LEADING INDICATORS FOR ECONOMIC RECOVERY

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Leading indicators as defined by students and practitioners of business cycles are:

"Certain (economic) activities that frequently foreshadow changes in aggregate economic activity. They reflect future production and employment. For example, new orders are placed particularly for machinery and other types of equipment; contracts are left for the construction of new plants; investments in materials inventories are made; and new businesses are started. Statistical measures of activities which foreshadow changes in aggregate economic activity are leading indicators. They are signals of things to come." [1]

The indicators that we seek are statistical measures of economic activity that will provide us an idea of the economy's performance a period or two ahead. These choice of leading indicators do not significantly change if our concern focuses on economic recovery. Economic recovery implies a level of economic performance by the economy in relation to a government standard or criterion.

Economie Recovery Criterion

The government standard or criterion for economic recovery is formally stated in the Medium Term Philippine Development Plan 1987-1992. Economic recovery in macroeconomic terms requires that we regain the highest level of real per capita income achieved by the country. This milesone in Philippine economic history was achieved in 1981 when real per capita income hit P1933 in 1972 prices.

"... implementation of essential and consistent policy reforms shall enable the economy to recover and sustain respectable growth during the period 1987-1992 while maintaining internal and external stability.

During the Plan period, real Gross National Product ... is targeted to increase by 6.8 percent on the average. ... In real terms, this represents an average annual increase in per capita income of 4.4 percent during the period, higher than the recorded increase in real per capita income in 1961-1980. This increase in real per capita income shall provide for the recovery of the income of the population which has been set back by ten years when the level in 1985 fell to its 1975 level. It is expected that the 1981 real per capita income of P1,933, the highest ever achieved by the country will be regained in 1991. The targeted level also allows for some improvement in the income level which hinges on the success of the structural reforms which shall continue to be implemented during the Plan period."[2]

DETERMINING LEADING INDICATORS

Although structural reforms have been listed and some have been implemented, quantitatively monitoring the implementation of the structural reforms will prove cumbersome for our purpose here. We have to relate the indicators that we have selected to real income growth. In doing so, we need a time series of these indicators. However some of the structural reforms are policy reforms that are difficult to capture statistically much more so provide for a time series of these. Secondly, inorder to relate it to the statistical measure of income and to provide some basis for the conclusions on the

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indicators' leading relationship with the income, a structural change may prevent us from putting much reliance on the relationship. This is the so called "Lucas Critique". To go around this limitation, by using monthly/quarterly data the gradual manifestations of these structural reforms could be captured. Notice here a reasonable assumption is made. The effect of implementation of most if not all of the structural reforms are gradual. Therefore the indicators that we seek are monthly or quarterly indicators. An externality in using short term data is that these leading indicators could provide us and government indications whether our targets can be met annually.

Notice too that through the statements in the Plan, we could focus our search by limiting ourselves to an income variable. Real per capita income is a ratio of real income in a period to population. In the context of economic recovery, efforts should focus on the search for leading indicators to real national income or real Gross National Product (GNP). Here we will focus on indicators of real income.

Although it is important to know the components of GNP since the knowledge of these will provide some idea of the indicators that we seek, it is not necessary that the targets for these be incrementally achieved. The Plan has set sectoral targets for the components (Table 1). They are sufficient conditions for the economy to recover. The targets and its configuration are not necessary conditions. Some components may overshoot its targets while others may perform below the expectations. As long as real income grows at the required five-year average of 6.8 percent per annum, then economic recovery could be achieved. Whether the growth path and configuration of real income's components are consistent with a sustainable growth tragectory is another (though related) issue. If this issue is important, then the debate between NEDA and CB gains significant proportions. Fortunately, we will not consider this here.

Thus, what is important here would be to relate the leading indicators to our income variable in a systematic and therefore to some extent predictable manner.

REAL INCOME

Real income in the context of the Plan is real GNP. However in arriving at GNP net factor income from abroad is netted out from Gross Domestic Product (GDP). Net factor income from abroad is the difference of factor payments made by the Philippines which includes interest payments on external debt and factor payments from abroad which include Filipino expatriates remittances. Over the past years this National Income Accounts item has always been subtracted from GDP. Thus to attain a GNP level consistent with population growth and the economic recovery criterion, GDP must grow at a certain level. GDP must grow at 6.9 percent. Furthermore, the significant component in net factor income from abroad is interest payments on our external debt. This remains more or less predictable within a range dependent on the LIBOR rates one assumes. As such the relevant income variable to monitor will be Gross Domestic Product.

LIST OF INDICATORS

Here, the indicators that we seek are indicators for GDP. As mentioned above the indicators that could foreshadow the growth of GDP are also indicators for some of the components.

The indicators that would be elaborated here are only a partial list and have been identified and tested jointly by CRC and IDE of Tokyo. The project is called the Short-term Economic Prediction In Asia (SEPIA)-Philippine projects. [3]

From more than 180 monthly variables, it differentiated leading indicators from coincident and lagging variables. By seasonally smoothing the time series and determining reference dates for economic contraction and expansion as measured by these indicators, a list was generated that foreshadows economic downturn and upturn. This was related to real GNP growth rates or coincident indicators of GNP.

The indicators found to be leading indicators are the following:

1) Permit Valuation of Private Building Construction (residential in Metro Manila) PCONRESV;

2) Permit Valuation of Private Building Construction (non-residential in Metro Manila) PCONNRSV;

3) Local Cement Production DCEMEN;

4) Initial Paid-Up Capital for Construction INVECONS;

5) Initial Paid-Up Capital for Manufacturing INVEMANU;

6) Stock Price Index for all items in the stock exchanges STPALL65;

7) Import Coverage of Reserves INCOVRSV;

8) Export Value of Fruits and Vegetables EVIO and of Miscellaneous Food Preparation EVMFP;

9) Unit Value of Coconut Oil in the Philippine market UNICOC70;

10) Wholesale Price of Plywood (Japan) PLYWODWP;

11) Real Currency Issue CURISR;

12) Nominal Lending Rate PKBLR;

13) Philippine Import Price Index PMPI

BRIEF EXPLANATIONS AND PROSPECTIVE INDICATORS[4]

Briefly the first four indicators relate to construction in particular and investments in general. These have been considered leading indicators since they give us an indication as to how construction or investments will move in the future. The level of permit valuation gives us an indication as to the peso level of construction plans to be initiated within the coming months. Obviously, an indicator for these plans to materialize is the level of financing made available by the banking system to bankroll the construction projects.

Local cement production is a temporarily closer indicator to fixed capital investment activity. The temporal closeness is constrained by the shelf life of cement. This usually has a three month lead over the actual construction of the plans. While the fourth indicator, initial paid-up capital for construction, focuses on the construction industry's ability to cope with the prospective demand for construction services. Again this embodied the reading of the construction people about their market.

The next two indicators, like the fourth, contains the perception of businessmen and entrepreneurs about their markets.

This is manifested in their willingness and intentions to invest equity in existing companies or the set-up of new firms. Investments in manufacturing represent the willingness to expand existing capacities or to set up new businesses. To augment our indicator, a monthly series on orders could be constructed.

The stock market price index reflects the confidence of investors in the overall prospects of the firms listed in the stock exchanges. These indicators deal with the expectations of businessmen or entrepreneurs, people in the know in business. The movements signal future movements in the economy. Although the stock offerings and selection in the stock exchanges are not as big as those in Tokyo and New York which would boost confidence in using the indicator, the stock price index in the

smaller stock exchanges like Makati and Manila still provides us a picture of investor confidence. A consistent trend over several months in the index could signal a future movement in the real income variable. In our case a quarterly or a semestral movement in GDP or GNP.

Import Cover or Reserves for a significantly import dependent economy such as the Philippines reflects the ability of the country to purchase the necessary imported capital goods and raw materials or intermediate goods. The importation is essential to keep our factories stocked with the necessary intermediate goods and to provide the capital equipment for maintenance or for an expanded level of economic activity. Without sufficient foreign exchange reserves, the prospects for the economy would not be rosy.

The next three indicators relate to export performance. The export value of food and other miscellaneous manufactures contain the ability of the country to generate foreign exchange necessary for the preceding indicator. Exports are composed of sugar, coconut, copper, logs and most recently garments and semiconductors. These are our leading exports. How these perform has an impact on exports. Moreover, prices of these, especially our exported agricultural products, influence the value of our exports. However, there is usually a trade-off between prices and volume if there is a weather disturbance affecting the production of our agricultural output. Similar to manufacturing orders, it would be ideal to have a monthly series on overseas orders for our exportable products.

Real currency issue and the commercial bank lending rate are financial indicators that impact on investments and consumption. The level of currency in circulation to some extent describes the liquidity in the system. Another measure that would complete the liquidity picture of the system are reserves and loans of the banks. All these would have an impact on consumption and investment purposes, i.e. financing consumer and business requirements for operating and expansion capital.

The movements of the Philippine import price index paints a scenario on the ability of the Philippines to first buy required imported input items and second to sell the products locally. This indicator must be used in tandem with import coverage and with data disaggregated to the type of products especially across countries. This would mean that the terms of trade is affected. Depending on the impact on domestic prices and costs, exports and domestic production can be affected through its impact on demand.

OTHER PROSPECTIVE INDICATORS

Like the indicators listed above which are based on the abstraction of economic activity and based on economic theory, other prospective indicators that could be tested (if and when a sufficiently long time series could be constructed or could be made accessible) are investments data generated by the Board of Investments, importation of capital equipment and raw materials and intermediate goods, the Department of Trade and Industry series on sales volume and sales value of a number of construction and capital equipment-related industrial sectors. Data generated by the Survey of Key Manufacturing Enterprises: Industry Trends for these specific industries could also be tested. Inventory levels of manufacturing and agro-related sectors could provide a better picture of the economy a period or two ahead.

STATISTICAL RELATION TO GDP

Although the indicators used by the SWPIA project relates the indicators to coincident indicators on a

monthly basis, some of the indicators significantly foreshadow fluctuations in GDP. The paper tests this premise by using the identified indicators to capture movements of GDP.

Some of the identified leading indicators are in nominal terms. They have been transformed into real values consistent with the real GDP base.

The time series on the leading indicators were subjected to a deseasonalization procedure used in the U.S. (i.e. X-ll). The growth rates of these deseasonalized date are calculated and averaged to come out with quarterly measures. This is then first subjected to a correlation test with the deseasonalized quarterly series of GDP. A cross correlation is performed to determine the lead periods of the significantly related series to GDP. To determine whether these quarterly leading indicators capture the movements of GDP a regression was performed. Turning points were checked after doing a simulation procedure.

CORRELATION

Correlation coefficients are used to specify the degree of relationship between variables. It provides us a picture of how closely a number of variables move together. However, this statistical measure does not imply casuality between our indicators and GDP. The casuality should have been considered in the selection of the indicators based on some economic theorization.

The correlation step identifies a number of the leading indicators significantly moving together with our quarterly GDP growth rates. The monthly series (averaged to get the quarterly figure) of the growth rate of cement production is positively and significantly related to GDP. Other variables with signigicant simple correlation coefficients are the growth rates of stock price index, investments in construction, wholesale price of coconut oil, real currency issue, interest rates. The negative correlation of the wholesale price of coconut oil with GDP could be caused by the lower volume of coconut oil production. The lower output level may have not been offset by the higher prices such that the value has decreased. Thus the negative impact on GDP.

The correlation matrix also showed some significant levels of potential multicollinearity problems in the event when a regression is estimated. (Table 2)

CROSS CORRELATION

After identifying the significant indicators of GDP, a cross correlation coefficients were calculated for the indicators lagged by 1 to 8 quarters against GDP. This provided information regarding the lead time periods of the indicators.

The variables with zero to three quarter leads are the growth rates of stock price index, real currency issue, cement production, import price index, non-residential construction, interest rates, and plywood prices. The other leading indicators have a longer lead time and would be difficult to check their validity of the length of the lead quarters.

With the information on the length of the lead period for the significant variables, the correlation matrix for these variables with the appropriate lead periods were calculated. Again this is done to check for possible multicollinearity among leading indicators. This is crucial for the regression results. (Table 3)

TRACKING AND TURNING POINTS

The significant leading indicators with the appropriate lead periods were regressed against the dependent variable GDP. A dummy variable was included in the set of explanatory variables (leading indicators) to capture the aberrations during the Crisis years and the

months when political uncertainty regarding the stability of the new government. The political events had a significant impact on the performance of our economy.

Table 4 gives us the regression results and the statistics regarding the explanatory power of the variables selected. To correct for possible autocorrelation a Cochrane-Orcutt Procedure was used yielding better explanatory capability by the model.

This is shown in Table 5.

When simulated, the model does not capture all the turning points. From the second quarter of 1984 to the third quarter of 1986, the model tracks the GDP movement quite well. However, the inadequacies of the model shows its inability to predict the turning points. One could say that additional information is required to improve the models tracking ability. (Figure 1)

As a starting point, the model could very well give us indicators of the quarterly performance of the economy with a root mean square error of 1.06.

CONCLUSION

The exercise in determining leading indicators and how it relates to GDP must be taken as one of several initial steps. With additional effort in developing other indicators and their time series, a better monitoring system for the economy could be designed. The benefits in developing this which starts with better time series data are countless. Government and the private sector could very well react positively with longer lead times.

NOTES:

[1] Julius Shiskin and Leonard H. Lempert, Indicator Forecasting in Willima F. Butler, Robert A. Kavesh, and Robert B. Platt. Methods Business Forecasting. Prentice-Hall, 1974, pp. 42-43.

[2] Medium Term Development Plan 1987 - 1992. Chapter 1. Sec. 4.1. p12.

[3] Ferdinand C. Maquito. SEPIA-PHILIPPINES PROJECT. 1987.

[4] Ibid.

Table 1
REAL CONSUMPTION, INVESTMENT AND EXTERNAL TRANSACTIONS, 1986-92
(Annual percentage change)

	Estimate	Targets						Annual average
	1986	1987	1988	1989	1990	1991	1992	1987-92
Consumption	1.0	3.1	3.7	3.9	4.7	5.2	5.2	4.3
Personal consumption	0.8	1.9	2.8	3.6	4.3	4.8	5.0	3.7
Government consumption	2.7	12.7	9.4	5.8	7.6	7.9	6.3	8.3
Gross Domestic Investment	–3.6	34.4	20.4	16.3	14.8	11.3	10.8	18.0
Fixed investment	–5.6	22.2	19.3	15.2	11.8	13.1	11.6	15.5
Construction	–13.8	24.2	20.5	12.3	11.6	12.2	12.7	15.6
Government	11.9	18.8	10.3	8.1	9.2	10.0	11.9	11.4
Private	–27.0	28.5	28.0	15.0	13.1	13.5	13.2	18.6
Durable equipment	4.3	20.2	18.0	18.1	11.9	13.9	10.4	15.4
External Transactions								
Exports of goods and nonfactor services	8.0	5.4	11.7	10.5	10.3	9.8	8.8	9.4
Imports of goods and nonfactor services	19.7	12.3	9.8	9.6	9.9	9.0	8.9	9.9
Gross Domestic Product Growth Rate (%)	0.4	6.7	7.1	6.7	7.1	6.9	6.7	6.9
Gross National Product Growth Rate (%)	1.1	6.5	6.9	6.7	7.0	6.9	6.7	6.8

Source : NEDA

Table 2.

SMPL 1982.1 - 1988.1
25 Observations

Series	Mean	S.D.	Maximum	Minimum
GDPAGR	0.2536000	4.690586	9.430000	-9.150000
GRSTPA	25.248399	56.276404	159.02000	-24.680000
GRIMCO	13.457200	65.236148	214.25000	-68.470000
GRCEME	1.6871998	17.747953	36.780000	-36.240000
GINVEC	14.632000	61.368209	179.12000	-63.690000
GREVMF	12.523200	22.359906	66.530000	-26.200000
GRCOCW	9.6460002	57.052268	114.41000	-69.370000
GRCURI	1.9732001	15.413332	38.430000	-25.900000
GRPKBL	4.6308001	34.267709	75.760000	-47.960000
DUM1	0.4800000	0.5099020	1.0000000	0.0000000

	Covariance	Correlation
GDPAGR,GDPAGR	21.95199	1.0000000
GDPAGR,GRSTPA	154.55296	0.6008308
GDPAGR,GRIMCO	-13.410385	-0.0455720
GDPAGR,GRCEME	61.780183	0.7716965
GDPAGR,GINVEC	146.71280	0.5299931
GDPAGR,GREVMF	26.017393	0.2579523
GDPAGR,GRCOCW	-23.317533	-0.0893527
GDPAGR,GRCURI	34.537317	0.4967490
GDPAGR,GRPKBL	-60.671967	-0.5218951
GDPAGR,DUM1	0.1522720	0.0662032
GRSTPA,GRSTPA	3040.3523	1.0000000
GRSTPA,GRIMCO	277.70386	0.2206624
GRSTPA,GRCEME	521.74761	0.5441450
GRSTPA,GINVEC	238.12646	0.0718235
GRSTPA,GREVMF	-245.94297	-0.2035949
GRSTPA,GRCOCW	512.65230	0.1736216
GRSTPA,GRCURI	440.44971	0.5289349
GRSTPA,GRPKBL	-1066.0073	-0.5758078
GRSTPA,DUM1	10.521568	0.3819409
GRIMCO,GRIMCO	4085.5248	1.0000000
GRIMCO,GRCEME	22.480256	0.0265230
GRIMCO,GINVEC	584.60349	0.1521102
GRIMCO,GREVMF	-507.87932	-0.4198157
GRIMCO,GRCOCW	-1924.1255	-0.5310721
GRIMCO,GRCURI	-89.438540	-0.0926550
GRIMCO,GRPKBL	-930.24851	-0.4521040
GRIMCO,DUM1	-7.8974559	-0.2473096
GRCEME,GRCEME	302.39026	1.0000000
GRCEME,GINVEC	417.79057	0.3995726
GRCEME,GREVMF	156.36760	0.4104472
GRCEME,GRCOCW	-19.161487	-0.0194397
GRCEME,GRCURI	172.21948	0.6557922
GRCEME,GRPKBL	-400.48957	-0.6859391
GRCEME,DUM1	2.1777441	0.2506690
GINVEC,GINVEC	3015.4147	1.0000000
GINVEC,GREVMF	356.98341	0.2709963
GINVEC,GRCOCW	-1225.1629	-0.3594668
GINVEC,GRCURI	37.531918	0.0413323
GINVEC,GRPKBL	-670.21539	-0.3419365
GINVEC,DUM1	-1.0641600	-0.0354247
GREVMF,GREVMF	479.96676	1.0000000
GREVMF,GRCOCW	392.49570	0.3160628
GREVMF,GRCURI	81.172603	0.2544093
GREVMF,GRPKBL	-64.964752	-0.0883185
GREVMF,DUM1	1.9304640	0.1763737
GRCOCW,GRCOCW	3213.0095	1.0000000
GRCOCW,GRCURI	-41.671576	-0.0486801
GRCOCW,GRPKBL	614.25656	0.3227551
GRCOCW,DUM1	16.944720	0.5903511
GRCURI,GRCURI	228.06797	1.0000000
GRCURI,GRPKBL	-368.58846	-0.7269230
GRCURI,DUM1	2.4432640	0.3238292
GRPKBL,GRPKBL	1127.3049	1.0000000
GRPKBL,DUM1	-4.0603042	-0.2420606
DUM1,DUM1	0.2496000	1.0000000

Table 3.

SMPL 1983.4 - 1980.1
10 Observations

Series	Mean	S.D.	Maximum	Minimum
GDPAGR	-0.6550000	5.0405803	7.4300000	-9.1500000
GRSTPA(-1)	35.363333	61.901046	159.02000	-14.310000
GRSTPA(-2)	32.361110	62.048162	159.02000	-14.310000
GRIMCO(-4)	22.759444	43.929177	214.25000	-60.470000
GRCEME	-0.5455556	20.112767	36.730000	-36.240000
GINVEC(-3)	2.6572221	50.669740	114.21000	-63.600000
GREVMF(-5)	11.619444	24.900353	66.530000	-26.200000
GRCOCW(-5)	2.3638891	61.971242	114.41000	-69.370000
GRCURI(-2)	2.2311112	19.119755	30.430000	-25.900000
GRPKBL(-4)	3.7255556	30.172450	75.760000	-47.960000
DUM1	0.5555556	0.5113100	1.0000000	0.0000000

	Covariance	Correlation
GDPAGR,GDPAGR	24.081691	1.0000000
GDPAGR,GRSTPA(-1)	245.84062	0.8316930
GDPAGR,GRSTPA(-2)	220.02307	0.7706580
GDPAGR,GRIMCO(-4)	220.06231	0.7904031
GDPAGR,GRCEME	20.521501	0.0106251
GDPAGR,GINVEC(-3)	190.23491	0.4528764
GDPAGR,GREVMF(-5)	-63.268036	-0.5327791
GDPAGR,GRCOCW(-5)	-223.43734	-0.7560210
GDPAGR,GRCURI(-2)	56.613294	0.6551751
GDPAGR,GRPKBL(-4)	-119.04092	-0.6539048
GDPAGR,DUM1	0.5930889	0.2435506
GRSTPA(-1),GRSTPA(-1)	3820.2251	1.0000000
GRSTPA(-1),GRSTPA(-2)	3134.6535	0.8031123
GRSTPA(-1),GRIMCO(-4)	2406.7690	0.5557630
GRSTPA(-1),GRCEME	829.99201	0.7049637
GRSTPA(-1),GINVEC(-3)	1980.9026	0.5008660
GRSTPA(-1),GREVMF(-5)	-455.71717	-0.3126472
GRSTPA(-1),GRCOCW(-5)	-2760.1625	-0.7608732
GRSTPA(-1),GRCURI(-2)	644.08652	0.6072347
GRSTPA(-1),GRPKBL(-4)	-1720.6096	-0.7200111
GRSTPA(-1),DUM1	12.425926	0.4151539
GRSTPA(-2),GRSTPA(-2)	3635.3837	1.0000000
GRSTPA(-2),GRIMCO(-4)	2250.5426	0.5191757
GRSTPA(-2),GRCEME	710.92703	0.6032396
GRSTPA(-2),GINVEC(-3)	1437.0208	0.4405351
GRSTPA(-2),GREVMF(-5)	-342.07302	-0.2275966
GRSTPA(-2),GRCOCW(-5)	-2392.1920	-0.6395859
GRSTPA(-2),GRCURI(-2)	564.40236	0.5315855
GRSTPA(-2),GRPKBL(-4)	-1725.4909	-0.7714349
GRSTPA(-2),DUM1	7.1703268	0.2396105
GRIMCO(-4),GRIMCO(-4)	5168.0676	1.0000000
GRIMCO(-4),GRCEME	753.86706	0.5364610
GRIMCO(-4),GINVEC(-3)	2141.6065	0.5506105
GRIMCO(-4),GREVMF(-5)	-1037.3659	-0.5962667
GRIMCO(-4),GRCOCW(-5)	-2375.9094	-0.5487238
GRIMCO(-4),GRCURI(-2)	903.39949	0.7175277
GRIMCO(-4),GRPKBL(-4)	-1200.5521	-0.4531369
GRIMCO(-4),DUM1	4.2975308	0.1202993
GRCEME,GRCEME	382.04706	1.0000000
GRCEME,GINVEC(-3)	307.71175	0.2909891
GRCEME,GREVMF(-5)	-208.40990	-0.5253552
GRCEME,GRCOCW(-5)	-805.03895	-0.8413025
GRCEME,GRCURI(-2)	101.64394	0.2953119
GRCEME,GRPKBL(-4)	-232.31814	-0.3203944
GRCEME,DUM1	3.6075310	0.3796673
GINVEC(-3),GINVEC(-3)	2926.9466	1.0000000
GINVEC(-3),GREVMF(-5)	-382.11591	-0.2765964
GINVEC(-3),GRCOCW(-5)	-1695.3309	-0.5203178
GINVEC(-3),GRCURI(-2)	611.68510	0.6420664
GINVEC(-3),GRPKBL(-4)	-832.63611	-0.4140677
GINVEC(-3),DUM1	11.866543	0.4414122
GREVMF(-5),GREVMF(-5)	505.50161	1.0000000
GREVMF(-5),GRCOCW(-5)	627.05981	0.4302658
GREVMF(-5),GRCURI(-2)	-155.41951	-0.3647298
GREVMF(-5),GRPKBL(-4)	80.069330	0.0891937
GREVMF(-5),DUM1	-0.7096914	-0.0656737
GRCOCW(-5),GRCOCW(-5)	3627.0774	1.0000000
GRCOCW(-5),GRCURI(-2)	-847.27580	-0.7909247
GRCOCW(-5),GRPKBL(-4)	1693.8801	0.7581690
GRCOCW(-5),DUM1	-21.174383	-0.7075544
GRCURI(-2),GRCURI(-2)	310.08522	1.0000000
GRCURI(-2),GRPKBL(-4)	-526.05992	-0.8052977
GRCURI(-2),DUM1	1.3138271	0.4930032
GRPKBL(-4),GRPKBL(-4)	1376.1040	1.0000000
GRPKBL(-4),DUM1	-7.3686420	-0.3997392
DUM1,DUM1	0.2469136	1.0000000

Table 4.

Covariance Matrix

C,C	0.315504	C,GRSTPA(-1)	-0.002499
C,GRCEME	-0.006537	C,GRCURI(-2)	0.006223
C,DUM1	-0.273566	GRSTPA(-1),GRSTPA(-1)	7.21D-05
GRSTPA(-1),GRCEME	-0.000129	GRSTPA(-1),GRCURI(-2)	-0.000111
GRSTPA(-1),DUM1	0.000238	GRCEME,GRCEME	0.000500
GRCEME,GRCURI(-2)	0.000156	GRCEME,DUM1	-0.003678
GRCURI(-2),GRCURI(-2)	0.000542	GRCURI(-2),DUM1	-0.006235
DUM1,DUM1	0.499240		

RMSE = 1.055960

Residual Plot	obs	RESIDUAL	ACTUAL	FITTED
	83.4	-0.64634	-2.83000	-2.18366
	84.1	-1.12139	-4.42000	-3.29861
	84.2	1.52394	-3.21000	-4.73394
	84.3	-0.37153	-9.15000	-8.77847
	84.4	-1.00567	-7.51000	-6.50433
	85.1	0.09545	-4.92000	-5.01545
	85.2	0.53483	-6.38000	-6.91483
	85.3	0.72605	-3.52000	-4.24605
	85.4	-0.82201	-2.56000	-1.73799
	86.1	0.39626	-1.06000	-1.45626
	86.2	-0.09267	-0.55000	-0.45733
	86.3	0.09926	3.82000	3.72074
	86.4	-1.11195	4.63000	5.74195
	87.1	2.65942	7.43000	4.77058
	87.2	0.06429	3.61000	3.54571
	87.3	-0.25386	4.90000	5.15386
	87.4	-1.86112	4.54000	6.40112
	88.1	1.10704	5.39000	4.20296

SMPL 1983.4 - 1988.1
18 Observations
LS // Dependent Variable is GDPAGR

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	0.3795449	0.5616971	0.6757110	0.511
GRSTPA(-1)	-0.0167165	0.0084890	1.9691902	0.071
GRCEME	0.1640705	0.0223525	7.3401321	0.000
GRCURI(-2)	0.1405773	0.0232766	6.0394179	0.000
DUM1	-3.3423449	0.7065689	-4.7303877	0.000

R-squared	0.953697	Mean of dependent var	-0.655000
Adjusted R-squared	0.939450	S.D. of dependent var	5.049580
S.E. of regression	1.242544	Sum of squared resid	20.07092
Durbin-Watson stat	2.551844	F-statistic	66.94006
Log likelihood	-26.52099		

Covariance Matrix

C,C	0.244051	C,GRSTPA(-1)	-0.001790
C,GRCEME	0.004558	C,GRCURI(-2)	0.006062
C,DUM1	-0.262370	C,AR(1)	0.048274
GRSTPA(-1),GRSTPA(-1)	4.39D-05	GRSTPA(-1),GRCEME	-8.22D-05
GRSTPA(-1),GRCURI(-2)	-7.77D-05	GRSTPA(-1),DUM1	0.000692
GRSTPA(-1),AR(1)	-0.000227	GRCEME,GRCEME	0.000310
GRCEME,GRCURI(-2)	0.000107	GRCEME,DUM1	-0.003146
GRCEME,AR(1)	0.000583	GRCURI(-2),GRCURI(-2)	0.000416
GRCURI(-2),DUM1	-0.007346	GRCURI(-2),AR(1)	0.001731
DUM1,DUM1	0.443931	DUM1,AR(1)	-0.079173
AR(1),AR(1)	0.080149		

RMSE = 1.070655

Residual Plot	obs	RESIDUAL	ACTUAL	FITTED
	83.4	0.07280	-2.83000	-2.90280
	84.1	-1.29534	-4.42000	-3.12466
	84.2	1.16118	-3.21000	-4.37118
	84.3	0.10591	-9.15000	-9.25590
	84.4	-1.24597	-7.51000	-6.26403
	85.1	-0.33368	-4.92000	-4.58632
	85.2	0.48575	-6.38000	-6.86575
	85.3	0.88887	-3.52000	-4.40887
	85.4	-0.51513	-2.56000	-2.04487
	86.1	0.16066	-1.06000	-1.22066
	86.2	0.14405	-0.55000	-0.69405
	86.3	0.16930	3.82000	3.65070
	86.4	-1.03133	4.63000	5.66133
	87.1	2.22085	7.43000	5.20915
	87.2	0.85858	3.61000	2.75142
	87.3	-0.29831	4.90000	5.19831
	87.4	-2.04400	4.54000	6.58400
	88.1	0.49578	5.39000	4.89422

SMPL 1983.4 - 1988.1
18 Observations
LS // Dependent Variable is GDPAGR
Convergence achieved after 2 iterations

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	0.3254795	0.4940148	0.6588457	0.522
GRSTPA(-1)	0.0184340	0.0066229	2.7835052	0.017
GRCEME	0.1601852	0.0175963	9.1033617	0.000
GRCURI(-2)	0.1381542	0.0203893	6.7758081	0.000
DUM1	-3.3310607	0.6662816	-4.9994906	0.000
AR(1)	-0.3552101	0.2831059	-1.2546896	0.233

R-squared	0.960046	Mean of dependent var	-0.655000
Adjusted R-squared	0.943399	S.D. of dependent var	5.049580
S.E. of regression	1.201348	Sum of squared resid	17.31884
Durbin-Watson stat	2.289574	F-statistic	57.66921
Log likelihood	-25.19370		

Figure 1.