the Soviet Economy," (July 1974).
23. Higgins, C.I., "A New Consumption Price Index, Retail and Wholesale Price Determination," (August 1974).
24. Higgins, C.I., "Data and Relationships for Soviet Inventories," (August 1974).
25. Green, D.W., "The State Budget of the USSR: An Econometric Analysis," (September 1974).
26. Green, D.W., "The Agricultural Sector of the SRI-WEFA Model of the USSR," (September 1974).