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Japan's Economic Growth and Policy Making in the Context of Leontief's Scientific Contributions

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1. Introduction

Since the contributions of Leontief's input-output analysis to economic theory are discussed by many speakers in the present session of the IIOA, I would like to focus upon the applied aspects and the policy implications of his theory especially in the context of Japanese economic policy since the Second World War. Because of the space limits of the paper, I would like to emphasize the role and impacts of his model for national economic policy and development planning in terms of macro and structural changes since the mid 1950s. While regional I-O models also have been widely utilized for regional development of Japan's local governments and related institutions, I shall touch on them only in the context of nationwide development policy. Although the national input-output models have been extensively used by the government agencies, especially the Economic

Planning Agency (EPA) and the Ministry of International Trade and Industry (MITI), the enthousiasm for the use of the model especially between the 1950's and 1970's seems to have gradually cooled down, except for the area of environmental policy. The dramatic turning point was observed in the early 1980's when Nakasone's cabinet started with neo-liberal economic policy, declaring an abundance of quantitative guideline policy, except a few which had been the core of the government's economic planning. Even though the important improvements continued to be accumulated in the I-O table compilation and related modelling techniques by the government, the relegation of quantitative analysis of both macro economic and sectoral targets has been generally observed.

In the second half of the present paper the long-term consequences of the negligence, or begine neglect of the quantitative guideline by the government since the early 1980s will be discussed by analyzing capacity output, production, employment, the rate of utilization, productivity, etc. on the basis of sectoral and macro-economic variables. Although the analysis is further to be deepened on a more elaborate basis, our tentative findings suggest that there are huge imbalances in every sector of Japan's economy between supply capacity and demand which requires vigorous endeavors by the government to narrow. We shall first discuss the positive role of Leontief's input-output model for national policy and planning andthen analyze the long-term imbalance of the economy as a result of the government's negligence of the Leontief type quantitative framework.

2. Japan's Medium-Term Planning and Leontief Models

It was not until 1965 that the Japanese government officially adopted the Leontief model in the framework of the comprehensive planning model for the period between 1964 and '68. The planning model comprises three models.

a. a macro-econometric model with 43 equations,

b. an input-output econometric model with 60 output and trade sectors and 25 subsectors for value added, employment, investment and capital stock,

c. an integrated econometric model comprising the above macro and input-output models. The idea is that the first model, a macro model built on a Keynesian idea needs to be tested in a more disaggregated input-output model especially in terms of supply side of output, imports, employment, capacity constraints, etc. The third model is designed to integrate macro and input-output systems for the target year in a full capacity and full employment condition. This model is constructed mainly for estimating desirable policy values for target years, four year ahead, without consideration of cyclical movement during the intermediate period. Since the above two models are integrated mostly in a one way linkage, i.e. "macro model   input-output model", there is a possibility of labor shortage, acceleration of inflation, balance of payments difficulties, bottlenecks in specific resource availability, etc. These problems can be fully checked and dealt with by appropreate policy measues by using the third model having a mutual feadback between the macro and input-output systems. The Japanese economy was in those days enjoying fairly rapid economic growth, but the dangers in trade balance and bottlenecks in specific sectors including social overhead, always existed, requiring a deliberate macro-economic policy and structural adjustment formulated within an input-output framework. The relationship between the three models is shown below.

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          Macro Model          I-O Model
         (semi-annual,         (annual, dynamic)
             dynamic)   (results of         |
               |         structural check)  |
               |                            |
               |    Integrated Model
                   (target year only, annual)
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The new model forecasts conducted by the Econometric Committee of the EPA including various policy simulations, were strongly responded to by the business world especially the stock market, since the results include alternative forecasts on a sectoral basis unlike the previous plans. The announcement effect resulting from these alternative forecasts was much stronger than expected, especial as compared with the previous plan, the National Income Doubling Plan made by the Ikeda Cabinet which did include forecasts for sectoral output, which securd no consistency between micro-economic growth of 7.2 percent and various sectoral output forecasts which were roughly gathered on the basis of business opinions. The models in the report of the above Econometric Committee of the EPA were well documented and contributed to the promotion of policy modelling, especially input-outputmodelling for government and business organizations. [1][2][6][8]

Although the government's official plan concentrated upon a four year period in the context of various contraints. such as overall output capacity, price stability, and balance of payments, a longer term analysis of the Japanese economy was also conducted under the project on historical growth modelling. The model was estimated for the period between 1906 and 1960 heavily relying on production functions with technical progress for agriculture and non-agriculture. This supply side growth model in which saving is assumed to be fully absorbed in fixed investment and trade surplus was used for ten-year projections, providing useful information on exogenous variables such as the demand for social overhead and private housing stock, etc. for the medium-term macro model mentioned above.

In summing-up, the Econometric Committee of the EPA, represented by leading scholars and analysts in those days, contributed to the progress of sound and balanced development of policy modelling for both a) short or medium-term macro-economic demand management on the one hand and b) sectoral supply and capacity building with structural changes on the other. Particularly important, as discussed later, is the integrated study and policy analysis of Keynesian type from demand side and structural analysis of Leontief type from supply side with capacity utilization, Issues over technological and environmental progress, international competitiveness, etc. were successfully dealt with through the latter side analysis.

3. Later Development of Guideline Policies

The combined use of Leontief-Keynesian models by the EPA was further improved in 1977. The medium-term macro model which had been used officially was now transformed into a multisectoral econometric model having ten sectors. This semi-annual model can be regarded in a sense as a kind of macro-model with a more general-equilibrium type elaboration with respect to the interdependence betweenn sectoral quantities and prices. Sectoral capacity variables were newly added to the main body of the model, although the capacity forecasts were never officially published. The Leontief type input-output model which had been extensively utilized as a business guideline virtually disappeared in the official target. The input-output model, however, appeared again as a long-term optimum growth model with a turn-pike property. Although the model has only 27 sectors, not as big as the previous planning-use model with about 60 sectors, it was characterized as a model of the optimal resource allocation for welfare and the environment. Pollution abatement activity is one of the most important activities and the three types of pollutants (SOx, BOx, and BOD) were explicitly included in the model. The model was simulated between 1975 and 1990 under the alternative policy packages. (for technical discussions, see [2])

Although the important contributions by the Econometric Committee of the EPA continued during the 1970s, public opinion over the desirable growth rate of GDP began to shift gradually from about 8 to 10% of 1960s to around 5%, nearly half of the previous rate. This dramatic downward shift was ignited by the growing anti-growth sentiments caused by the oil price shock in 1973-74 and an increasing number of environmentalists. In the academic world too, though gradually, an sceptism started to grow under the monetarist group's pressure with respect to the effectiveness of the conventional macro-economic policy, and some economists in industrial countries also joined in this campaign and the influence of the conventional mainstream of macro-economic policy began to weaken. With these ideological shifts as the background, the Nakasone cabinet decided to drastically cut down the number of the target figures except for a few items, and the role of the EPA as an analytical core within the government substantially weakened. Although the activity of the Economic Committee continued until recent years the results of their analyses with policy implications have been published only on a very few occasions. The interest in the potential output or capacity of both macro and sectoral levels also began to fade out among policy makers and mass media.

Within the government agencies outside of the EPA, however, intellectual endeavors with Leontief type models have never been discontinued. Those are grouped into three categories. First, the international input-output table compilation and analysis conducted by MITI and the IDE (Institute of Developing Economies) greatly contributed to the strengthening of intellectual infrastructure for East Asian countries in the context of the Japanese and the United States' economies. The MITI project was later extended to the linkages to European input-output tables. The projct also stimulated academic groups to construct multi-country multi-sectoral econometric models through international collaboration.

Second, The Environment Agency of the government has conducted vigorous research projects directly or indirectly. Especially noted among them are global environment modelling with a Leontief matrix [5], Japanese econometric modelling with 60 sectors and KEIO's input-output projects on extensive technological study in environment and recycling activities.

Third, regional input-output analyses which were initiated by the Kansai district and MITI in the early 1960s have been gradually spreading and now all the prefectures have their own tables for 1990. The next tables for 1995 will be due before long and various comparative studies of gravity type are to be conducted, thrownning light on the interesting changes in Japan's regional structure.

Those three points mentioned above seem to suggest that a Leontief model is more flexible than Keynesian type model on which the evaluation tends to vary especially according to the different ideological climates.

4. Capacity Output at Macro- and Sectoral Levels

A. Purpose of the Study and Date Base

A consensus opinion prevailing today that lower growth rates in the 1990s compared with the previous decades are mostly due to the structural factors such as aging of Japan's demographic composition, future concerns of consumers about a likely rise in tax burden, capital outflows due to the lower rate of profit caused by the yen's rising tedency during the 1990s, etc. They argue that the potential GDP or aggregate capacity of Japan's economy has also been stagnant and the gap between the capacity and actual GDP is negligible, say around 5 percent, implying that the acceleration of growth is useless, resuting only in chronic inflation.

Such a low-ceiling hyposesis, however, stands on a fragile empirical basis which relys on a limited number of samples in estimating production functions and unrealistic procedure innormalizing capacity output, as already pointed out by H. Niwa [4].

As observed in the previous attempts by the Econometric Committee, it is likely to obtain more realistic estimates at both aggregate and disaggregated levels, if we use the samples for a much longer period and an improved specification for production function.

In the present paper, the data basis for the production function are mostly taken from an updated version of the EPA's data which cover 45 years between 1955 and 1998 with respect to value added and gross capital stock in 1990 prices, employment, and working hours for eight sectors as below.

1. agriculture, etc.
2, mining
3. manufacturing
4. construction
5. electricity & gas
6. wholesale & retail
7. transport & communication
8. finance and services*

note:* Government services and non-profit organization services are excluded.

For securing continuity, the time series on capital stock were adjusted so that the capital stock owned by the national railway and the public corporation for telephone service and communication before 1990 were integrated into the private capital stock series of transportation and communication.

Working hours data was taken from the Ministry of Labor for establishments employing 30 or more employees.

The period taken for the present analysis covers historical development over the nearly half century including 9 business cycles as compared with the recent quarterly studies on capacity estimation covering only three business cycles or so.

Regarding the industries covered, the present study is still tentative in the sense that agriculture, forestry and fishery are excluded for the time being because of the time necessary for data adjustment. Manufacturing is also covered only as a single sector in the present paper, and we are to elaborate it at a more disaggregate level in the near future. The capacity data by sector is fairly satisfactorily available in manufacturing as will be discussed later.

B. The Model and the Results

Ideally, in estimating production functions the concept of production should be gross, instead of net output or value added. (For instance, see Klein & Kumasaka [3].) For conventional use and comparability, however, we tentatively adopted a sectoral production function approach on a value added basis, disregarding the contributions of intermediate inputs. Although we are fully aware of the bias caused by this approach, we are obliged to be satisfied at this stage, because our present purpose is the measurement of capacity output rather than elaborate estimation of sectoral production functions.

Four types of spcification were attempted for each sector in logarithm (except for and t) as shown below.

type A V f [K, (L*H),u ,t]
type B V/(L*M) - *K/(L*H) = f [u, ,t]
type C V/(L*H) - *K/(L*H) = f [u, ,t]
type D V/(L*H) = F [*K/(L*H), u, ,t]
where: V = real value added (GDP), K = gross capital stock, L = number of employment, H = working

hours, U = the rate of unemployment, t = time trend, = scale factor (= log Vt-i),   = share of capital, = fixed share of capital

Type A indicates an unconstrained function, where U represents a short-run reaction, i.e. short-run shift of the supply curve. Type B is a TFP function, indicating a constrained production function with current share of capital ( ), while type C indicates a constrained function with fixed share of capital ( ). Both types B and C have the common explanatory variables (u, ,and t), where   (= log V) is a shift parameter representing scale effect, i.e. a shift of the long-run supply curve. t is a parameter representing technical change of a Hick-neutrality which is usually positive. A negative t is observed for some sectors as notedlater.

Type D is a hybrid type of type A and type B. The dependent explain variable is not a TFP, but labor productivity which is a function of current share of capital-labor input ratio (*K/(L*H), u, t, and . This type can also be regarded as a variant of type B, since it expects an adjusted value of   with the help of regression. A possibility of a more flexible time lag searching for K, L, and is regarded as the advantage of this approach.

C. The Results

Before estimating sectoral functions, we first attempted four types for an aggregate production function, since it is more familiar among economists. The best estimate for non-agricultural private GDP for 1957 to 1998 turned out to be type D as shown below.

(1957 - 1998: type D)

n[V/(L*H)] = -4.143 + 0.626   n[*K-2/(L*H)]
(-4.2) (7.2)
-0.181   nU + 0.020 time + 2.189 IPR
(-3.7)   (6.4)   (4.5)
+0.200   nV-7
(2.3)

R^2 = 0.997   S.E. = 0.027   D.W. = 1.16

where IPR =   K/V (net fixed investment ratio)

This result was selected after various searching of lag structure, considering the appropriateness and balances between parameter estimates.

Regarding the contributions of capital and labor, the long-run elasticities are about 0.3 for capital, 0.7 for labor, while the elasticity on economies of scale is 0.2 which is relatively low and long delayed as compared with the results of other alternative types of estimation. Strikingly, the value on technical progress remains as high as 2 percent over the past 40 years with a significant t value. The value is particularly important when we consider the fact that the growth of real GDP sharply fell after 1974 due to oil price shock and it further declined during the 1990s.

The relative contributions of all the factors in our production function are summarized as below.

	Growth rate A	Factor input B	TFP C (=A-B)	Technical progress D	Residual item E (=C-D)
1955-73	9.4	4.3	5.1	2.0	3.1
1973-1998	3.2	1.8	1.4	2.0	-0.6

The last column (E.) is interesting, since in the latter period the demand effects of u and IPR weakened substantially, resulting in a negative value of -0.6 percent in sharp contrast with 3.1 percent during the previous period.

Now we turn to the sectoral breakdown of these macroeconomic changes through the sectoral differences in production functions and capacity building.

After attempting four alternative types, we decided to use type C, the version with fixed factor share, with the exception for manufacturing on which type B, a flexible share version, was used. The reason is mostly based on the continuity of the factor share data from SNA statistics, except for manufacturing. Another reason is that the long-run shift from capital to labor in terms factor share is highly significant in manufacturing as compared with other sectors.

The results of our regression analysis are summarized in Table 1, while technical details are attached in the Appendix. Factor shares ( ) represents relative contributions capital input as compared with labor input (1-) whose values are generally in accordance with the conventional findings of economists especially in input-output analysis. As noted before, short-term aggregative demand effects, i.e. unemployment rate (u), are all significant especially in construction, trade, and transport and communication. Scale effects ( ) are important in mining, electricity, etc. and trade, while construction is least responsive to it. For other sectors the scale effects are also significant, indicating the values between 0.1 and 0.2. Regarding technical progress (t), and the time parameter, the values are relatively high in mining, manufacturing, trade, and transport and communication. The high values of t in mining and manufacturing are roughly in accordance with the aggregate production function mentioned earlier. Strikingly observed are the negative trend values for electricity, etc.and finance and services. In view of a growing trend in environment costs the negative value in electric power and gas industries seems to be understable. For finance and service, a heavy protective environment by the Japanese government for banking and insurance sectors which continued until the early 1990s might account for this negative trend, but it requires a more elaborate analysis in our next stage.

D. Capacity Output and the Rate of Operation

Having discussed macro- and sectoral production functions, we can now estimate sectoral capacity output and the rate of operation by sector and also aggregate GDP capacity by summing up those sectoral estimates.

In estimating the capacity, we opted for the approach of measuring maximum output levels by normalizing the unemployment rate and working hours and by taking account of scale effects.

For simplicity we selected the year 1973 as the maximum rate of unitization for all sectors in terms of working hours and the unemployment rate. For two sectors, however, the year 1970 was used as the maximum rate year. The lowest rate of unemployment of 1.1 percent is observed in 1964 which was ommitted due to its inflationary tendency. The adopted figures for normalization are given below.

a. Monthly working hours (1973)

Mining	192
Manufacturing	182
Construction	197
Electricity, etc.	176
Trade	183
Transport & Communication	192*
Finance & Services	180*
Average	183

Note: * is in 1970.

b. Unemployment rate (1973) 1.3%

Regarding the scale effect, we normalize the output by assuming a long-run stationery value when V(t) = V(t-i) (i = time lag). Mining and trade tend to have higher values of capacity because of their larger values in .

The results on sectoral capacity output (or value added) and the rates of operation are indicated in Figures 1 to 2.

First, we take an aggregate figure which is not taken from the aggregate production function discussed earlier, but from the summations of sectral output and capacity estimated from the equations in Table 1. Fig. 1-A clearly indicates a faster growth of capacity GDP or potential GDP with a widening gap between potential and actual GDPs. Fig. 1-B shows a falling trend of the rate of operation (V/Vc), where Vc represents capacity GDP. It is rather surprising that even during the "bubble" period (1988-91) the rate of operation grew quite modestly. Interestingly, this result is broadly in accordance with Niwa's estimation of the aggregate capacity and the rate of operation, although his GDP covers all sectors, including agriculture and government sectors. [4]

Sectoral cycle and trend are shown in Fig. 2. Manufacturing sector in Fig. 2-A also indicates a growing gap, but its performance is slightly better than the average or the aggregate rate of operation. A more detailed study on sub-sectors of manufacturing can be easily conducted from the MITI data in monthly reports on the capacities and their rates of operation. Generally, our estimate for the manufacturing sector as a whole is in accordance with MITI's official figures since 1973. (See [7] for detailed study on manufacturing.)

Fig. 2-B indicates a widely fluctuating pattern of construction, but its falling tendency is faster than the average trend. Electricity and gas industries seem to suffer from the low rate of operation for nearly 40 years except for a boom period between 1967 and 1973.

A similar tendency can be observed in Fig. 2-C for the wholesale and retail sector which is operating under the worst conditions. In the 1990s its deterioration seems to be accelerating, reflecting the conservative behavior of consumers in recent years. The transport and communication sector also shows low operation, but in the 1990's it remains at a slightly higher level than the average. A falling tendency, however, continues in recent years.

The finance and service sector in Fig. 2-D seems to indicate the slightest deterioration. Although the rate fell substantially since 1985, it appears to have hit the bottom at a higher level than the average.

Although, because of a small share of GDP, mining sector is omitted from the above figures, it also indicates an inactive rate of operation which is significantly lower than the average especially after the early 1980s.

Finally, we need to discuss the rate of growth of capacity as compared with the actual rate of growth of the GDP. As shown in Table 2 Japan's capacity tended to grow as fast as actual GDP until 1973, but it was immediately followed bya significant deceleration in the late 1970s. The average growth rate of capacity in the 1980s was around 5.4 percent, while the pace decelerated further in the 1990s to around 3.3 percent. However, as shown in the right column, the gap between the potential and actual GDP continued to widen.

5. Concluding Remarks

As discussed in the earlier sections, Japan's government medium-term plan and its growth target, though supported by its econometric model, has become gradually diverted from the optimum track securing full capacity and full employment growth. This tendency was accelerated especially after the two oil price shocks in the 1970's and the political climate of neo-liberalism in the early 1980's. As pointed out earlier, an explicit linkage between macro- and input-output models which used to be a theoretical core in formulating medium and long-term policy programs has substantially weakened so that the idea of macro and sectoral capacity utilization has also been gradually disregarded.

The growing imbalance discussed above has been causing various adverse impacts, such as, a huge trade surplus with an upward pressure on the yen, stagnant imports discouraging neighbors and the world market, a government fiscal debt accumulation and excessive unemployment breeding serious social unrest, etc.

In order to restore the Japanese economy so as to narrow the present gap, we need a vigorous policy package from the demand side and concrete indicative targets at macro- and sectoral levels. Although our present study still remains at broader categories of the economy, the findings obtained so far seem to suggest more promising results if we concentrate upon several strategic sectors in manufacturing and expand our coverage to agriculture and government services, especially infrastructures. Under the present huge deflationery gap, a "big push" on both private consumptionand fixed investment seems to be essential, which require an elaborate chart of Leontief-Keynesian type, because the market mechanism, or "invisible hand of God" cannot readily solve the present situation.

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Table 1 Summary of Regression Analysis
of Sectoral Production Function

	Factor share (σ)	Unemployment(u)	Scale (λ)	Time (t)	R2	D.W.
Mining	0.379	-0.137 (-3)	0.750	0.020	0.938	0.974
Manufacturing*	0.4□0.2	-0.190 (-4)	0.122	0.021	0.979	1.229
Construction	0.325	-0.330 (-4)	0.059	0.006	0.523	0.707
Electricity, etc.	0.519	-0.233 (-4)	0.432	-0.011	0.841	0.551
Trade	0.240	-0.318 (-2)	0.515	0.013	0.997	1.164
Transport & Communication	0.510	-0.295	0.124 (-1)	0.013	0.958	0.766
Finance & Services	0.451	-0.031 (-1)	0.238	-0.024	0.962	1.064

Note : * current share for sample period. **( ) denotes time lag.

Table 2
Non-agricultural Private GDP:
Capacity (Vc) and Actual (V) and
Rate of Operation (V/Vc)

	VC	V	V/VC
1955			79.6%
1960	6.7%	10.4%	94.0%
1965	11.1%	9.7%	88.2%
1970	10.2%	13.0%	99.7%
1975	9.0%	4.9%	82.6%
1980	5.3%	5.0%	81.3%
1985	5.2%	4.0%	76.9%
1990	5.7%	5.3%	75.7%
1995	3.9%	1.6%	67.7%
1998	2.7%	1.1%	64.5%

Note: The annual rate is the average over the past five years, while the rate of capacity utilization is shown currently.

FIGURES

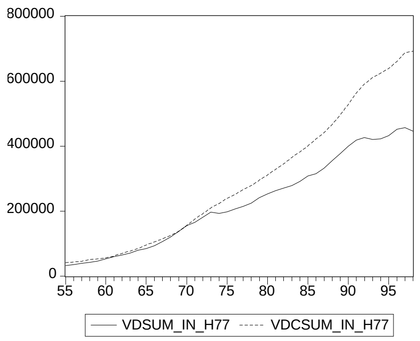

FIG-.1-A NON-AGR. PRIVATE GDP ACTUAL & CAPACITY

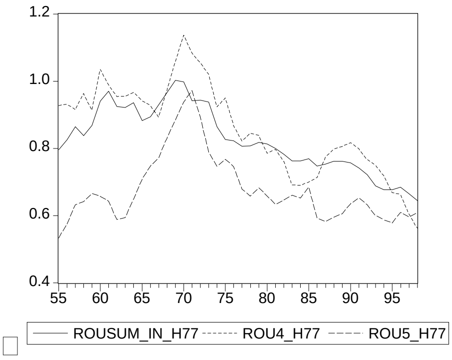

FIG.2-B CONSTRUCTION & ELECTRICITY GAS & AVER.

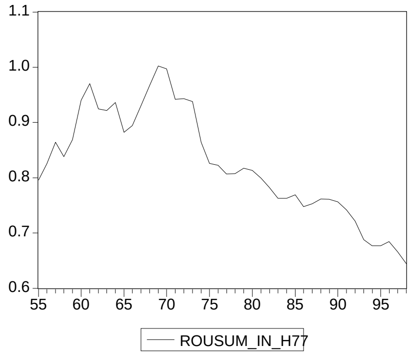

FIG.1-B AVE RATE

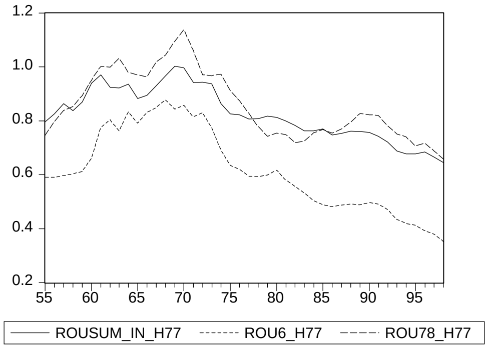

FIG.2-C TRADE,TRANS.& COM.

FIG.2-A MANUF.& AVE.

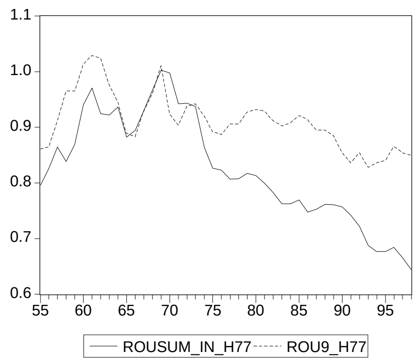

FIG.2-D FINANCE & SERVICES

List Variables

VD ------ real value a dated 200 ---- mining

B\(V) 300 ---- manufacturing
URATE --- unemployment rate, % 400 ---- construction
KP ------ grow capital stock,B\ 500 ---- electricity, gas etc.
L ------- persons engagement 600 ---- trade

(10 thousand) 708 ---- transport &

H ------- Working hours communication
900 ---- finance & service

MINING

DependentVariable:ILOG(VD200/(L200*H200))-0.379*LOG(KP200/(L200*H200))
Method: Least Squares
Date: 08/05/00 Time: 16:03
Sample(adjusted): 1958 1998
Included observations: 41 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.499010	0.502929	-12.92231	0.0000
LOG(URATE)	-0.137130	0.088472	-1.549989	0.1297
TIME	0.020186	0.003570	5.654416	0.0000
LOG(VD200(-3))	0.749760	0.080257	9.342026	0.0000

R-squared	0.942808	Mean dependent var	-1.039288
Adjusted R-squared	0.938171	S.D. dependent var	0.461628
S.E. of regression	0.114786	Akaike info criterion	-1.399024
Sum squared resid	0.487507	Schwarz criterion	-1.231846
Log likelihood	32.67999	F-statistic	203.3143
Durbin-Watson stat	0.973802	Prob(F-statistic)	0.000000

MANUF.

Dependent Variable: LOG(VD300/(L300*H300))-SHARE300*LOG(KP300/(L300*H300))
Method: Least Squares
Date: 07/19/00 Time: 00:00M
Sample(adjusted): 1959 1998
Included observations: 40 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.805385	0.279276	-10.04521	0.0000
LOG(URATE)	-0.190141	0.037195	-5.111947	0.0000
TIME	0.021447	0.002852	7.521126	0.0000
LOG(VD300(-4))	0.121634	0.031467	3.865492	0.0004

R-squared	0.980592	Mean dependent var	-1.106267
Adjusted R-squared	0.978975	S.D. dependent var	0.305969
S.E. of regression	0.044365	Akaike info criterion	-3.298074
Sum squared resid	0.070858	Schwarz criterion	-3.129186
Log likelihood	69.96149	F-statistic	606.3128
Durbin-Watson stat	1.228534	Prob(F-statistic)	0.000000

CONST.

Dependent Variable: LOG(VD400/(L400*H400))-0.325*LOG(KP400/(L400*H400))
Method: Least Squares
Date: 07/19/00 Time: 00:09
Sample(adjusted): 1959 1998
Included observations: 40 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.085785	0.394169	-2.754616	0.0092
LOG(URATE)	-0.330235	0.053887	-6.128338	0.0000
TIME	0.005559	0.003329	1.669829	0.1036
LOG(VD400(-4))	0.059253	0.045954	1.289411	0.2055

R-squared	0.560158	Mean dependent var	-0.579680
Adjusted R-squared	0.523504	S.D. dependent var	0.094214
S.E. of regression	0.065035	Akaike info criterion	-2.533158
Sum squared resid	0.152262	Schwarz criterion	-2.364270
Log likelihood	54.66316	F-statistic	15.28252
Durbin-Watson stat	0.707503	Prob(F-statistic)	0.000001

ELEC&GAS

Dependent Variable: LOG(VD500/(L500*H500))-0.519*LOG(KP500/(L500*H500))
Method: Least Squares
Date: 07/19/00 Time: 00:14
Sample(adjusted): 1959 1998
Included observations: 40 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.048880	0.413493	-9.791902	0.0000
LOG(URATE)	-0.232621	0.063596	-3.657811	0.0008
TIME	-0.010927	0.004818	-2.268169	0.0294
LOG(VD500(-4))	0.432472	0.059853	7.225543	0.0000

R-squared	0.853111	Mean dependent var	-0.806725
Adjusted R-squared	0.840871	S.D. dependent var	0.186479
S.E. of regression	0.074388	Akaike info criterion	-2.264400
Sum squared resid	0.199210	Schwarz criterion	-2.095512
Log likelihood	49.28799	F-statistic	69.69452
Durbin-Watson stat	0.551252	Prob(F-statistic)	0.000000

TRADE

Dependent Variable: LOG(VD600/(L600*H600))-0.24*LOG(KP600/(L600*H600))
Method: Least Squares
Date: 07/19/00 Time: 00:19
Sample(adjusted): 1957 1998
Included observations: 42 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.706926	0.161218	-41.60156	0.0000
LOG(URATE)	-0.318279	0.027286	-11.66455	0.0000
TIME	0.013019	0.002165	6.012334	0.0000
LOG(VD600(-2))	0.514638	0.020275	25.38310	0.0000

R-squared	0.997481	Mean dependent var	-1.545192
Adjusted R-squared	0.997282	S.D. dependent var	0.645437
S.E. of regression	0.033650	Akaike info criterion	-3.855224
Sum squared resid	0.043028	Schwarz criterion	-3.689731
Log likelihood	84.95970	F-statistic	5015.430
Durbin-Watson stat	1.163992	Prob(F-statistic)	0.000000

TRANS&COM

Dependent Variable: LOG(VD708/(L708*H708))-0.5096*LOG(KP708/(L708*H708))
Method: Least Squares
Date: 07/19/00 Time: 18:49
Sample(adjusted): 1956 1998
Included observations: 43 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.457578	0.351694	-6.987827	0.0000
LOG(URATE)	-0.294534	0.039856	-7.389885	0.0000
TIME	0.012952	0.003089	4.192261	0.0002
LOG(VD708(-1))	0.124006	0.042165	2.940986	0.0055

R-squared	0.960922	Mean dependent var	-1.177703
Adjusted R-squared	0.957916	S.D. dependent var	0.203496

S.E. of regression	0.041746	Akaike info criterion	-3.426029
Sum squared resid	0.067966	Schwarz criterion	-3.262196
Log likelihood	77.65962	F-statistic	319.6714
Durbin-Watson stat	0.765889	Prob(F-statistic)	0.000000

FINANCE&SERV.

Dependent Variable: LOG(VD900/(L900A*H900))-0.451*LOG(KP900/(L900A*H900))
Method: Least Squares
Date: 07/19/00 Time: 00:37
Sample(adjusted): 1956 1998
Included observations: 43 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.199461	0.451557	-4.870838	0.0000
LOG(URATE)	-0.030896	0.020415	-1.513405	0.1382
LOG(VD900(-1))	0.237675	0.046310	5.132300	0.0000
TIME	-0.024203	0.002902	-8.339674	0.0000

R-squared	0.965007	Mean dependent var	-0.155648
Adjusted R-squared	0.962315	S.D. dependent var	0.146253
S.E. of regression	0.028392	Akaike info criterion	-4.197036
Sum squared resid	0.031437	Schwarz criterion	-4.033204
Log likelihood	94.23628	F-statistic	358.5003
Durbin-Watson stat	1.064390	Prob(F-statistic)	0.000000