



*Monetary and Banking Research Academy  
Affiliated to the Central Bank of Iran*

# **Macroeconometric Model of Iran**

**Version 6.0**

(General Technical Document)

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## Table of Contents

Introduction .....	5
Exogenous policy variables.....	5
Exogenous slack variables .....	6
Dummy variables definitions .....	6
Endogenous variables.....	6
Identities .....	12
Equations .....	12
System of equations.....	13
Foreign sector.....	13
Monetary sector.....	15
Government sector .....	17
Real sector.....	18
Nominal values.....	20
Price.....	23
Labor market .....	26
Block structure of the model .....	28
Special characteristics .....	30
Theoretical mechanism and functioning .....	32
Foreign sector.....	32
Monetary sector.....	33
Public sector .....	36
Real sector.....	36
Nominal section .....	37
Price section .....	37
Labor market .....	37
Verifying the identities .....	38
Method 1: Artificial correctness of the data.....	38
Method 2: Using add factor.....	38
Method 3: Bridge regression without residual term.....	39
Method 4: Bridge regression with residual term.....	39
Stock and flow variables relations.....	41
Method 1: Converting stock variable to flow variable.....	41
Method 2: Converting flow variable to stock variable.....	41
Time structure and lagged variables.....	42
Structural changes and qualitative variables .....	43
Estimation.....	44
Plot of residuals.....	60
Numerical model .....	65

Evaluations .....	81
Evaluations for 1959-2003 ex-post simulation .....	83
Evaluation of model forecasting power .....	104
Shock analysis .....	115
Forecasting .....	126
National policy assumptions .....	127
Foreign exchange system .....	127
Trade reforms .....	127
Foreign investment .....	128
Monetary policies .....	128
Fiscal policy .....	129
International environment .....	130
Forecast summary .....	131
Policy issues and uncertainty .....	133
Computer programs .....	135
Program CALC14.PRG .....	135
Program EVAL200.PRG .....	138
Program EVAL200FORCASTABILITY.PRG .....	142
Program SHOCK200.PRG .....	146
References .....	153
Farsi .....	153
English .....	153

## General Features

Name: Macroeconometric Model of Iran

Version: 6.00

Date: October 2004

Organization: Monetary and Banking Research Academy

Supervisor: Bijan Bidabad

Time structure: Annual medium term model

Purpose: Policy analyses and forecasting

Estimation: Ordinary Least Squares

Sample period: 1959-2003

Software: EViews (Econometric Views), Version 4.1

Simulation: Gauss-Seidel dynamic solution

Sectors: Foreign, monetary, government, real, nominal, price-exchange rate-wage, labor

Dynamism: 1 year lag, time accumulation, first order integrity removal

Mathematical structure: Linear in parameters and nonlinear and linear in variables

Total number of behavioral equations: ..... 200

Number of stochastic equations: ..... 65

Number of identities: ..... 135

Number of endogenous variables: ..... 200

Number of exogenous policy variables: ..... 20

Number of exogenous slack variables: ..... 4

Total number of exogenous variables: ..... 68

Number of lagged endogenous variables: ..... 108

Total number of predetermined variables: ..... 170

Total number of variables: ..... 370

Number of coefficients: ..... 208

## Introduction

The macro econometric model of Iran is one the most generalized and extensive models of Iran. This model has 200 equations, 65 of which are stochastic and 135 equations are identities.

The number of endogenous variables is equal to the number of equations and is equal to 200 variables. This model has 20 exogenous policy variables, 4 auxiliary exogenous variables and 38 qualitative explanatory variables in equations and identities, which along with one variable in the form of unit vector as a whole, would become 62 exogenous variables. Number of lagged variables is 108 variables which along with exogenous variables would be 180 predetermined variables. So, the whole variables of the model would be 370. In the case of adding the "add factors" to the model, the number of variables would be (370-570). The number of variables would be varied in different analytical cases, such as shock analysis, ex-post solution, dynamic solution and forecasting. We deliberately, due to special cases and arguments use "add factor" less or more. This model has 208 parameters, which would be estimated with the use of ordinary least squares method by applying time series data for the period of years 1959-2003. Endogenous variables are the variables on the left side of the equations, which can be clearly found by looking at each equation.

### Exogenous policy variables

'1	IRKAD:	Capital account in balance of payments, million Dollars
'2	OECDP:	Foreign consumer price index of industrial countries
'3	IRCIFP:	Import CIF price index
'5	IRWPOIL:	Weighted price of Iran's oil in international markets, Dollars
'6	IRYOILB:	Production of oil, million barrels per year
'7	IREO:	Official exchange rate, Rials/Dollar
'8	IREX:	Export exchange rate, Rials/Dollar
'9	LIBOR:	London inter bank offer rate, percent
'10	IRFEOAV:	Foreign exchange obligation account, billion Rials
'11	IRGRDSV:	Sales of Dollars at unofficial exchange market, billion Rials
'12	IRGECV:	Government current expenditures, billion Rials
'13	IRGEDV:	Government development expenditures, billion Rials
'14	IRGESPV:	Government special payments expenditures, billion Rials
'15	IRGEFIV:	Government foreign investment expenditures, billion Rials
'16	IRPDOIL:	Index of domestic price of oil products
'17	IRIRS:	Saving deposits weighted average interest rate (banking system)
'18	IRIRL:	Loans weighted average interest rate (banking system)
'19	IROLPV:	Government budget obligatory loans granted to private sector
'20	IROLGV:	Government budget obligatory loans granted to government sector
'21	IRMACHIMV:	Ratio of import of machineries and equipments to total current import

### Exogenous slack variables

'IRWARCD:	War damages on construction
'IRWARED:	War damages on equipment
'IRWARMD:	War damages on materials
'IRYEAR:	Iranian year

### Dummy variables definitions

'General features of dummy variables are as indicated by following expressions:

$00 \geq cd \geq 05$  ;  $59 \geq ab \geq 99$  ; a, b, c, d are digits

'The symbols "a", "b", "c" and "d" are numeric digits.

'IRDab = {1: For the year 19(20)ab ; 0: Otherwise}

'IRDabcd = {1: for the period of 19(20)ab to 19(20)cd ; 0: Otherwise I cd=00 refers to the year 2000}

'All dates are in Gregorian calendar, to convert to Iranian year decrease Iranian year number by 621.

### Endogenous variables

IRTBD	1:Balance of trade, million Dollars
IRSBD	2:Balance of services, million Dollars
IRCAD	3:Current account, million Dollars
IRBOPD	4:Balance of payments, million Dollars
IRXGD	5:Export of goods, million Dollars
IRXNFS	6:Export of non-factor services, million Dollars
IRMNFS	7:Import of non-factor services, million Dollars
IRXGNOD	8:Export of non-oil goods, million Dollars
IRMGD	9:Import of goods, million Dollars
IRXSD	10:Export of services, million Dollars
IRMSD	11:Import of services, million Dollars
IRFYSB	12:Balance of factor income services, million Dollars
IRNFSB	13:Balance of non-factor income services, million Dollars
IRBOPDC	14:Cumulative balance of payments, million Dollars
IRBOPEOD	15:Balance of payments errors and omissions, million Dollars
IRKADC	16:Cumulative capital account, million Dollars
IRCADC	17:Cumulative current account, million Dollars
IRTBDC	18:Cumulative balance of trade, million Dollars
IRSBDC	19:Cumulative balance of services, million Dollars
IRNTRD	20:Net transfers, million Dollars
IRFYSBDC	21:Cumulative balance of factor income services, million Dollars
IRNFSBDC	22:Cumulative balance of non-factor income services, million Dollars
IRXOILD	23:Export of oil, million Dollars
IRXOILB	101:Export of oil, million barrels/year

IRXNFSODP	102:Export of non-factor services, million Dollars
IRMNFSDCIFP	103:Import of non-factor services, million Dollars
IRMGDCIFP	104:Real import of goods, million Dollars
IRXGNODOP	105:Real export of non-oil goods, million Dollars
IRMFYSD	106:Import of factor income services, million Dollars
IRXFYSD	107:Export of factor income services, million Dollars
IRBOPEODC	108:Cumulative balance of payments errors and omissions, million Dollars
IRNTRDC	109:Cumulative net transfers, million Dollars
IRM2NGV	201:Net claim of banking system to government sector (including public government), billion Rials
IRM2NGGV	202:Net claim of banking system to public government, billion Rials
IRM2NGSV	203:Net claim of banking system to government sector (excluding public government) at constant prices, billion Rials
IRM2NPV	204:Net claim of banking system to private sector at constant prices, billion Rials
IROLVC	205:Cumulative obligatory loans in government budget, billion rials
IROLV	206:Obligatory loans in government budget, billion rials
IRDDV	207:Demand deposits of private sector, billion Rials
IRSDV	208:Saving and time deposits of private sector, billion Rials
IRCUV	209:Currency in hands of public, billion Rials
IRM2V	210:Liquidity, billion Rials
IRM2NFAV	211:Net foreign assets of banking system, billion Rials
IRM2NWW	212:Net worth and net of other items of banking system, billion Rials
IRM2NPVPGDPM	301:Net claim of banking system to private sector at constant prices, billion Rials
IRM2NGSVPGDPM	302:Net claim of banking system to government sector (excluding public government) at constant prices, billion Rials
IRM2NFAD	303:Net foreign assets of banking system, million Dollars
IRDDVPGDPM	304:Real demand deposits of private sector, billion Rials
IRSDVPGDPM	305:Real saving and time deposits of private sector, billion Rials
IRCUVPGDPM	306:Real currency in hands of public, billion Rials
IRGBDVC	401:Cumulative government budget deficit, billion Rials
IRGRV	402:Government revenue, billion Rials
IRGRTV	403:Government tax revenue, billion Rials
IRGEV	404:Government expenditure, billion Rials
IRGBDV	405:Government budget deficit, billion Rials
IRGESV	406:Government special expenditures, billion Rials
IRGEFIDC	407:Cumulative government expenditures in foreign investment, million Dollars
IRGRTIV	501:Government indirect tax revenue, billion Rials
IRGROILV	502:Government oil revenue, billion Rials

IRGRMV	503:Government miscellaneous revenue, billion Rials
IRGRSV	504:Government special revenue, billion Rials
IRGRTDV	505:Government direct tax revenue, billion Rials
IRAD	601: Aggregate demand at constant prices, billion Rials
IRAS	602: Aggregate supply at constant prices, billion Rials
IROUTPUT	603:Aggregate output at constant prices, billion Rials
IRGNS	604:Gross national saving at constant prices, billion Rials
IRNNS	605:Net national saving at constant prices, billion Rials
IRX	606:Export at constant prices, billion Rials
IRM	607:Import at constant prices, billion Rials
IRBOT	608: Balance of trade at constant prices, billion Rials
IRGDEM	609: Gross domestic expenditure at market prices at constant prices, billion Rials
IRSP	610: Private saving at constant prices, billion Rials
IRTOT	611:Terms of trade, billion Rials
IRGDIM	612:Gross domestic income at market prices at constant prices, billion Rials
IRDIS	613:Discrepancies at constant prices, billion Rials
IRGNPM	614:Gross national product at market prices at constant prices, billion Rials
IRGNIM	615:Gross national income at market prices at constant prices, billion Rials
IRNNIF	616:Net national income at factor cost at constant prices, billion Rials
IRNFY	617:Net factor income at constant prices, billion Rials
IRNIT	618:Indirect taxes at constant prices, billion Rials
IRK	619:Capital stock at constant prices, billion Rials
IRGDPM	620:Gross domestic product at market prices at constant prices, billion Rials
IRYD	621:Disposable income at constant prices, billion Rials
IRI	622:Investment at constant prices, billion Rials
IRIT	623:Indirect taxes at constant prices, billion Rials
IRSUB	624:Subsidies at constant prices, billion Rials
IRGDPF	625:Gross domestic product at factor cost at constant prices, billion Rials
IRIG	701:Government investment at constant prices, billion Rials
IRG	702:Government consumption at constant prices, billion Rials
IRGDPNF	703:Non-oil gross domestic product at market prices at constant prices, billion Rials
IRMG	704:Import of goods at constant prices, billion Rials
IRMNFS	705:Import if non-factor services at constant prices, billion Rials
IRIP	706:Private investment at constant prices, billion Rials
IRVAOIL	707:Value added of oil at constant prices, billion Rials
IRCCA	708:Capital consumption allowances at constant prices, billion Rials



IRC	709:Private consumption at constant prices, billion Rials
IRXFY	710:Export of factor income from abroad at constant prices, billion Rials
IRMFY	711:Import of factor income from abroad at constant prices, billion Rials
IRXOIL	712:Oil export at constant prices, billion Rials
IRXNOILG	713:Export of goods at constant prices, billion Rials
IRXNFS	714:Export of non factor services at constant prices, billion Rials
IRINPUT	715:Input of production at constant prices, billion Rials
IRII	716:Changes in inventory at constant prices, billion Rials
IRADV	801: Aggregate demand at current prices, billion Rials
IRASV	802: Aggregate supply at current prices, billion Rials
IROUTPUTV	803: Aggregate output at current prices, billion Rials
IRINPUTV	804: Aggregate input at current prices, billion Rials
IRGNSV	805:National saving at current prices, billion Rials
IRNNSV	806:Net national saving at current prices, billion Rials
IRXV	807:Export at current prices, billion Rials
IRMV	808:Import at current prices, billion Rials
IRBOTV	809: Balance of trade at current prices, billion Rials
IRGDEM	810: Gross domestic expenditure at market prices at current prices, billion Rials
IRSPV	811: Private saving at current prices, billion Rials
IRKV	812:Capital stock at current prices, billion Rials
IRGDIMV	813:Gross domestic income at market prices at current prices, billion Rials
IRGNIMV	814:Gross national income at market prices at current prices, billion Rials
IRNNIFV	815:Net national income at factor cost at current prices, billion Rials
IRGDPNFV	816:Non-oil gross domestic product at market prices at current prices, billion Rials
IRGNPMV	817:Gross national products at market prices at current prices, billion Rials
IRGDPMV	818:Gross domestic products at market prices at current prices, billion Rials
IRYDV	819:Disposable income at current prices, billion Rials
IRCCAV	820:Capital consumption allowances at current prices, billion Rials
IRIV	821:Investment at current prices, billion Rials
IRDISV	822:Discrepancies at current prices, billion Rials
IRNITV	823:Net indirect taxes at current prices, billion Rials
IRNFYV	824:Net factor income at current prices, billion Rials
IRGDPFV	825:Gross domestic product at factor cost at current prices, billion Rials
IRGV	901:Government consumption at current prices, billion Rials

IRIGV	902:Government investment at current prices, billion Rials
IRSUBV	903:Subsidies at current prices, billion Rials
IRCV	904:Private consumption at current prices, billion Rials
IRVAOILV	905:Value added of oil sector at current prices, billion Rials
IRMGV	906:Import of goods at current prices, billion Rials
IRMNFSV	907:Import of non-factor services at current prices, billion Rials
IRXFYV	908:Export of factor income from abroad at current prices, billion Rials
IRMFYV	909:Import of factor income from abroad at current prices, billion Rials
IRITV	910:Indirect taxes at current prices, billion Rials
IRIPV	911:Private investment at current prices, billion Rials
IRXOILV	912:Oil export at current prices, billion Rials
IRXNOILGV	913:Non-oil goods export at current prices, billion Rials
IRXNFSV	914:Non-factor services export at current prices, billion Rials
IRIIV	915:Changes in inventory at current prices, billion Rials
IRPA	1001: Implicit price deflator corresponding aggregate demand and supply
IRPGDPF	1002: Gross domestic product at factor cost, implicit price deflator
IRPGNS	1003:Gross national saving implicit price deflator
IRPNNS	1004:Net national saving implicit price deflator
IRPMG	1005:Import of goods implicit price deflator
IRPMNFS	1006:Import of non factor services implicit price deflator
IRPXOIL	1007:Export of oil implicit price deflator
IRPXNOILG	1008:Export of non-oil goods implicit price deflator
IRPXNFS	1009:Export of non-factor services implicit price deflator
IRPBOT	1010: Balance of trade implicit price deflator
IRPGDEM	1011: Gross domestic expenditure at market prices, implicit price deflator
IRPSP	1012: Private saving implicit price deflator
IRPK	1013:Capital stock implicit price deflator
IRPGDPM	1014:Gross domestic product implicit price deflator
IRPC	1015:Private consumption implicit price deflator
IRPIG	1016:Government investment implicit price deflator
IRPIP	1017:Private investment implicit price deflator
IRPG	1018:Government consumption implicit price deflator
IRPNIT	1019:Net indirect taxes implicit price deflator
IRPM	1020:Import implicit price deflator
IRPX	1021:Export implicit price deflator
IRPNFY	1022:Net factor income from abroad implicit price deflator
IRPXFY	1023:Export of factor income from abroad implicit price deflator
IRPMFY	1024:Import of factor income from abroad implicit price deflator

IRPVAOIL	1025:Oil value added implicit price deflator
IRPI	1026:Investment implicit price deflator
IRINFCPI	1027:Inflation rate, consumer price index
IRINFWPI	1028:Inflation rate, wholesale price index
IRPGNPM	1029:Gross national product implicit price deflator
IRPDIS	1030:Discrepancies implicit price deflator
IRPGDIM	1031:Gross domestic income implicit price deflator
IRPGNIM	1032:Gross national income implicit price deflator
IRPYD	1033:Disposable income implicit price deflator
IRPNNIF	1034:Net national income implicit price deflator
IRPGDPNF	1035:Non-oil gross domestic product implicit price deflator
IRPIT	1036: Indirect taxes implicit price deflator
IRPSUB	1037: Subsidies implicit price deflator
IRPOUTPUT	1038: Output implicit price deflator
IRPII	1039: Changes in inventory implicit price deflator
IREM	2001:Market exchange rate, Rials/Dollar 2002:Effective exchange rate for non-oil goods and services, Rials/Dollar
IREENOIL	
IRWPIM	2003:Wholesale price index for imported goods
IRWPIX	2004:Wholesale price index for exported goods 2005:Wholesale price index for domestically produced and consumed goods
IRWPID	
IRWPI	2006:Wholesale price index
IRCPI	2007:Consumer price index
IRIRNB	2008:Non-organized market interest rate
IRPCCA	2009:Capital consumption allowances implicit price deflator
IRPINPUT	2010: Input implicit price deflator
IRWIND	3001:Wage index
IRPOPA	3002:Active population, thousands
IRUNEMP	3003:Unemployment, thousands
IRUNEMPR	3004:Unemployment rate, percent
IRPOPAPOP	3101:Active population, ratio
IRPOP	3102:Population, thousands
IRWINDPGDPM	3103:Real wage index
IREMP	3104:Employment, thousands

## Identities

As mentioned before this model has 135 explanatory identities. In explanation of some identities we use qualitative dummy variables which take the bivalent numbers one and zero. The reason is for eliminating mathematical ambiguities in some years or eliminating of dividing to zero for one variable in some special years or applying some necessary adjustments in some of unadjusted statistical figures. For example, we can mention to the identity 211 which is related to the net foreign asset of the banking system in terms of Rial and its conversion from dollar with applying the official exchange rate. Regarding the fact that during the years 1990 to 1993, the Central Bank applied some special adjustments for exchange rates, these adjustments have entered in the model by qualitative variables.

## Equations

Number of regression equations in this model is 65. In the equations of the model, every unknown parameter would be shown by B(...) in which the first figures in the parentheses will show the connection of the parameter to the number of the equation. If the mentioned number ended to zero, it shows that parameter is an intercept e.g. B(1340) shows the intercept of the equation 134. The qualitative variables have been used for inserting different intercepts and slopes of equations in some other way. In some cases the equations are obliged to show special relations between parameters. e.g. in equation number 2002 the effective exchange rate has been showed in such a way that the sum of coefficients after the estimation will become one, so we can better reach to the concept of effective exchange rate. This would be the same for the wholesale price indices in equation 2006 in which the sum of parameters for estimation would be equal to one. This is because the index has been defined as the weighted average of three wholesale price indices for imported, exported and the domestically produced and consumed goods. In some other equations the intercepts have been eliminated because of their non-economic behavior in the ex-post simulation period. In some equations which we tried to use, the first order lagged equations, instead of applying differentiate operator (D), we brought the left hand variable with one period lag to the right hand side, which has the same meaning from mathematical point of view. This rearrangement is to establish stationarity. Be careful that some regressions must had been defined as identities before, but we have intentionally introduced them as “bridge regressions”.

## System of equations

The equations and identities in this model are distributed in different sections as follows:

No.	Sector	Identities	Equations	Total
1	Foreign	23	9	<b>32</b>
2	Monetary	12	6	<b>18</b>
3	Government	7	5	<b>12</b>
4	Real	25	16	<b>41</b>
5	Nominal	25	15	<b>40</b>
6	Price	39	10	<b>49</b>
7	Labor	4	4	<b>8</b>
<b>8</b>	<b>Total</b>	<b>135</b>	<b>65</b>	<b>200</b>

The way of arranging stochastic equations and identities is such that in every section at first we brought identities and then regression equations. In these equations for simplicity, we ignored disturbances. It would be worth mentioning that every endogenous variable would be shown only one time in the left-hand side of the model. The parametric system of the model would be as below:

### Foreign sector

'1:Balance of trade, million Dollars

$$IRTBD = IRXGD - IRMGD$$

'2:Balance of services, million Dollars

$$IRSBD = IRXSD - IRMSD$$

'3:Current account, million Dollars

$$IRCAD = IRTBD + IRSBD + IRNTRD$$

'4:Balance of payments, million Dollars

$$IRBOPD = IRCAD + IRKAD + IRBOPEOD$$

'5:Export of goods, million Dollars

$$IRXGD = IRXOILD + IRXGNOD$$

'6:Export of non-factor services, million Dollars

$$IRXNFSD = IRXNFSDOP * OECDP$$

'7:Import of non-factor services, million Dollars

$$IRMNFSD = IRMNFSDCIFP * IRCIFP$$

'8:Export of non-oil goods, million Dollars

$$IRXGNOD = IRXGNODOP * OECDP$$

'9:Import of goods, million Dollars  
 $IRMGD = IRMGDCIFP * IRCIFP$

'10:Export of services, million Dollars  
 $IRXSD = IRXNFSD + IRXFYSD$

'11:Import of services, million Dollars  
 $IRMSD = IRMNFSD + IRMFYSD$

'12:Balance of factor income services, million Dollars  
 $IRFYSBD = IRXFYSD - IRMFYSD$

'13:Balance of non-factor income services, million Dollars  
 $IRNFSBD = IRXNFSD - IRMNFSD$

'14:Cumulative balance of payments, million Dollars  
 $IRBOPDC = IRBOPDC(-1) + IRBOPD$

'15:Balance of payments errors and omissions, million Dollars  
 $IRBOPEOD = IRBOPEODC - IRBOPEODC(-1)$

'16:Cumulative capital account, million Dollars  
 $IRKADC = IRKADC(-1) + IRKAD$

'17:Cumulative current account, million Dollars  
 $IRCADC = IRCADC(-1) + IRCAD$

'18:Cumulative balance of trade, million Dollars  
 $IRTBDC = IRTBDC(-1) + IRTBD$

'19:Cumulative balance of services, million Dollars  
 $IRSBDC = IRSBDC(-1) + IRSBD$

'20:Net transfers, million Dollars  
 $IRNTRD = IRNTRDC - IRNTRDC(-1)$

'21:Cumulative factor income services balance, million Dollars  
 $IRFYSBDC = IRFYSBDC(-1) + IRFYSBD$

'22:Cumulative non-factor income services balance, million Dollars  
 $IRNFSBDC = IRNFSBDC(-1) + IRNFSBD$

'23:Export of oil, million Dollars  
 $IRXOILD = IRWPOIL * IRXOILB$

'101:Export of oil, million barrels/year  
 $IRXOILB = IRXOILB(-1) + B(1011) * (IRYOILB - IRYOILB(-1))$

'102:Export of non-factor services, million Dollars

$IRXNFSDOP = IRXNFSDOP(-1) + B(1021) * IREENOIL + B(1022) * (IRGDPNF - IRGDPNF(-1)) + B(1023) * IRD79$

'103:Import of non-factor services, million Dollars

$IRMNFSDCIFP = IRMNFSDCIFP(-1) + B(1030) + B(1031) * (IREENOIL * IRCIFP / IRWPI - IREENOIL(-1) * IRCIFP(-1) / IRWPI(-1)) + B(1032) * (IRGDPM - IRGDPM(-1)) + B(1033) * (IRD77 + IRD79 + IRD88 + IRD02)$

'104:Real import of goods, million Dollars

$IRMGDCIFP = B(1040) + B(1041) * (IRXGD + IRXSD) + B(1042) * IREENOIL + B(1043) * IRGDPM + B(1044) * IRCIFP + B(1045) * IRKAD + B(1046) * IRD79$

'105:Real export of non-oil goods, million Dollars

$IRXGNODOP = B(1050) + B(1051) * IREX * OECDP / IRWPI + B(1052) * IRXGNODOP(-1) + B(1053) * IRGDPNF$

'106:Import of factor income services, million Dollars

$IRMFYSD = B(1060) + (B(1061) + B(1062) * (1 - IRD5977)) * IRKADC * LIBOR / 100 + B(1063) * IRMFYSD(-1) + B(1064) * IRD5978 * IRMGD + B(1065) * IRD5977 + B(1066) * IRD0205$

'107:Export of factor income services, million Dollars

$IRXFYSD = B(1070) + B(1071) * IRGEFIDC + B(1072) * (1 - IRD5978) + B(1073) * IRXFYSD(-1) + B(1074) * IRD0105$

'108:Cumulative balance of payments errors and omissions, million Dollars

$IRBOPEODC = B(1081) * IRKADC + B(1082) * IRTBDC + B(1083) * IRFYSBDC + B(1084) * IRNFSBDC + B(1085) * IRD84 + B(1086) * IRD9495$

'109:Cumulative net transfers, million Dollars

$IRNTRDC = IRNTRDC(-1) + (B(1090) + B(1091) * IRKADC + B(1092) * IRTBDC + B(1093) * IRFYSBDC + B(1094) * IRNFSBDC + B(1095) * IRBOPEODC) * (1 + B(1096) * IRD5988) + B(1097) * IRD95 + B(1098) * IRD92$

## **Monetary sector**

'201:Net claim of banking system to government sector (including public government), billion Rials

$IRM2NGV = IRM2NGGV + IRM2NGSV$

'202:Net claim of banking system to public government, billion Rials

$IRM2NGGV = IRGBDVC + IRFEOAV + IROLVC$

'203:Net claim of banking system to government sector (excluding public government) at constant prices, billion Rials

$IRM2NGSV = IRM2NGSVPGDPM * IRPGDPM$

'204:Net claim of banking system to private sector at constant prices, billion Rials  
 $IRM2NPV = IRM2NPVPGDPM * IRPGDPM$

'205:Cumulative obligatory loans in government budget, billion rials  
 $IROLVC = IROLVC(-1) + IROLV$

'206:Obligatory loans in government budget, billion rials  
 $IROLV = IROLPV + IROLV$

'207:Demand deposits of private sector, billion Rials  
 $IRDDV = IRDDVPGDPM * IRPGDPM$

'208:Saving and time deposits of private sector, billion Rials  
 $IRSDV = IRSDVPGDPM * IRPGDPM$

'209:Currency in hands of public, billion Rials  
 $IRCUV = IRCUVPGDPM * IRPGDPM$

'210:Liquidity, billion Rials  
 $IRM2V = IRCUV + IRDDV + IRSDV$

'211:Net foreign assets of banking system, billion Rials  
 $IRM2NFAV = IRM2NFAD / (((1 - IRD93 - IRD90 - IRD91 - IRD92) / IREO + IRD93 / 1748 + IRD90 / 221.89 + IRD91 / 351.9 + IRD92 / 641.2) * 1000)$

'212:Net worth and other items net of banking system, billion Rials  
 $IRM2NWV = IRM2V - (IRM2NPV + IRM2NGV + IRM2NFAV)$

'301:Net claim of banking system to private sector at constant prices, billion Rials  
 $IRM2NPVPGDPM = IRM2NPVPGDPM(-1) + B(3011) * IRIRL + B(3012) * IRD7576$

'302:Net claim of banking system to government sector (excluding public government) at constant prices, billion Rials

$IRM2NGSVPGDPM = B(3020) + B(3021) * IRM2NGSVPGDPM(-1) + B(3022) * IRIRL + B(3023) * IRD9497 + B(3024) * IRD5978 * IRM2NGSVPGDPM(-1)$

'303:Net foreign assets of banking system, million Dollars  
 $IRM2NFAD = B(3031) * IRBOPDC + B(3032) * IRM2NFAD(-1) + B(3033) * IRD8589 + B(3034) * IRD9705$

'304:Real demand deposits of private sector, billion Rials  
 $IRDDVPGDPM = B(3041) * IRGDPM + B(3042) * IRDDVPGDPM(-1) + B(3043) * IRIRS + B(3044) * IRIRNB$

'305:Real saving and time deposits of private sector, billion Rials  
 $IRSDVPGDPM = B(3050) + B(3051) * IRGDPM + B(3052) * IRIRS + B(3053) * IRSDVPGDPM(-1)$



'306:Real currency in hands of public, billion Rials

$$\text{IRCUVPGDPM} = \text{B}(3060) + \text{B}(3061) * \text{IRCUVPGDPM}(-1) + \text{B}(3062) * \text{IRGDPM} + \text{B}(3063) * \text{IRD5977} + \text{B}(3064) * \text{IRIRL} + \text{B}(3065) * \text{IRIRNB} + \text{B}(3066) * \text{IRD79}$$

### **Government sector**

'401:Cumulative government budget deficit, billion Rials

$$\text{IRGBDVC} = \text{IRGBDVC}(-1) - \text{IRGBDV}$$

'402:Government revenue, billion Rials

$$\text{IRGRV} = \text{IRGROILV} + \text{IRGRTV} + \text{IRGRMV} + \text{IRGRDSV} + \text{IRGRSV}$$

'403:Government tax revenue, billion Rials

$$\text{IRGRTV} = \text{IRGRTDV} + \text{IRGRTIV}$$

'404:Government expenditure, billion Rials

$$\text{IRGEV} = \text{IRGECV} + \text{IRGEDV} + \text{IRGESV} + \text{IRGESPV} + \text{IRGEFIV}$$

'405:Government budget deficit, billion Rials

$$\text{IRGBDV} = \text{IRGRV} - \text{IRGEV}$$

'406:Government special expenditures, billion Rials

$$\text{IRGESV} = \text{IRGRSV}$$

'407:Cumulative government expenditures in foreign investment, million Dollars

$$\text{IRGEFIDC} = \text{IRGEFIDC}(-1) + \text{IRGEFIV} / \text{IREO} * 1000$$

'501:Government indirect tax revenue, billion Rials

$$\text{IRGRTIV} = \text{IRGRTIV}(-1) + \text{B}(5011) * (\text{IRMGV} - \text{IRMGV}(-1)) + \text{B}(5012) * (\text{IRCV} - \text{IRMGV} - (\text{IRCV}(-1) - \text{IRMGV}(-1))) + \text{B}(5013) * \text{IRD00} + \text{B}(5014) * \text{IRD99}$$

'502:Government oil revenue, billion Rials

$$\text{IRGROILV} = \text{B}(5021) * (1 - \text{IRD93}) * \text{IREO} * (\text{IRXOILD} / 1000 - \text{IRGRDSV} / \text{IREM}) + \text{B}(5022) * \text{IRPDOIL} * (\text{IRYOILB} - \text{IRXOILB}) + \text{B}(5023) * \text{IRD93} * (0.58 * 1000 + 0.42 * (\text{IREO} - 1000)) * (\text{IRXOILD} / 1000 - \text{IRGRDSV} / \text{IREM}) + \text{B}(5024) * \text{IRD0005} + \text{B}(5025) * \text{IRD9597}$$

'503:Government miscellaneous revenue, billion Rials

$$\text{IRGRMV} = \text{IRGRMV}(-1) + \text{B}(5031) * (\text{IROUTPUTV} - \text{IROUTPUTV}(-1))$$

'504:Government special revenue, billion Rials

$$\text{IRGRSV} = \text{IRGRSV}(-1) + \text{B}(5040) * (\text{IROUTPUTV} - \text{IROUTPUTV}(-1))$$

'505:Government direct tax revenue, billion Rials

$$\text{IRGRTDV} = \text{IRGRTDV}(-1) + \text{B}(5051) * (\text{IROUTPUTV} - \text{IROUTPUTV}(-1))$$

## Real sector

'601: Aggregate demand at constant prices, billion Rials

$$\text{IRAD} = \text{IRINPUT} + \text{IRC} + \text{IRG} + \text{IRI} + \text{IRDIS} + \text{IRX} + \text{IRTOT}$$

'602: Aggregate supply at constant prices, billion Rials

$$\text{IRAS} = \text{IROUTPUT} + \text{IRNIT} + \text{IRM} + \text{IRTOT}$$

'603: Aggregate output at constant prices, billion Rials

$$\text{IROUTPUT} = \text{IRINPUT} + \text{IRGDPF}$$

'604: Gross national saving at constant prices, billion Rials

$$\text{IRGNS} = \text{IRI} + \text{IRII} + \text{IRBOT} + \text{IRNFY} + \text{IRTOT}$$

'605: Net national saving at constant prices, billion Rials

$$\text{IRNNS} = \text{IRGNS} - \text{IRCCA}$$

'606: Export at constant prices, billion Rials

$$\text{IRX} = \text{IRXOIL} + \text{IRXNOILG} + \text{IRXNFS}$$

'607: Import at constant prices, billion Rials

$$\text{IRM} = \text{IRMG} + \text{IRMNFS}$$

'608: Balance of trade at constant prices, billion Rials

$$\text{IRBOT} = \text{IRX} - \text{IRM}$$

'609: Gross domestic expenditure at market prices at constant prices, billion Rials

$$\text{IRGDEM} = \text{IRC} + \text{IRG} + \text{IRI} + \text{IRBOT} + \text{IRDIS}$$

'610: Private saving at constant prices, billion Rials

$$\text{IRSP} = \text{IRYD} - \text{IRC}$$

'611: Terms of trade, billion Rials

$$\text{IRTOT} = 2 * ((\text{IRXV} * \text{IRM}) - (\text{IRMV} * \text{IRX})) / (\text{IRXV} + \text{IRMV})$$

'612: Gross domestic income at market prices at constant prices, billion Rials

$$\text{IRGDIM} = \text{IRGDPM} + \text{IRTOT}$$

'613: Discrepancies at constant prices, billion Rials

$$\text{IRDIS} = \text{IRGDPM} - (\text{IRC} + \text{IRG} + \text{IRI} + \text{IRBOT})$$

'614: Gross national product at market prices at constant prices, billion Rials

$$\text{IRGNPM} = \text{IRGDPM} + \text{IRNFY}$$

'615: Gross national income at market prices at constant prices, billion Rials

$$\text{IRGNIM} = \text{IRGNPM} + \text{IRTOT}$$

'616: Net national income at factor cost at constant prices, billion Rials

$$\text{IRNNIF} = \text{IRGNIM} - \text{IRCCA} - \text{IRNIT}$$

'617:Net factor income at constant prices, billion Rials

$$\text{IRNFY} = \text{IRXFY} - \text{IRMFY}$$

'618:Net indirect taxes at constant prices, billion Rials

$$\text{IRNIT} = \text{IRIT} - \text{IRSUB}$$

'619:Capital stock at constant prices, billion Rials

$$\text{IRK} = \text{IRK}(-1) + \text{IRI} - \text{IRCCA}$$

'620:Gross domestic product at market prices at constant prices, billion Rials

$$\text{IRGDPM} = \text{IRGDPNF} + \text{IRVAOIL} + \text{IRNIT}$$

'621:Disposable income at constant prices, billion Rials

$$\text{IRYD} = \text{IRGDPNF} + \text{IRNFY} - \text{IRCCA} - \text{IRGRTDV} / \text{IRPIT}$$

'622:Investment at constant prices, billion Rials

$$\text{IRI} = \text{IRIP} + \text{IRIG}$$

'623:Indirect taxes at constant prices, billion Rials

$$\text{IRIT} = \text{IRITV} / \text{IRPIT}$$

'624:Subsidies at constant prices, billion Rials

$$\text{IRSUB} = \text{IRSUBV} / \text{IRPSUB}$$

'625:Gross domestic product at factor cost at constant prices, billion Rials

$$\text{IRGDPF} = \text{IRGDPNF} + \text{IRVAOIL}$$

'701:Government investment at constant prices, billion Rials

$$\text{IRIG} = \text{IRIG}(-1) + \text{B}(7011) * (\text{IRGEDV} / \text{IRWPI} - \text{IRGEDV}(-1) / \text{IRWPI}(-1)) + \text{B}(7012) * \text{IRD76} + \text{B}(7013) * \text{IRD77} + \text{B}(7014) * \text{IRD78} + \text{B}(7015) * \text{IRD79}$$

'702:Government consumption at constant prices, billion Rials

$$\text{IRG} = \text{IRG}(-1) + \text{B}(7021) * ((\text{IRGECV} + \text{IRGESV}) / \text{IRWPI} - (\text{IRGECV}(-1) + \text{IRGESV}(-1)) / \text{IRWPI}(-1))$$

'703:Non-oil gross domestic product at market prices at constant prices, billion Rials

$$\text{IRGDPNF} = \text{B}(7030) + \text{B}(7031) * \text{IRK}(-1) + \text{B}(7032) * (\text{IRIP} + \text{IRIG} - \text{IRM} * \text{IRMACHIMV}) + \text{B}(7033) * \text{IREMP} + \text{B}(7034) * \text{IRM} * \text{IRMACHIMV} + \text{B}(7035) * \text{IRD79} + \text{B}(7036) * \text{IRD8789}$$

'704:Import of goods at constant prices, billion Rials

$$\text{IRMG} = \text{IRMG}(-1) + \text{B}(7041) * (\text{IRMGDCIFP} - \text{IRMGDCIFP}(-1))$$

'705:Import if non-factor services at constant prices, billion Rials

$$\text{IRMNFS} = \text{B}(7051) * (\text{IRMNFSDCIFP} - \text{IRMNFSDCIFP}(-1)) + \text{B}(7052) * \text{IRMNFS}(-1)$$

'706:Private investment at constant prices, billion Rials

$$\text{IRIP} = \text{B}(7060) + \text{B}(7061) * \text{IRGDPNF}(-1) + \text{B}(7062) * \text{IRM} * \text{IRMACHIMV} \\ + \text{B}(7063) * \text{IRIRL} + \text{B}(7064) * \text{IRD7779}$$

'707:Value added of oil at constant prices, billion Rials

$$\text{IRVAOIL} = \text{B}(7071) * \text{IRVAOIL}(-1) + \text{B}(7072) * (\text{IRXOILB} - \text{IRXOILB}(-1)) \\ + \text{B}(7073) * ((\text{IRYOILB} - \text{IRXOILB}) - (\text{IRYOILB}(-1) - \text{IRXOILB}(-1))) + \text{B}(7074) * \text{IRD02}$$

'708:Capital consumption allowances at constant prices, billion Rials

$$\text{IRCCA} = \text{B}(7080) + \text{B}(7081) * (1 + \text{B}(7082) * \text{IRD9405}) * \text{IRK}(-1) + \text{B}(7083) * (\text{IRWARCD} + \\ \text{IRWARDED} + \text{IRWARMD}) + \text{B}(7084) * \text{IRD9405}$$

'709:Private consumption at constant prices, billion Rials

$$\text{IRC} = \text{B}(7091) * (\text{IRYD} - \text{IRYD}(-1)) + \text{B}(7092) * \text{IRSP}(-1) + \text{IRC}(-1)$$

'710:Export of factor income from abroad at constant prices, billion Rials

$$\text{IRXFY} = \text{IRXFY}(-1) + \text{B}(7101) * (\text{IRXFYSD} / \text{OECDP} - \text{IRXFYSD}(-1) / \text{OECDP}(-1)) \\ + \text{B}(7102) * \text{IRD7879}$$

'711:Import of factor income from abroad at constant prices, billion Rials

$$\text{IRMFY} = \text{IRMFY}(-1) + \text{B}(7111) * (\text{IRMFYSD} / \text{OECDP} - \text{IRMFYSD}(-1) / \text{OECDP}(-1)) + \\ \text{B}(7112) * \text{IRD7377}$$

'712:Oil export at constant prices, billion Rials

$$\text{IRXOIL} = \text{IRXOIL}(-1) + \text{B}(7122) * (\text{IRXOILB} - \text{IRXOILB}(-1)) + \text{B}(7123) * \text{IRD73} + \\ \text{B}(7124) * \text{IRD83}$$

'713:Export of goods at constant prices, billion Rials

$$\text{IRXNOILG} = \text{IRXNOILG}(-1) + \text{B}(7131) * (\text{IRXGNODOP} - \text{IRXGNODOP}(-1))$$

'714:Export of non factor services at constant prices, billion Rials

$$\text{IRXNFS} = \text{IRXNFS}(-1) + \text{B}(7141) * (\text{IRXNFS DOP} - \text{IRXNFS DOP}(-1))$$

'715:Input of production at constant prices, billion Rials

$$\text{IRINPUT} = \text{IRINPUT}(-1) + \text{B}(7151) * (\text{IRGDPF} - \text{IRGDPF}(-1)) + \text{B}(7152) * \text{IRD79}$$

'716:Changes in inventory at constant prices, billion Rials

$$\text{IRII} = \text{B}(7160) + \text{B}(7161) * (\text{IRII}(-1) / \text{IROUTPUT}(-1)) * (\text{IROUTPUT} - \text{IROUTPUT}(-1)) \\ + \text{B}(7162) * \text{IRII}(-1) + \text{B}(7163) * \text{IRYEAR} + \text{B}(7164) * \text{IRPGDPF} + \\ \text{B}(7165) * (\text{IRD8285} + \text{IRD9394} + \text{IRD73})$$

## **Nominal values**

'801: Aggregate demand at current prices, billion Rials

$$\text{IRADV} = \text{IRINPUTV} + \text{IRCV} + \text{IRGV} + \text{IRIV} + \text{IRDISV} + \text{IRXV}$$

'802: Aggregate supply at current prices, billion Rials

$$\text{IRASV} = \text{IROUTPUTV} + \text{IRNITV} + \text{IRMV}$$

'803: Aggregate output at current prices, billion Rials

$$\text{IROUTPUTV} = \text{IRINPUTV} + \text{IRGDPFV}$$

'804: Aggregate input at current prices, billion Rials

$$\text{IRINPUTV} = \text{IRPINPUT} * \text{IRINPUT}$$

'805: Gross national saving at current prices, billion Rials

$$\text{IRGNSV} = \text{IRIV} + \text{IRIIV} + \text{IRBOTV} + \text{IRNFYV}$$

'806: Net national saving at current prices, billion Rials

$$\text{IRNNSV} = \text{IRGNSV} - \text{IRCCAV}$$

'807: Export at current prices, billion Rials

$$\text{IRXV} = \text{IRXOILV} + \text{IRXNOILGV} + \text{IRXNFSV}$$

'808: Import at current prices, billion Rials

$$\text{IRMV} = \text{IRMGV} + \text{IRMNFSV}$$

'809: Balance of trade at current prices, billion Rials

$$\text{IRBOTV} = \text{IRXV} - \text{IRMV}$$

'810: Gross domestic expenditure at market prices at current prices, billion Rials

$$\text{IRGDEM} = \text{IRCV} + \text{IRGV} + \text{IRIV} + \text{IRBOTV} + \text{IRDISV}$$

'811: Private saving at current prices, billion Rials

$$\text{IRSPV} = \text{IRYDV} - \text{IRCV}$$

'812: Capital stock at current prices, billion Rials

$$\text{IRKV} = \text{IRKV}(-1) * (1 + (\text{IRPI} - \text{IRPI}(-1)) / \text{IRPI}(-1)) + \text{IRIV} - \text{IRCCAV}$$

'813: Gross domestic income at market prices at current prices, billion Rials

$$\text{IRGDIMV} = \text{IRGDPMV}$$

'814: Gross national income at market prices at current prices, billion Rials

$$\text{IRGNIMV} = \text{IRGNPMV}$$

'815: Net national income at factor cost at current prices, billion Rials

$$\text{IRNNIFV} = \text{IRGNIMV} - \text{IRCCAV} - \text{IRNITV}$$

'816: Non-oil gross domestic product at market prices at current prices, billion Rials

$$\text{IRGDPNFV} = \text{IRPGDPNF} * \text{IRGDPNF}$$

'817: Gross national products at market prices at current prices, billion Rials

$$\text{IRGNPMV} = \text{IRGDPMV} + \text{IRNFYV}$$

'818: Gross domestic products at market prices at current prices, billion Rials

$$\text{IRGDPMV} = \text{IRGDPNFV} + \text{IRVAOILV} + \text{IRNITV}$$

'819: Disposable income at current prices, billion Rials

$$\text{IRYDV} = \text{IRGDPNFV} + \text{IRNFYV} - \text{IRCCAV} - \text{IRGRTDV}$$

'820: Capital consumption allowances at current prices, billion Rials

$$\text{IRCCAV} = \text{IRCCA} * \text{IRPCCA}$$

'821: Investment at current prices, billion Rials

$$\text{IRIV} = \text{IRIGV} + \text{IRIPV}$$

'822: Discrepancies at current prices, billion Rials

$$\text{IRDISV} = \text{IRGDPMV} - (\text{IRCV} + \text{IRGV} + \text{IRIV} + \text{IRBOTV})$$

'823: Net indirect taxes at current prices, billion Rials

$$\text{IRNITV} = \text{IRITV} - \text{IRSUBV}$$

'824: Net factor income at current prices, billion Rials

$$\text{IRNFYV} = \text{IRXFYV} - \text{IRMFYV}$$

'825: Gross domestic product at factor cost at current prices, billion Rials

$$\text{IRGDPFV} = \text{IRGDPNFV} + \text{IRVAOILV}$$

'901: Government consumption at current prices, billion Rials

$$\text{IRGV} = \text{IRGV}(-1) + \text{B}(9011) * ((\text{IRGECV} + \text{IRGESV}) - (\text{IRGECV}(-1) - (\text{IRGESV}(-1))))$$

'902: Government investment at current prices, billion Rials

$$\text{IRIGV} = \text{IRIGV}(-1) + \text{B}(9021) * (\text{IRGEDV} - \text{IRGEDV}(-1)) + \text{B}(9022) * (\text{IRFEOAV} - \text{IRFEOAV}(-1)) + \text{B}(9023) * \text{IROLGV} + \text{B}(9024) * \text{IRD9497} + \text{B}(9025) * \text{IRD02}$$

'903: Subsidies at current prices, billion Rials

$$\text{IRSUBV} = \text{IRSUBV}(-1) + \text{B}(9031) * (\text{IRGECV} + \text{IRGESV} - \text{IRGECV}(-1) - \text{IRGESV})$$

'904: Private consumption at current prices, billion Rials

$$\text{IRCV} = \text{IRCV}(-1) + \text{B}(9041) * (\text{IRYDV} - \text{IRYDV}(-1)) + \text{B}(9042) * \text{IRSPV}(-1)$$

'905: Value added of oil sector at current prices, billion Rials

$$\text{IRVAOILV} = \text{IRVAOILV}(-1) + \text{B}(9051) * (\text{IRXOILD} / 1000 * \text{IREO} - \text{IRXOILD}(-1) / 1000 * \text{IREO}(-1)) + \text{B}(9052) * (\text{IRPDOIL} * (\text{IRYOILB} - \text{IRXOILB}) - \text{IRPDOIL}(-1) * (\text{IRYOILB}(-1) - \text{IRXOILB}(-1)))$$

'906: Import of goods at current prices, billion Rials

$$\text{IRMGV} = \text{IRMGV}(-1) + \text{B}(9061) * (\text{IRMGD} * \text{IREENOIL} - \text{IRMGD}(-1) * \text{IREENOIL}(-1))$$

'907: Import of non-factor services at current prices, billion Rials

$$\text{IRMNFSV} = \text{IRMNFSV}(-1) + \text{B}(9071) * (\text{IRMNFSV} * \text{IREENOIL} - \text{IRMNFSV}(-1) * \text{IREENOIL}(-1))$$

'908: Export of factor income from abroad at current prices, billion Rials

$$\text{IRXFYV} = \text{IRXFYV}(-1) + \text{B}(9081) * (\text{IRXFYSD} * \text{IREENOIL} - \text{IRXFYSD}(-1) * \text{IREENOIL}(-1))$$

'909: Import of factor income from abroad at current prices, billion Rials

$$\text{IRMFYV} = \text{IRMFYV}(-1) + \text{B}(9090) + \text{B}(9091) * (\text{IRMFYSD} * \text{IREENOIL} - \text{IRMFYSD}(-1) * \text{IREENOIL}(-1)) + \text{B}(9092) * \text{IRD93} + \text{B}(9093) * \text{IRD5992}$$

'910: Indirect taxes at current prices, billion Rials

$$\text{IRITV} = \text{IRITV}(-1) + \text{B}(9101) * (\text{IRGRTIV} - \text{IRGRTIV}(-1))$$

'911: Private investment at current prices, billion Rials

$$\text{IRIPV} = \text{IRIPV}(-1) + \text{IROLPV} + \text{B}(9111) * (\text{IRIRL} - \text{IRIRL}(-1)) + \text{B}(9112) * (\text{IRIRNB} - \text{IRIRNB}(-1)) + \text{B}(9113) * (\text{IROUTPUTV} - \text{IROUTPUTV}(-1)) + \text{B}(9114) * \text{IRD99} + \text{B}(9115) * \text{IRD02}$$

'912: Oil export at current prices, billion Rials

$$\text{IRXOILV} = \text{IRXOILV}(-1) + \text{B}(9121) * (\text{IRXOILD} * \text{IREO} - \text{IRXOILD}(-1) * \text{IREO}(-1)) + \text{B}(9122) * \text{IRD9900}$$

'913: Non-oil goods export at current prices, billion Rials

$$\text{IRXNOILGV} = \text{B}(9131) * (\text{IRXGNOD} * \text{IREENOIL} - \text{IRXGNOD}(-1) * \text{IREENOIL}(-1)) + \text{IRXNOILGV}(-1)$$

'914: Non-factor services export at current prices, billion Rials

$$\text{IRXNFSV} = \text{IRXNFSV}(-1) + \text{B}(9141) * (\text{IRXNFSV} * \text{IREENOIL} - \text{IRXNFSV}(-1) * \text{IREENOIL}(-1))$$

'915: Changes in inventory at current prices, billion Rials

$$\text{IRIIV} = \text{IRIIV}(-1) + \text{B}(9151) * (\text{IRIIV}(-1) / \text{IRINPUTV}(-1)) * (\text{IRINPUTV} - \text{IRINPUTV}(-1)) + \text{B}(9152) * (\text{IRIIV}(-1) / \text{IRGDPFV}(-1)) * (\text{IRGDPFV} - \text{IRGDPFV}(-1)) + \text{B}(9153) * \text{IRD00} + \text{B}(9154) * \text{IRD95} + \text{B}(9156) * \text{IRD03}$$

## Price

'1001: Implicit price deflator corresponding aggregate demand and supply

$$\text{IRPA} = \text{IRADV} / \text{IRAS}$$

'1002: Gross domestic product at factor cost implicit price deflator

$$\text{IRPGDPF} = \text{IRGDPFV} / \text{IRGDPF}$$

'1003: Gross national saving implicit price deflator

$$\text{IRPGNS} = \text{IRGNSV} / \text{IRGNS}$$

'1004: Net national saving implicit price deflator

$$\text{IRPNNS} = \text{IRNNSV} / \text{IRNNS}$$

'1005: Import of goods implicit price deflator

$$\text{IRPMG} = \text{IRMGV} / \text{IRMG}$$

'1006:Import of non factor services implicit price deflator  
 $IRPMNFS = IRMNFSV / IRMNFS$

'1007:Export of oil implicit price deflator  
 $IRPXOIL = IRXOILV / IRXOIL$

'1008:Export of non-oil goods implicit price deflator  
 $IRPXNOILG = IRXNOILGV / IRXNOILG$

'1009:Export of non-factor services implicit price deflator  
 $IRPXNFS = IRXNFSV / IRXNFS$

'1010: Balance of trade implicit price deflator  
 $IRPBOT = IRBOTV / IRBOT$

'1011: Gross domestic expenditure at market prices implicit price deflator  
 $IRPGDEM = IRGDEM V / IRGDEM$

'1012: Private saving implicit price deflator  
 $IRPSP = IRSPV / IRSP$

'1013:Capital stock implicit price deflator  
 $IRPK = IRKV / IRK$

'1014:Gross domestic product implicit price deflator  
 $IRPGDPM = IRGDPMV / IRGDPM$

'1015:Private consumption implicit price deflator  
 $IRPC = IRCV / IRC$

'1016:Government investment implicit price deflator  
 $IRPIG = IRIGV / IRIG$

'1017:Private investment implicit price deflator  
 $IRPIP = IRIPV / IRIP$

'1018:Government consumption implicit price deflator  
 $IRPG = IRGV / IRG$

'1019:Net indirect taxes implicit price deflator  
 $IRPNIT = IRNITV/IRNIT$

'1020:Import implicit price deflator  
 $IRPM = IRMV / IRM$

'1021:Export implicit price deflator  
 $IRPX = IRXV / IRX$



'1022:Net factor income from abroad implicit price deflator  
 $IRPNFY = IRNFYV / IRNFY$

'1023:Export of factor income from abroad implicit price deflator  
 $IRPXFY = IRXFYV / IRXFY$

'1024:Import of factor income from abroad implicit price deflator  
 $IRPMFY = IRMFYV / IRMFY$

'1025:Oil value added implicit price deflator  
 $IRVAOIL = IRVAOILV / IRVAOIL$

'1026:Investment implicit price deflator  
 $IRPI = IRIV / IRI$

'1027:Inflation rate, consumer price index  
 $IRINFCPI = (IRCPI - IRCPI(-1)) / IRCPI(-1)$

'1028:Inflation rate, wholesale price index  
 $IRINFWPI = (IRWPI - IRWPI(-1)) / IRWPI(-1)$

'1029:Gross national product implicit price deflator  
 $IRPGNPM = IRGNPMV / IRGNPM$

'1030:Discrepancies implicit price deflator  
 $IRPDIS = IRDISV / IRDIS$

'1031:Gross domestic income implicit price deflator  
 $IRPGDIM = IRGDIMV / IRGDIM$

'1032:Gross national income implicit price deflator  
 $IRPGNIM = IRGNIMV / IRGNIM$

'1033:Disposable income implicit price deflator  
 $IRPYD = IRYDV / IRYD$

'1034:Net national income implicit price deflator  
 $IRPNNIF = IRNNIFV / IRNNIF$

'1035:Non-oil gross domestic product implicit price deflator  
 $IRGDPNF = (IRCV + IRGV + IRIV + IRXV - IRMV + IRDISV - IRVAOILV - IRNITV) / IRGDPNF$

'1036: Indirect taxes implicit price deflator  
 $IRPIT=IRPGDPF$

'1037: Subsidies implicit price deflator

IRPSUB = IRPGDPF

'1038: Output implicit price deflator  
IRPOUTPUT=IROUTPUTV/IROUTPUT

'1039: Changes in inventory implicit price deflator  
IRPII=IRIIV/IRII

'2001:Market exchange rate, Rials/Dollar  
IREM =IREM(-1)+B(20011)\*(IRM2V-IRM2V(-1))+B(20012)\*IRBOPD+  
B(20013)\*IRGRDSV+B(20014)\*IRD99+B(20015)\*IRD0205

'2002:Effective exchange rate for non-oil goods and services, Rials/Dollar  
IREENOIL=IREO\*IRD5978+(1-IRD5978)\*(B(20020)+B(20021)\*IREM+(1-  
B(20021)) \*IREO)+B(20022)\*IREENOIL(-1)+B(20023)\*IRD9305

'2003:Wholesale price index for imported goods  
IRWPIM = IRWPIM(-1)+ B(20031)\* ( ((IRMGD/(IRMGD+IRMNFSD))\*IRPM) -  
((IRMGD(-1)/(IRMGD(-1)+IRMNFSD(-1)))\*IRPM(-1)))

'2004:Wholesale price index for exported goods  
IRWPIX =IRWPIX(-1)+B(20041)\*(((IRXGNOD/(IRXGD+IRXNFSD))\*IRPX) -  
((IRXGNOD(-1)/(IRXGD(-1)+IRXNFSD(-1)))\*IRPX(-1)))

'2005:Wholesale price index for domestically produced and consumed goods  
IRWPID = IRWPID(-1)+B(20051)\*(IRPGDPNF-IRPGDPNF(-1))

'2006:Wholesale price index  
IRWPI =B(20061)\*IRWPID+B(20062)\*IRWPIM+(1-B(20061)-B(20062))\*IRWPIX

'2007:Consumer price index  
IRCPI= IRCPI(-1)+B(20071)\*(IRPGDPNF-IRPGDPNF(-1))+B(20072)\*IRD00

'2008:Non-organized market interest rate  
IRIRNB = B(20080) + B(20081)\* IRIRNB(-1) + B(20082)\* (IRSPV - IRSPV(-1))  
+(IRCPI-IRCPI(-1))/IRCPI(-1) +B(20083)\*IRD7905+B(20084)\*IRD9699

'2009:Capital consumption allowances implicit price deflator  
IRPCCA=IRPCCA(-1)+B(20091)\*(IRPK-IRPK(-1))

'2010: Input implicit price deflator  
IRPINPUT=IRPINPUT(-1)+B(20101)\*(IRPGDPF-IRPGDPF(-1))

## **Labor market**

'3001:Wage index  
IRWIND = IRWINDPGDPM \* IRPGDPM

'3002:Active population, thousands  
 $IRPOPA = IRPOPAPOP * IRPOP$

'3003:Unemployment, thousands  
 $IRUNEMP = IRPOPA - IREMP$

'3004:Unemployment rate, percent  
 $IRUNEMPR = IRUNEMP / IRPOPA * 100$

'3101:Active population ratio  
 $IRPOPAPOP=B(31010)+B(31011)*IRPOPAPOP(-1)+B(31012)*IRYEAR+$   
 $B(31012)*IRD66$

'3102:Population, thousands  
 $IRPOP =B(31020) +B(31021)*IRPOP(-1)$

'3103:Real wage index  
 $IRWINDPGDPM=IRWINDPGDPM(-1)+B(31031)*(IREMP-IREMP(-1))$   
 $+B(31032)*(IRGDPM-IRGDPM(-1))+B(31033)*IRD7579+B(31034)*IRD7880$

'3104:Employment, thousands  
 $IREMP=IREMP(-1)+B(31041)*(IRWIND-IRWIND(-1))+B(31042)*IRPOPA+$   
 $B(31043)*IRD66+B(31044)*IRD76$

## Block structure of the model

Block structure of a model would show the interdependence of the equations in the form of some separated computational blocks. The block structure implying that, the model can be separated to independent blocks, for which to solve each block we need not the variables of the equations of the other blocks.

By blocking the equations, we can better solve the models in the form of some smaller blocks and practically the variables which should be simultaneously solved would be less. By doing this we can better solve and study the model. We can use some separated structures, which show the interdependences among variables of different equations.

The blocks are categorized in two simultaneous and recursive sections. A recursive block is one that can be written in such a way that all its equations consist only predetermined variables. A recursive block can simply be solved by solving the equations of the model. A simultaneous block is a block of equations which in any case, cannot be solved for one variable in a block without the feedback of other variables in other equations of the model. As a result the whole block should be solved simultaneously.

The block structure of Iran's macro econometric model is as follows:

Number of equations: 200

Number of independent blocks: 3

Number of simultaneous blocks: 1

Number of recursive blocks: 2

Block 1: 14 Recursive Equations

irxoilb(24)	irxoild(23)	irvaoilv(133)	irkadc(16)
irgefildc(57)	irxfysd(30)	irpop(198)	irpopapop(197)
irpopa(194)	irvaoil(94)	irxoilv(140)	irxoil(99)
irigv(130)	ircca(95)		

Block 2: 102 Simultaneous Equations

irtbd(1)	irsbd(2)	ircad(3)	irbopd(4)
irxgd(5)	irxnfsd(6)	irmnfsd(7)	irxgnod(8)
irmgd(9)	irxsd(10)	irmsd(11)	irfysbd(12)
irnfsbd(13)	irbopeod(15)	irtbdc(18)	irntrd(20)
irfysbdc(21)	irnfsbdc(22)	irxnfsdop(25)	irmnfsdcifp(26)
irmgdcifp(27)	irxgnodop(28)	irmfysd(29)	irbopeodc(31)
irntrdc(32)	irddv(39)	irsdv(40)	ircuv(41)
irm2v(42)	irddvpgdpm(48)	irsdvpgdpm(49)	ircuvpgdpm(50)

irgesv(56)	irgrtiv(58)	irgrsv(61)	irgrtdv(62)
irx(68)	irm(69)	irnit(80)	irk(81)
irgdpm(82)	iri(84)	irit(85)	irsub(86)
irgdpf(87)	irig(88)	irgdpnf(90)	irmg(91)
irmnfs(92)	irip(93)	irxnoilg(100)	irxnfs(101)
irinput(102)	iroutputv(106)	irinputv(107)	irxv(110)
irmv(111)	irbotv(112)	irspv(114)	irkv(115)
irgdpnfv(119)	irgdpmv(121)	irydv(122)	irccav(123)
iriv(124)	irdisv(125)	irnitv(126)	irnfyv(127)
irgdpfv(128)	irgv(129)	irsubv(131)	ircv(132)
irmgv(134)	irmnfsv(135)	irxfyv(136)	irmfyv(137)
iritv(138)	iripv(139)	irxnoilgv(141)	irxnfsv(142)
irpgdpf(145)	irpk(156)	irpgdpm(157)	irpm(163)
irpx(164)	irpi(169)	irgdpnf(178)	irpit(179)
irpsub(180)	irem(183)	ireenoil(184)	irwpim(185)
irwpix(186)	irwpid(187)	irwpi(188)	ircpi(189)
irirnb(190)	irpcca(191)	irpinput(192)	irwind(193)
irwindpgdpm(199)	iremp(200)		

### Block 3: 84 Recursive Equations

irbopdc(14)	ircadc(17)	irsdbc(19)	irm2ngsvpgdpm(46)
irm2ngsv(35)	irgev(54)	irgrmv(60)	irgroilv(59)
irgrtv(53)	irgrv(52)	irgbdv(55)	irgbdvc(51)
irolv(38)	irolvc(37)	irm2nggv(34)	irm2ngv(33)
irm2npvpgdpm(45)	irm2npv(36)	irm2nfad(47)	irm2nfav(43)
irm2nwv(44)	irmfy(98)	irxfy(97)	irmfy(79)
iryd(83)	irc(96)	irg(89)	irbot(70)
irdis(75)	irtot(73)	irad(63)	iroutput(65)
iras(64)	irii(103)	irgns(66)	irnns(67)
irgdem(71)	irsp(72)	irgdim(74)	irgnpm(76)
irgnim(77)	irnnif(78)	iradv(104)	irasv(105)
iriiiv(143)	irgnsv(108)	irnnsv(109)	irgdemv(113)
irgdimv(116)	irgnpmv(120)	irgnimv(117)	irnnifv(118)
irpa(144)	irpgns(146)	irpnns(147)	irpmg(148)
irpmnfs(149)	irpxoil(150)	irpxnoilg(151)	irpxnfs(152)
irpbot(153)	irpgdem(154)	irpsp(155)	irpc(158)
irpig(159)	irpip(160)	irpg(161)	irpnit(162)
irpnfy(165)	irpxfy(166)	irpmfy(167)	irpvaoil(168)
irinfcpi(170)	irinfwpi(171)	irpgnpm(172)	irpdis(173)
irpgdim(174)	irpgnim(175)	irpyd(176)	irpnif(177)
irpoutput(181)	irpii(182)	irunemp(195)	irunempr(196)

## Special characteristics

Principally, the obvious characteristic of a model would become clear from its variable, equations and their relations. We may describe the specific characteristics of this model as:

- ❖ All sectors are described in form of demand and supply and excess supply or demand is declared in necessary cases. E.g. in demand for imports and supply of exports, trade imbalance is shown as trade surplus or deficit. In foreign exchange receipts of export and payments of imports in balance of payments account defines a surplus or deficit in foreign money sector. In monetary section, the supply and demand for money, with net banking claim from the private sector, would be in equilibrium. In government sector, the government expenditure and revenue with budget deficit or surplus would create equilibrium situation. In the real sector, supply and demand of goods and services with changes in inventories accompanying with statistical discrepancies would reach to equilibrium. The same mechanism would exist in nominal sector from national income and national expenditure sides. In the labor market, the supply and demand of labor along with unemployment variable would cause equilibrium in the labor market. In other words, the deficit or surplus would cause equilibrium in the model markets and would change the disequilibrium structure of the model to equilibrium.
- ❖ Unlike the other econometrics models, the price in this model is determined systematically. In other models, there would be always one principal section, and the other price indices would be calculated by bridge regressions. In the present model, all implicit price deflators are calculated by dividing current quantities to fixed quantities and the theoretical mathematical relationships of implicit price deflators practically exist for different implicit price deflators of national income accounting figures. In other words, the weighted average of detailed implicit price deflators are equal to the whole implicit price deflators. This mechanism will provide very close relationship among the model variables, which makes the confidence bands of forecasts tighter.
- ❖ We also considered a new treatment to the balance of payments errors and omissions by their time accumulating and making them endogenous as function of other accumulated variables. By this manipulation, we would avoid the problem of guess estimates for the future ex-ante values of these variables, which would help a lot in accuracy of forecasting. Along this, we applied the zero summation and zero average statistical properties of errors for the long-run.
- ❖ Regarding different definitions of different figures in government budget and national accounts, and also differences between dollar figures of balance of payments and Rial figures of national accounts, we applied bridge regressions for protecting the existing definitions and also maintaining the relations among different accounts.
- ❖ The price in this model is completely endogenous, so calculating all of current and constant prices items are necessary. Thus, all figures from national accounting are both in constant and current prices.
- ❖ Duality of money markets is specified. The organized and non-organized money markets based on supply and demand of deposits and credit facilities considering

the weighted average of interest rates for both deposits and loan facilities and also the rate of interest at non-organized money market, are presented in the model.

- ❖ The other of duality in Iran's economy is government and government sector. Most of government companies and related institutions, committees, foundations and other similar institutions which are recorded under this category would be several times larger than government body itself as defined in public budget. This distinction between government and government sector would be obvious in comparing assets and liabilities accounts of the banking system, but we can not easily obtain these figures in other sections of the economy. This government financial duality has been asserted in the model.
- ❖ Multiplicity of exchange rates is considered in the model. Official exchange rate, export exchange rate, effective and non-official or market exchange rates have all been shown and each rate has been applied for proper equation. The first two exchange rates are exogenous and the next two are endogenous.
- ❖ Foreign exchange obligation account of government which was increasing in last decade has been specified in the model.
- ❖ Considering the importance of oil sector in Iran's economy and dependence of Iran's economic variables to behavior of oil sector, the oil duality of Iran's economy as the oil and non-oil sectors has been fully specified.
- ❖ Providing necessary financial resources for private investment, net claims of banking system to private sector is connected to private nominal investment expenditures. This interrelates money and investment sections of the model.
- ❖ The government obligatory loan facilities are considered in the model as private and public loans.
- ❖ For eliminating non-stationarities from some of time series and making them stationary we applied the simple first order lag or generalized first difference of the variables when necessary.
- ❖ Basic relation of foreign sector and monetary sector is based on monetary approach to balance of payment.
- ❖ The production function of non-oil goods and services is defined as perfectly substitutable.
- ❖ The related adjustments of exchange rate for banking system foreign assets have been considered in the model.

## **Theoretical mechanism and functioning**

One of the most important characteristics of all macroeconomic models would be their sectors' linkages and interrelationships, which would make the economic viewpoint of the model builder clear. Here, we considered some basic sectors. The sectors' linkages were carefully based on the Iran's economy characteristics. Let's have a look at the provided framework. The basic sectors of the model are as follows:

- Foreign sector
- Monetary sector
- Government sector
- Real sector
- Nominal sector
- Price-exchange rate-wage
- Labor sector

In each of the above seven sections, we clearly specified the supply and demand dimensions in the model. In foreign sector, the demand for the import of goods and services and also the supply of the export of goods and services would ultimately show the disequilibrium in the foreign sector which would be asserted in the balance of payment. In the money sector, demand for money for components of banking system uses and supply of money from banking system resources; specify equilibrium in the money market. The government revenue and expenditure show the level of government activities, which finally by government budget deficit, we reach to government sector disequilibrium. In real sector of the economy, the product side as the supply side and the expenditure side as the demand side were used. In the nominal section of the model, the current production expenditures on one hand and the current expenditure of demand components on the other hand would make equilibrium on this sector. In the price part, the constant prices (real) and current prices (nominal) sections and their variables are used to define supply (production) and demand (expenditure) sides and prices are shown as their deflators. All the implicit price deflators have necessary relationships as in national income accounting. In the labor market, the supply and demand for labor were defined and the wage rate and unemployment are determined in relation with the performance of all sectors.

### **Foreign sector**

The oil price is considered as exogenous variable in the model. The oil revenue along with non-oil exports revenue are considered endogenous. The two oil and non-oil parts would determine the total export sector of the country. The demand for import function is adjusted by effective exchange rate and foreign prices. Also gross domestic product and the foreign exchange revenue resulted from the export of goods and services and the use of resources of capital account would determine the amount of imported goods. In this function, the capital account was considered exogenous for determining the effect of foreign borrowing on the demand for imports.

In general, the import demand function tries to determine the amount of imported goods with the help of effective exchange rate and the price of goods in foreign



countries also by considering the total foreign exchange revenue resulted from the export of goods and services. The trade balance is determined from the difference between export and import which along with the net export of services and transfer payments would determine the current account balance of country. The export and import of services were categorized as receipts and payments of the factors and non factors of production from abroad which in total, few equations were applied to show for estimating their components.

Iran's capital account and present foreign debt conditions and the way of calculating their grace period, forced us to change our treatment with these variables as exogenous. Trade balance, capital account and errors and omissions make the balance of payments account.

### **Monetary sector**

Money supply is defined as total banking system resources. In other words, the sum of net foreign assets, net claims to government sector (including government and quasi government) and net claims to private sector and net capital account and other assets of the banking system. Net foreign assets of the banking system, connects monetary sector to balance of payments of foreign sector. This approach is based upon monetary approach to balance of payments. Net claims of banking system to government sector relate the monetary sector to the government sector equations of the model by government budget deficit financing. Net of other assets and capital account of the banking system are revalued and adjusted by inflation rate. Net claim of the banking system to private sector is treated as liquidity residue. This residue would be the difference of the banking system uses (total of notes and coins in hands of public, current, savings and time deposits at the banking system), from three other resources of the banking system (net foreign assets of banking system, net claims of banking system to government sector, net of other assets and capital account of the banking system) in form of residue. This means that the banking system would provide credit to the private sector when it has free reserve.

When we cannot enter the interest rate as a variable in the demand for money function, we would face with several problems in our theoretical analysis and also in making a proper macro economic analysis. Some economists believe that in Iran's economy without interest rate as the conventional forms of western economies, we may apply "expected rate of inflation" instead of interest rate in an IS-LM framework of Hicks and Hanson. In general, applying a proxy variable in the model would cause some distortions in our theoretical analysis.

These distortions can be examined from three different points of views. At first, from quantitative point of view, the expected inflation rate and rate of interest are not equal. In theory, we can suppose that the rate of interest is less than or equal to the expected rate of inflation and their economic performances in both micro and macro economics are against each other; because interest rate is regarded as the nominal cost of investment but the expected rate of inflation will cause an increase in the nominal rate of return of investment. Any increase in interest rate will cause a decrease in investment but the expectation of price increase will cause increment in investment. In

other words, the effect of interest rate and expected rate of inflation are in two opposite directions. The second important point is about the definition of IS curve. If we define IS curve as equilibrium in goods and services market, we can write it as follow:

$$y=c[y-t(y)]+g+i(r)$$

in which  $y$  is disposable income and  $c$  is consumption function and  $g$  is government expenditure and  $i$  stands for investment. Consumption is a function of disposable income and investment is a function of interest rate ( $r$ ). The slope of IS would be derived simply from differentiating the two sides of the equation:

$$dy = c' \cdot (dy - t' dy) + i' dr$$

$$\left. \frac{dr}{dy} \right|_{IS|r} = \frac{1-c'(1-t')}{i'(r)}$$

Since  $c'$  is the marginal propensity to consume and is positive and less than one and the income tax rate ( $t'$ ) is also less than one, the nominator of the above fraction is positive and the investment changes in relation to rate of interest ( $i'$ ) is negative. As a result:

$$1-c'(1-t') > 0$$

$$i'(r) = \frac{\partial i(r)}{\partial r} < 0$$

$$\left. \frac{dr}{dy} \right|_{IS|r} < 0$$

Which means that IS curve is downward sloping. Now, if we put inflation instead of interest rate the IS equation would be:

$$y=c[y-t(y)]+g=i(p^{oe})$$

In which ( $p^{oe}$ ) is the expected rate of inflation. Slope of IS curve would be:

$$\left. \frac{dr}{dy} \right|_{IS|p^{oe}} = \frac{1-c'(1-t')}{i'(p^{oe})} > 0$$

This is positive because:

$$i'(p^{oe}) = \frac{\partial i(p^{oe})}{\partial (p^{oe})} > 0$$

In other words, IS is defined by a positive slope. In the case of replacing expected rate of inflation instead of current rate of interest, the discussion background will not change so much but another problem will appear that: while in determination of price level as intersection of aggregate demand and supply, the equilibrium price itself must be simultaneously determined in the IS as well.

The third point which can be deduced from the first point is the slope change of the LM curve. Though the changes in real money demand due to interest rate changes and also due to expected rate of inflation changes is negative, they are not equivalent, so replacing these two variables with each other will change the slope of LM curve.

Finally, since the increase in interest rate does not mean increase in expected rate of inflation and vice versa, these two variables cannot be used interchangeably. In fact, we can apply two variables as an approximate of each other if the domain of variation of the second variable is somehow a positive monotonic transformation of the domain of the first variable. In other words, the second variable should be converted to the first variable by two parameters of shift and scale parameters.

However, removing interest rate from the model with the above explanations however might create some special theoretical and practical problems in the model. One solution for this problem is to apply classical demand for money in Iran. In this case, transaction demand for money would be the basic variable in the money demand function. Regarding the fact that the velocity of money would be varied in different kinds of money and in any monetary innovations, the demand of money for the liquidity components would be defined by three separate equations, and real demand for demand deposits, time deposits and notes and coins would be related to gross domestic product. In fact, these equations relate the money sector to the real sector and prices.

Another solution would be to specify the duality of Iran's money market in the model. However, we tried to specify the behavioral effects of interest rate on the supply and demand for money resources in two organized (banking) and non-organized (non banking) monetary sectors.

In the organized market, the supply of banking resources to private and public sectors is a positive function of credit facilities' interest rates. The demand for liquidity components such as demand deposit, time deposit and notes and coins are defined as a function of deposits' interest rates in the banking system and free market interest rate in the non-organized money market. These equations relate the monetary sector to the real sector of the economy. On the other hand, by relating the investment demand as a function of credit facilities interest rate and non-organized market interest rate, the connection between the nominal and real sector of the model with monetary sector becomes stronger. The interest rate in the non-organized market would be determined as an endogenous variable from the intersection of demand and supply of investment and saving resources.

## **Public sector**

In this section, we define revenue and expenditure of government. Government expenditure includes current, development, special, special payment and investment in abroad. All of them, with the exception of special budget are exogenous. This variable is exogenous because, by law, government can spend this budget if she can finance it by some special revenues. The government revenue consists of oil and petrochemical products revenue, taxes, special revenues, miscellaneous revenue and revenue of foreign exchange sale. The latter revenues are resulting from government foreign exchange sales in non-official foreign exchange market. The tax revenue is divided into direct and indirect taxes. The direct taxes are a direct function of non-oil gross domestic expenditures at current prices and also a function of direct tax income in previous year. Indirect tax is a function of current consumption and import of goods at current prices. Miscellaneous revenue and special revenues are also a function of current gross domestic product. The oil revenue in dollar value is defined by the oil export and domestic oil consumption and the local price of petrochemical products. Budget deficit, as difference of total revenues and expenditures, is related to the banking system resources, and connect public and monetary sector in the model.

## **Real sector**

The operational mechanism in real sector is defined by two ways, first, by calculations of national product and second, by national expenditure. The non-oil products is a perfect substitutable production function, so connects to labor and capital markets. The non-oil products along with the value added of the oil sector would make the gross domestic products. The gross domestic expenditures is the sum of private consumption expenditures and public expenditures and private and public investment and net export. Each of these variables is function of some special variables. The private consumption is a function of disposable income. Government consumption and investment expenditures are both calculated as components of government budget expenditures at constant prices. The private investment as a demand function is a function of gross domestic product and the previous years' investment and imports. The exports and imports at Rial values are defined by converting from their dollar values. The total difference between gross domestic product and gross domestic expenditure is equal to statistical discrepancies and changes in inventory.

By adding terms of trade to gross domestic products we will have gross domestic income. The gross national expenditure and gross national income are defined by adding net factor income from abroad to gross domestic expenditure and gross domestic income. The net factor income from abroad is defined from regressions in dollar values at constant prices. The necessary functions for calculating the capital stock and depreciation at constant prices have also been defined in this sector. The net indirect taxes variable is the difference between subsidies and indirect taxes which along with depreciation are subtracted from gross national income and so will define national income.

## **Nominal section**

The current variables are also defined with the same mechanism as real sector. In this sector, all components of expenditure and product are defined in current prices in order to apply them for calculating implicit price deflators. Almost all equations in real sector (at constant prices) are defined in the nominal sector at current prices. The terms of trade is an exception which is not defined in nominal sector.

## **Price section**

In this section, various types of price indices as implicit price deflators for products and expenditures, retail and wholesale price indices and their main components as the imported goods, exported goods and home produced and consumed goods; and effective and regular market exchange rates of dollar and interest rate in non-organized money market are specified. The implicit price deflators are defined by dividing their current price values of nominal sector to corresponding variables at constant prices in real sector. The implicit price deflators for import, export and net factor income from abroad and their components, and also the value added of the oil sector, the private and public investment, the gross domestic and national output and expenditure, the price index of capital stock, disposable income, the net indirect taxes, depreciation, private and public sectors consumption and so on are all available in the model. The wholesale price indices are defined from the relation of this index to price indices from export, import and non oil product and finally, we defined inflation rate of this index as an endogenous variable. The retail price index is a function of gross domestic product implicit price deflator and its inflation rate is defined endogenous in the model. The non official market exchange rate is calculated in respect to national and foreign money supplies and the amount of foreign currency sold in the non-official market. The effective exchange rate is defined as the weighted average of official and non-official exchange rates. The interest rate in the non-organized market is defined from the supply and demand for investment and saving. Since, the official (banking) interest rates are determined by the Money and Credit Council, this variable is regarded exogenous in the model.

## **Labor market**

The labor market consists of two parts, supply and demand for labor. Demand for labor is a function of real wage and output. Supply of labor is a function of nominal wage and active population. The active population is related to total population with an equation. The number of unemployed persons and the unemployment rate are also calculated in this sector.

## Verifying the identities

Since all identities in the model should be proved for all of observations, before estimation and building the model, all equations are controlled. For the equations with different amounts in the two sides, we did some special approaches as follow:

In most of identities we observed that the right and left hand sides of identities were not equal. That is, the identity does not satisfy when real data is used. Consider the following example:

(per barrel oil price in dollar)×(barrels of exported oil) ≠ (exported oil revenue)

$$Y_t \neq X_t \cdot P_t$$

We explained the reason of this inequality. In most of times such inequalities will happen. Different approaches will be applied in this regard:

### Method 1: Artificial correctness of the data

In this method, we just change the variables with most error and use a proxy variable for it, and change the inequality to equality. In other words, in the above equation we calculate:

$$PP_t = Y_t/X_t$$

Then, we put  $PP_t$  instead of  $P_t$ , so the equation would be in the form of :

$$Y_t = X_t \cdot PP_t$$

If,  $P_t$  and its substitute variable  $PP_t$  were exogenous variables, then systematic effects of this manipulation would be less in comparison to considering  $P_t$  as an endogenous variable.

### Method 2: Using add factor

In this method, we define the differences of the right and left hand side as a residual term and add it to the right hand side of the equation as follows:

$$Res_t = Y_t - X_t \cdot P_t$$

and then we define the necessary identity as:

$$Y_t = X_t \cdot P_t + Res_t$$

In this method, the first inequality is changed to an equality, but a residual term is also appeared in the identity, which in time of simulation and especially estimation it would create redundant reflections. In simulation of the model, we may add the calculated add factors amounts for  $Res_t$ , but for prediction period we don't have any

valuable figure. Usually, we will put zero for this variable in ex-ante sample period. If the  $Res_t$  is a random variable satisfying classical regression assumptions for random error term, then equating this variable to zero for prediction period will not so harm the results of prediction. But if, the expected value of add factor were not equal to zero or its variance were not constant or the series were auto-regressive, in this case, using this method cause some disappeared biases in the predicted values of endogenous variables. All of these difficulties also exist in making simulation in the sample but as we have the least  $Res_t$  in the sample period, it would have less side effects on statistical properties of estimators. But however, it will cause good appearance for simulated ex-post values but make biases in prediction of ex-ante forecast.

### **Method 3: Bridge regression without residual term**

In this method the regarded inequality is defined as a probabilistic regression relation and we try to obtain the existing relation between the left and right hand sides values mostly as a simple linear regression with minimizing the differences between the right and left hand sides amounts. In other words, the above inequality is defined as following regression model:

$$Y_t = \alpha + \beta X_t . P_t + u_t$$

In which,  $\alpha$  and  $\beta$  are unknown parameters and  $u_t$  is an error term. We can estimate  $\alpha$  and  $\beta$  by ordinary least squares method. In other words, our identity in the model will be in the form of:

$$\hat{Y}_t = \hat{\alpha} + \hat{\beta} X_t P_t$$

In this method we don't have the previous method difficulties and the defined identity is considered as a probabilistic relation. The simulation results for in-sample period will not have any error term and in prediction for out-sample period there is no need to determine  $u_t$  values. Most of these regressions in fact have very high  $R^2$  levels.

### **Method 4: Bridge regression with residual term**

This method is also the same as previous method but the regarded identity is defined as follow:

$$Y_t = \hat{\alpha} + \hat{\beta} X_t . P_t + u_t$$

This kind of specification would cause in-sample simulation be better than the third method. In out-sample forecast, as the mean of  $u_t$  is equal to zero, we can assume zero quantities for  $u_t$  and base our forecasting upon it. But, since zero is an unbiased estimate and not a real value of  $u_t$ , so it causes predictions to loose their small sample properties and get only asymptotic properties. It is worth mentioning that in this method, at first,

we estimate the regression equation defined by the third method and then obtain the  $\hat{u}_t$  from the following relation and enter it in above relation in form of a time series data. So the above equation will finally be used in simulation and prediction of the model:

$$\hat{u}_t = Y_t - \hat{\alpha} - \hat{\beta} \cdot X_t \cdot P_t$$

This method is also defined as add factor method which econometric softwares have provided special algorithm for it. The add factor can be put in or take from the equations in different situations. For example, for predicting out of sample, we apply the add factor for all equations and identities – in case of errors in-sample errors– and bridge regressions and behavioral equations for making predicted figures closer to real figures. Also for shock analyzing or different policy making for some equations we enter the add factors. All of these situations depend upon the different properties of the model.



## Stock and flow variables relations

In different sections of the model, for some equations we need to relate flow variables to stock variables. For example, we can mention the relation between balance of payments and net foreign asset of central bank or relation between government budget deficit and net claim of banking system to government. If we define a simple regression as follow:

The flow variable =  $f(\text{stock variable}) + \text{disturbance term}$ .

The specified regression, in fact, will suffer from strong specification error. To avoid this kind of error we may apply the following two methods.

### Method 1: Converting stock variable to flow variable

In this method, we take a first order difference from the stock variable to convert it to a flow variable and we put two flow variables in the left and right hand sides of the regression:

The flow variable =  $f[\Delta(\text{stock variable})] + \text{the residual term}$ .

### Method 2: Converting flow variable to stock variable

In this method the flow variable from the far last periods till present time is accumulated annually. The resulted variable would be one stock variable. Then the following specification is used in the model:

$\sum (\text{flow variable}) = f(\text{stock variable}) + \text{disturbance term}$ .

The first method is application of discrete derivative and the second method is application of discrete integration in converting stock and flow variables to each other. These two methods have one similarity from theoretical/mathematical point of view but they have different regression properties, because specification and probability distribution of disturbance term are different. Thus the choice and application of the first and second method should be done according to the evaluation of disturbance term in each of the equations. In selecting method, we choose the method that its disturbance term has closer similarity to classical regression disturbance term assumptions.

## **Time structure and lagged variables**

Principally, models can be classified into long-run, medium term and short-run models. The structure of a short-run model is designed to possess the ability of explaining exogenous variables fluctuations effects on the endogenous variables changes in the short-run, e.g., monthly and seasonal models. These models are used to forecast a period of maximum of 1 year ahead. These models would be good predictors if all used variables were stable and unexplained factors outside of the model have less important role in the behavior of the model and its variables. The model structure of this class is strongly based on lagged exogenous and endogenous variables. For this reason the likelihood of divergence for predicting more than one year ahead is higher than other classes. In these models, the time variables are less directly entered into the model and model builder mostly emphasize on demand side of the model. Long-run models are designed for more than five years prediction and analysis. In long-run models, the lagged variables would not more or less enter the model. The trend variables generally appear as direct variables in the model and the model structure emphasizes on the supply side and variables such as capital stocks would appear in the model. In this class, equations have less accuracy on turning points.

The third class of models is medium term models. They would be applied for one to less than five years predictions. Model builders use some lagged variables in these models but with more simple structure than the short-run models. The accuracy of the models most of the times is concentrated on turning points and these models try to find fluctuations during a medium term. This kind of models would emphasis more on both supply and demand sides. The current designed model is for medium term and in specifying the model we mostly emphasized on accruing properties of these models.

## Structural changes and qualitative variables

Since 1959, lots of changes happened in Iran's economy which had so much effect on economic variables trends. The effects of some shocks were instantaneously and effects of some other were with some lags. However, ignorance of these changes would create specification errors in the model. Considering the fact that in simultaneous equations every specification error practically would go through other equations, so by applying these qualitative variables, we may avoid misspecification problem.

The other worth mentioning point would be the effect of ups and downs fluctuations of data series due to different structural changes. Outliers have important effects on least squares estimators, since in minimizing sum of squared residuals, larger errors have more leverage influence on the regression and the regression would tend toward the side of outliers. If we know that the error in one year is due to some special miscalculations or other reasons such as misbalancing of different series, we can neutralize their effects by applying some qualitative dummy variables. This means that practically, by losing one degree of freedom and entering one parameter due to one dummy variable, we ignore that observation from all of our calculations. If the qualitative dummy variable is defined for some observations, it means that by losing one degree of freedom, we ignore the effect of those year mean errors from the observed values of those years. Anyhow, due to Iran's statistical and economic conditions, we are obliged to apply this kind of variables. Some of major structural changes are listed as follows:

Structural changes	Period
Pre-oil price shock	1959-1973
Oil price shock	1974
Pre revolution period and after oil price shock	1975-1977
Revolution	1978
Pahlavi government	1959-1978
After revolution period	1979-.....
War	1980-1988
Non-usury banking	1993-.....
After war period	1983-.....
Foreign debt	1990-1993
Adjustment policies	1990-1994
Reconstruction policies	1990-1995
Export exchange rate decaluation	1991-.....
Exchange rate devaluation	1993-.....
Stability policies	1996-.....
President and country management changes	1997-2005
Civilized community policies	1998
Economic makeup policy	1999
Foreign exchange reserve fund	2000-.....
Oil price shock	2000
Exchange rate peg	2000
Unification of exchange rates	2001-.....

## Estimation

Following table shows the results of estimation. All equations are estimated by ordinary least squares method.

System: VER6\_SYS\_200\_EQ

Estimation Method: Iterative Least Squares

Date: 10/27/04 Time: 12:43

Sample: 1959 2003

Included observations: 45

Total system (unbalanced) observations 2864

Convergence achieved after 2 iterations

Parameter	Coefficient	Std. Error	t-Statistic	Prob.
B(1011)	0.938220	0.028509	32.90922	0.0000
B(1021)	0.000683	0.000106	6.463399	0.0000
B(1022)	5.17E-05	2.23E-05	2.316238	0.0206
B(1023)	-15.66976	1.428785	-10.96719	0.0000
B(1030)	-3.053998	0.640698	-4.766677	0.0000
B(1031)	-0.002714	0.001327	-2.044434	0.0410
B(1032)	0.000350	3.93E-05	8.899743	0.0000
B(1033)	18.25077	1.906234	9.574256	0.0000
B(1040)	16.51102	9.812815	1.682597	0.0926
B(1041)	0.007587	0.000695	10.91703	0.0000
B(1042)	-0.015600	0.002221	-7.024852	0.0000
B(1043)	0.000409	0.000111	3.681017	0.0002
B(1044)	-0.807827	0.132908	-6.078088	0.0000
B(1045)	0.006168	0.001035	5.959242	0.0000
B(1046)	-82.09988	20.79628	-3.947817	0.0001
B(1050)	-4.955529	1.707294	-2.902564	0.0037
B(1051)	0.001847	0.000539	3.428631	0.0006
B(1052)	0.791900	0.089987	8.800150	0.0000
B(1053)	2.49E-05	1.28E-05	1.941892	0.0523
B(1060)	1768.130	218.4329	8.094611	0.0000
B(1061)	2.620961	0.591710	4.429469	0.0000
B(1062)	-2.240442	0.600354	-3.731867	0.0002
B(1063)	0.220232	0.070848	3.108487	0.0019
B(1064)	0.259733	0.027441	9.465293	0.0000
B(1065)	-1852.226	236.9079	-7.818336	0.0000
B(1066)	2379.013	308.8867	7.701895	0.0000
B(1070)	93.46472	63.55033	1.470720	0.1415
B(1071)	0.241706	0.031465	7.681828	0.0000
B(1072)	-1629.943	194.1665	-8.394564	0.0000
B(1073)	0.543661	0.065315	8.323647	0.0000
B(1074)	884.2307	152.0219	5.816471	0.0000

Parameter	Coefficient	Std. Error	t-Statistic	Prob.
B(1081)	-0.129446	0.036481	-3.548318	0.0004
B(1082)	-0.214695	0.022534	-9.527470	0.0000
B(1083)	-0.090988	0.064386	-1.413172	0.1577
B(1084)	-0.077253	0.025184	-3.067585	0.0022
B(1085)	-4408.562	701.9070	-6.280834	0.0000
B(1086)	-2495.118	527.3125	-4.731764	0.0000
B(1090)	3967.793	208.3527	19.04363	0.0000
B(1091)	0.040286	0.015122	2.664024	0.0078
B(1092)	0.028933	0.011603	2.493640	0.0127
B(1093)	0.135731	0.060752	2.234173	0.0256
B(1094)	0.078389	0.032400	2.419389	0.0156
B(1095)	-0.099920	0.035707	-2.798371	0.0052
B(1096)	-0.999548	0.005804	-172.2151	0.0000
B(1097)	-1268.860	132.3117	-9.589933	0.0000
B(1098)	659.8853	137.1007	4.813142	0.0000
B(3011)	283.7412	104.7038	2.709942	0.0068
B(3012)	15796.21	5604.450	2.818512	0.0049
B(3020)	-8231.793	1990.450	-4.135645	0.0000
B(3021)	0.972871	0.026943	36.10824	0.0000
B(3022)	902.1258	210.4718	4.286207	0.0000
B(3023)	-17383.14	2552.939	-6.809068	0.0000
B(3024)	0.203182	0.040236	5.049744	0.0000
B(3025)	-28307.40	4317.386	-6.556607	0.0000
B(3031)	0.462007	0.062545	7.386744	0.0000
B(3032)	0.527280	0.068570	7.689661	0.0000
B(3033)	3703.509	884.1601	4.188731	0.0000
B(3034)	-3417.568	805.2976	-4.243857	0.0000
B(3041)	0.053394	0.013127	4.067409	0.0000
B(3042)	0.764757	0.053016	14.42507	0.0000
B(3043)	-1200.085	301.0781	-3.985958	0.0001
B(3044)	166.7775	48.19153	3.460722	0.0005
B(3050)	5025.716	2701.864	1.860092	0.0630
B(3051)	0.142900	0.024763	5.770804	0.0000
B(3052)	-2611.820	708.8954	-3.684352	0.0002
B(3053)	0.734614	0.055763	13.17384	0.0000
B(3060)	22432.19	4874.868	4.601598	0.0000
B(3061)	0.652367	0.096816	6.738206	0.0000
B(3062)	0.042999	0.013201	3.257174	0.0011
B(3063)	-10777.39	2721.385	-3.960257	0.0001
B(3064)	-909.9584	293.5188	-3.100170	0.0020
B(3065)	-316.5136	79.15276	-3.998769	0.0001
B(3066)	-5943.097	3070.199	-1.935737	0.0530
B(5011)	0.084521	0.010693	7.904267	0.0000
B(5012)	0.062022	0.014810	4.187820	0.0000
B(5013)	-10574.57	770.7049	-13.72065	0.0000
B(5014)	9187.662	845.3833	10.86804	0.0000

Parameter	Coefficient	Std. Error	t-Statistic	Prob.
B(5021)	0.503500	0.007866	64.01093	0.0000
B(5022)	0.131926	0.010511	12.55161	0.0000
B(5023)	0.794729	0.123601	6.429778	0.0000
B(5024)	-7967.086	1396.117	-5.706604	0.0000
B(5025)	10696.14	764.4136	13.99261	0.0000
B(5031)	0.099201	0.025541	3.883945	0.0001
B(5040)	0.027573	0.001332	20.69496	0.0000
B(5051)	0.017120	0.001265	13.53477	0.0000
B(7011)	61.94041	9.510108	6.513113	0.0000
B(7012)	18381.83	2718.127	6.762682	0.0000
B(7013)	-15923.26	3030.609	-5.254145	0.0000
B(7014)	26253.74	3224.967	8.140778	0.0000
B(7015)	-21355.61	2789.260	-7.656372	0.0000
B(7021)	16.80744	4.407601	3.813285	0.0001
B(7030)	-37400.25	4660.627	-8.024724	0.0000
B(7031)	0.068453	0.005795	11.81300	0.0000
B(7032)	0.885109	0.061272	14.44550	0.0000
B(7033)	9.216125	0.713384	12.91889	0.0000
B(7034)	0.251090	0.104137	2.411146	0.0160
B(7035)	23054.70	4405.671	5.232959	0.0000
B(7036)	-17816.29	2951.540	-6.036268	0.0000
B(7041)	372.4702	18.91275	19.69414	0.0000
B(7051)	343.9700	17.71250	19.41962	0.0000
B(7052)	0.964323	0.019718	48.90472	0.0000
B(7060)	12471.00	2399.541	5.197245	0.0000
B(7061)	0.202117	0.016929	11.93925	0.0000
B(7062)	1.735642	0.102105	16.99866	0.0000
B(7063)	-2298.971	366.7558	-6.268398	0.0000
B(7064)	-19862.51	3475.405	-5.715165	0.0000
B(7071)	0.995004	0.003334	298.4086	0.0000
B(7072)	40.89797	0.778274	52.54959	0.0000
B(7073)	7.749489	3.947542	1.963117	0.0497
B(7074)	4261.260	980.4222	4.346352	0.0000
B(7080)	5286.016	261.3786	20.22360	0.0000
B(7081)	0.035881	0.000465	77.14133	0.0000
B(7082)	-0.372030	0.073470	-5.063665	0.0000
B(7083)	0.015105	0.007309	2.066540	0.0389
B(7084)	14706.76	3315.921	4.435197	0.0000
B(7091)	0.329782	0.068604	4.807032	0.0000
B(7092)	0.101947	0.025481	4.000897	0.0001
B(7101)	244.4891	17.93685	13.63055	0.0000
B(7102)	-5058.133	752.5469	-6.721353	0.0000
B(7111)	165.2402	9.057111	18.24425	0.0000
B(7112)	2780.463	592.3333	4.694084	0.0000
B(7122)	39.27605	1.207021	32.53966	0.0000
B(7123)	-5884.918	1489.823	-3.950080	0.0001

Parameter	Coefficient	Std. Error	t-Statistic	Prob.
B(7124)	4822.320	1466.674	3.287930	0.0010
B(7131)	472.4020	56.11807	8.418001	0.0000
B(7141)	174.2496	18.52433	9.406526	0.0000
B(7151)	0.481404	0.062449	7.708722	0.0000
B(7152)	-37556.92	6282.031	-5.978469	0.0000
B(7160)	-897246.9	198114.5	-4.528931	0.0000
B(7161)	1.914627	1.087203	1.761057	0.0783
B(7162)	0.333426	0.105385	3.163900	0.0016
B(7163)	668.9374	146.6390	4.561797	0.0000
B(7164)	-8342.252	2353.605	-3.544457	0.0004
B(7165)	-19719.73	3084.657	-6.392842	0.0000
B(9011)	0.152953	0.016519	9.259208	0.0000
B(9021)	0.841844	0.079124	10.63954	0.0000
B(9022)	0.451966	0.238926	1.891659	0.0586
B(9023)	0.675673	0.197714	3.417424	0.0006
B(9024)	-9016.327	2635.186	-3.421515	0.0006
B(9025)	27815.29	2086.890	13.32858	0.0000
B(9031)	0.050171	0.004135	12.13198	0.0000
B(9041)	0.368968	0.074864	4.928490	0.0000
B(9042)	0.357412	0.064054	5.579873	0.0000
B(9051)	0.712555	0.037794	18.85367	0.0000
B(9052)	0.402393	0.093915	4.284636	0.0000
B(9061)	0.001006	1.62E-05	62.20524	0.0000
B(9071)	0.000983	6.18E-06	159.0198	0.0000
B(9081)	0.001175	8.12E-05	14.48233	0.0000
B(9090)	-1210.964	228.9710	-5.288722	0.0000
B(9091)	0.001289	2.88E-05	44.70607	0.0000
B(9092)	2290.315	656.9352	3.486364	0.0005
B(9093)	1163.855	252.6611	4.606389	0.0000
B(9101)	0.423051	0.086618	4.884091	0.0000
B(9111)	-846.8540	358.2333	-2.363973	0.0182
B(9112)	-251.9120	76.27983	-3.302472	0.0010
B(9113)	0.121572	0.006926	17.55399	0.0000
B(9114)	-9378.276	2920.234	-3.211481	0.0013
B(9115)	-11455.46	3587.160	-3.193463	0.0014
B(9121)	0.000644	1.90E-05	33.88678	0.0000
B(9122)	25627.52	2123.704	12.06737	0.0000
B(9131)	0.000870	7.45E-05	11.68833	0.0000
B(9141)	0.000964	1.56E-05	61.62260	0.0000
B(9151)	-2.608662	0.877087	-2.974234	0.0030
B(9152)	3.118477	0.701138	4.447738	0.0000
B(9153)	30557.12	3608.947	8.467047	0.0000
B(9154)	14290.91	3596.447	3.973618	0.0001
B(9156)	33592.62	5669.609	5.925033	0.0000
B(20011)	0.054779	0.005375	10.19134	0.0000
B(20012)	-0.031967	0.016651	-1.919838	0.0550

Parameter	Coefficient	Std. Error	t-Statistic	Prob.
B(20013)	-0.082960	0.009027	-9.190404	0.0000
B(20014)	1990.750	218.2428	9.121723	0.0000
B(20015)	-5344.133	570.5400	-9.366799	0.0000
B(20020)	-277.2563	65.58719	-4.227294	0.0000
B(20021)	0.601414	0.027469	21.89391	0.0000
B(20022)	0.191949	0.031479	6.097637	0.0000
B(20023)	-908.9763	152.1358	-5.974768	0.0000
B(20031)	38.89449	5.789690	6.717889	0.0000
B(20041)	185.0860	38.59996	4.794979	0.0000
B(20051)	83.87346	3.423243	24.50117	0.0000
B(20061)	0.714236	0.007719	92.52816	0.0000
B(20062)	0.245999	0.005082	48.40871	0.0000
B(20071)	99.87955	1.678574	59.50261	0.0000
B(20072)	-13.49636	1.216681	-11.09276	0.0000
B(20080)	12.56823	2.192764	5.731686	0.0000
B(20081)	0.429251	0.093687	4.581756	0.0000
B(20082)	0.000428	8.10E-05	5.285063	0.0000
B(20083)	10.62016	2.037808	5.211560	0.0000
B(20084)	-6.866608	1.978940	-3.469841	0.0005
B(20091)	1.049817	0.027679	37.92868	0.0000
B(20101)	0.810103	0.035278	22.96372	0.0000
B(31010)	-0.335100	0.055638	-6.022873	0.0000
B(31011)	1.095081	0.029810	36.73529	0.0000
B(31012)	0.000227	3.77E-05	6.017742	0.0000
B(31020)	752.8582	165.3721	4.552511	0.0000
B(31021)	1.006568	0.003728	270.0304	0.0000
B(31031)	-0.010461	0.004510	-2.319360	0.0205
B(31032)	0.000389	0.000117	3.320492	0.0009
B(31033)	13.89373	4.240248	3.276631	0.0011
B(31034)	16.68294	6.279030	2.656930	0.0079
B(31041)	15.23181	2.612997	5.829251	0.0000
B(31042)	0.015383	0.002110	7.290295	0.0000
B(31043)	681.5547	126.1824	5.401346	0.0000
B(31044)	373.2981	126.6665	2.947093	0.0032



Determinant residual covariance		0.000000	
Equation: IRXOILB=IRXOILB(-1)+B(1011)*(IRYOILB-IRYOILB(-1))			
Observations: 44			
R-squared	0.993289	Mean dependent var	924.3946
Adjusted R-squared	0.993289	S.D. dependent var	449.0470
S.E. of regression	36.78490	Sum squared resid	58184.54
Durbin-Watson stat	2.109162		
Equation: IRXNFSDOP=IRXNFSDOP(-1)+B(1021)*IREENOIL+B(1022) *(IRGDPNF-IRGDPNF(-1))+B(1023)*IRD79			
Observations: 44			
R-squared	0.964866	Mean dependent var	5.041983
Adjusted R-squared	0.963152	S.D. dependent var	7.437831
S.E. of regression	1.427752	Sum squared resid	83.57751
Durbin-Watson stat	1.551213		
Equation: IRMNFSDCIFP= IRMNFSDCIFP(-1)+B(1030)+B(1031) *(IREENOIL*IRCIFP/IRWPI-IREENOIL(-1)*IRCIFP(-1)/IRWPI(-1)) +B(1032)*(IRGDPM-IRGDPM(-1))+B(1033)*(IRD77+IRD79+IRD88 +IRD02)			
Observations: 44			
R-squared	0.941003	Mean dependent var	14.22489
Adjusted R-squared	0.936578	S.D. dependent var	13.69391
S.E. of regression	3.448631	Sum squared resid	475.7221
Durbin-Watson stat	1.322466		
Equation: IRMGDCIFP=B(1040) +B(1041)*(IRXGD+IRXSD)+B(1042) *IREENOIL+B(1043)*IRGDPM+B(1044)*IRCIFP+B(1045)*IRKAD +B(1046)*IRD79			
Observations: 45			
R-squared	0.948305	Mean dependent var	126.4949
Adjusted R-squared	0.940142	S.D. dependent var	75.92342
S.E. of regression	18.57533	Sum squared resid	13111.63
Durbin-Watson stat	1.424502		
Equation: IRXGNODOP = B(1050)+B(1051)*IREX*OECDP/IRWPI +B(1052)*IRXGNODOP(-1)+B(1053)*IRGDPNF			
Observations: 44			
R-squared	0.928045	Mean dependent var	17.26075
Adjusted R-squared	0.922648	S.D. dependent var	14.77531
S.E. of regression	4.109345	Sum squared resid	675.4688
Durbin-Watson stat	1.708243		
Equation: IRMFYSD=B(1060)+(B(1061)+B(1062)*(1-IRD5977))*IRKADC *LIBOR/100+B(1063)*IRMFYSD(-1)+B(1064)*IRD5978*IRMGD +B(1065)*IRD5977+B(1066)*IRD0205			
Observations: 44			
R-squared	0.927348	Mean dependent var	1617.873
Adjusted R-squared	0.915567	S.D. dependent var	1320.553
S.E. of regression	383.7184	Sum squared resid	5447874.
Durbin-Watson stat	1.791443		

$$\text{Equation: IRXFYSD} = B(1070) + B(1071) * \text{IRGEFIDC} + B(1072) * (1 - \text{IRD5978}) + B(1073) * \text{IRXFYSD}(-1) + B(1074) * \text{IRD0105}$$

Observations: 44

R-squared	0.938543	Mean dependent var	949.2086
Adjusted R-squared	0.932240	S.D. dependent var	928.7080
S.E. of regression	241.7498	Sum squared resid	2279276.
Durbin-Watson stat	2.746867		

$$\text{Equation: IRBOPEODC} = B(1081) * \text{IRKADC} + B(1082) * \text{IRTBDC} + B(1083) * \text{IRFYSBDC} + B(1084) * \text{IRNFSBDC} + B(1085) * \text{IRD84} + B(1086) * \text{IRD9495}$$

Observations: 45

R-squared	0.980722	Mean dependent var	-5610.767
Adjusted R-squared	0.978250	S.D. dependent var	4478.980
S.E. of regression	660.5513	Sum squared resid	17016793
Durbin-Watson stat	1.687301		

$$\text{Equation: IRNTRDC} = \text{IRNTRDC}(-1) + B(1090) + B(1091) * \text{IRKADC} + B(1092) * \text{IRTBDC} + B(1093) * \text{IRFYSBDC} + B(1094) * \text{IRNFSBDC} + B(1095) * \text{IRBOPEODC} * (1 + B(1096) * \text{IRD5988}) + B(1097) * \text{IRD95} + B(1098) * \text{IRD92}$$

Observations: 44

R-squared	0.999694	Mean dependent var	3978.714
Adjusted R-squared	0.999624	S.D. dependent var	5875.776
S.E. of regression	113.8773	Sum squared resid	453881.0
Durbin-Watson stat	2.015581		

$$\text{Equation: IRM2NPVPGDPM} = \text{IRM2NPVPGDPM}(-1) + B(3011) * \text{IRIRL} + B(3012) * \text{IRD7576}$$

Observations: 44

R-squared	0.949721	Mean dependent var	64883.88
Adjusted R-squared	0.948523	S.D. dependent var	34175.88
S.E. of regression	7753.973	Sum squared resid	2.53E+09
Durbin-Watson stat	1.253268		

$$\text{Equation: IRM2NGSVPGDPM} = B(3020) + B(3021) * \text{IRM2NGSVPGDPM}(-1) + B(3022) * \text{IRIRL} + B(3023) * \text{IRD9497} + B(3024) * \text{IRD5978} + B(3025) * \text{IRM2NGSVPGDPM}(-1) + B(3025) * \text{IRD0305}$$

Observations: 44

R-squared	0.977026	Mean dependent var	-41229.48
Adjusted R-squared	0.974003	S.D. dependent var	25006.88
S.E. of regression	4032.031	Sum squared resid	6.18E+08
Durbin-Watson stat	2.346445		

$$\text{Equation: IRM2NFAD} = B(3031) * \text{IRBOPDC} + B(3032) * \text{IRM2NFAD}(-1) + B(3033) * \text{IRD8589} + B(3034) * \text{IRD9705}$$

Observations: 44

R-squared	0.868280	Mean dependent var	4813.920
Adjusted R-squared	0.858401	S.D. dependent var	4320.640
S.E. of regression	1625.844	Sum squared resid	1.06E+08
Durbin-Watson stat	1.889031		

$$\text{Equation: IRDDVPGDPM} = B(3041)*\text{IRGDPM}+B(3042)*\text{IRDDVPGDPM}(-1)+B(3043)*\text{IRIRS}+B(3044)*\text{IRIRNB}$$

Observations: 44

R-squared	0.986936	Mean dependent var	28680.26
Adjusted R-squared	0.985956	S.D. dependent var	18042.19
S.E. of regression	2138.142	Sum squared resid	1.83E+08
Durbin-Watson stat	2.049635		

$$\text{Equation: IRSDVPGDPM} = B(3050)+B(3051)*\text{IRGDPM}+B(3052)*\text{IRIRS}+B(3053)*\text{IRSDVPGDPM}(-1)$$

Observations: 44

R-squared	0.980083	Mean dependent var	50243.27
Adjusted R-squared	0.978589	S.D. dependent var	28201.91
S.E. of regression	4126.649	Sum squared resid	6.81E+08
Durbin-Watson stat	1.725468		

$$\text{Equation: IRCUVPGDPM} = B(3060)+B(3061)*\text{IRCUVPGDPM}(-1)+B(3062)*\text{IRGDPM}+B(3063)*\text{IRD5977}+B(3064)*\text{IRIRL}+B(3065)*\text{IRIRNB}+B(3066)*\text{IRD79}$$

Observations: 44

R-squared	0.943314	Mean dependent var	17018.67
Adjusted R-squared	0.934122	S.D. dependent var	10935.36
S.E. of regression	2806.757	Sum squared resid	2.91E+08
Durbin-Watson stat	1.612120		

$$\text{Equation: IRGRTIV} = \text{IRGRTIV}(-1)+B(5011)*(\text{IRMGV}-\text{IRMGV}(-1))+B(5012)*(\text{IRCV}-\text{IRMGV}-(\text{IRCV}(-1)-\text{IRMGV}(-1)))+B(5013)*\text{IRD00}+B(5014)*\text{IRD99}$$

Observations: 44

R-squared	0.991765	Mean dependent var	3463.555
Adjusted R-squared	0.991148	S.D. dependent var	7727.706
S.E. of regression	727.0771	Sum squared resid	21145643
Durbin-Watson stat	1.447764		

$$\text{Equation: IRGROILV} = B(5021)*(1-\text{IRD93})*\text{IREO}*(\text{IRXOILD}/1000-\text{IRGRDSV}/\text{IREM})+B(5022)*\text{IRPDOIL}*(\text{IRYOILB}-\text{IRXOILB})+B(5023)*\text{IRD93}*(0.58*1000+0.42*(\text{IREO}-1000))*(\text{IRXOILD}/1000-\text{IRGRDSV}/\text{IREM})+B(5024)*\text{IRD0005}+B(5025)*\text{IRD9597}$$

Observations: 45

R-squared	0.997816	Mean dependent var	10158.62
Adjusted R-squared	0.997598	S.D. dependent var	24900.15
S.E. of regression	1220.461	Sum squared resid	59580974
Durbin-Watson stat	2.203452		

$$\text{Equation: IRGRMV} = \text{IRGRMV}(-1)+B(5031)*(\text{IROUTPUTV}-\text{IROUTPUTV}(-1))$$

Observations: 44

R-squared	0.395877	Mean dependent var	4437.618
Adjusted R-squared	0.395877	S.D. dependent var	17915.44
S.E. of regression	13924.84	Sum squared resid	8.34E+09
Durbin-Watson stat	1.599178		

$$\text{Equation: IRGRSV}=\text{IRGRSV}(-1)+\text{B}(5040)*(\text{IROUTPUTV}-\text{IROUTPUTV}(-1))$$

Observations: 44

R-squared	0.992984	Mean dependent var	3561.303
Adjusted R-squared	0.992984	S.D. dependent var	8672.055
S.E. of regression	726.3917	Sum squared resid	22688730
Durbin-Watson stat	1.792799		

$$\text{Equation: IRGRTDV}=\text{IRGRTDV}(-1)+\text{B}(5051)*(\text{IROUTPUTV}-\text{IROUTPUTV}(-1))$$

Observations: 44

R-squared	0.992214	Mean dependent var	3906.084
Adjusted R-squared	0.992214	S.D. dependent var	7815.021
S.E. of regression	689.5913	Sum squared resid	20448054
Durbin-Watson stat	2.506710		

$$\text{Equation: IRIG}=\text{IRIG}(-1)+\text{B}(7011)*(\text{IRGEDV}/\text{IRWPI}-\text{IRGEDV}(-1)/\text{IRWPI}(-1))+\text{B}(7012)*\text{IRD76}+\text{B}(7013)*\text{IRD77}+\text{B}(7014)*\text{IRD78}+\text{B}(7015)*\text{IRD79}$$

Observations: 44

R-squared	0.960948	Mean dependent var	22374.81
Adjusted R-squared	0.956942	S.D. dependent var	13098.81
S.E. of regression	2718.048	Sum squared resid	2.88E+08
Durbin-Watson stat	1.943642		

$$\text{Equation: IRG}=\text{IRG}(-1)+\text{B}(7021)*((\text{IRGECV}+\text{IRGESV})/\text{IRWPI}-(\text{IRGECV}(-1)+\text{IRGESV}(-1))/\text{IRWPI}(-1))$$

Observations: 44

R-squared	0.956452	Mean dependent var	32125.71
Adjusted R-squared	0.956452	S.D. dependent var	16141.65
S.E. of regression	3368.465	Sum squared resid	4.88E+08
Durbin-Watson stat	1.156216		

$$\text{Equation: IRGDPNF}=\text{B}(7030)+\text{B}(7031)*\text{IRK}(-1)+\text{B}(7032)*(\text{IRIP}+\text{IRIG}-\text{IRM}*\text{IRMACHIMV})+\text{B}(7033)*\text{IREMP}+\text{B}(7034)*\text{IRM}*\text{IRMACHIMV}+\text{B}(7035)*\text{IRD79}+\text{B}(7036)*\text{IRD8789}$$

Observations: 44

R-squared	0.997787	Mean dependent var	154911.9
Adjusted R-squared	0.997428	S.D. dependent var	84145.35
S.E. of regression	4267.714	Sum squared resid	6.74E+08
Durbin-Watson stat	1.691219		

$$\text{Equation: IRMG}=\text{IRMG}(-1)+\text{B}(7041)*(\text{IRMGDCIFP}-\text{IRMGDCIFP}(-1))$$

Observations: 44

R-squared	0.975540	Mean dependent var	47294.11
Adjusted R-squared	0.975540	S.D. dependent var	27989.89
S.E. of regression	4377.558	Sum squared resid	8.24E+08
Durbin-Watson stat	1.696943		

$$\text{Equation: IRMNFS}=\text{B}(7051)*(\text{IRMNFSDCIFP}-\text{IRMNFSDCIFP}(-1))+\text{B}(7052)*\text{IRMNFS}(-1)$$

Observations: 44

R-squared	0.965181	Mean dependent var	5105.688
Adjusted R-squared	0.964352	S.D. dependent var	4465.816
S.E. of regression	843.1808	Sum squared resid	29860062
Durbin-Watson stat	1.842198		

$$\text{Equation: IRIP} = B(7060) + B(7061) * \text{IRGDPNF}(-1) + B(7062) * \text{IRM} \\ * \text{IRMACHIMV} + B(7063) * \text{IRIRL} + B(7064) * \text{IRD7779}$$

Observations: 44

R-squared	0.948674	Mean dependent var	41497.45
Adjusted R-squared	0.943410	S.D. dependent var	21776.65
S.E. of regression	5180.392	Sum squared resid	1.05E+09
Durbin-Watson stat	1.185581		

$$\text{Equation: IRVAOIL} = B(7071) * \text{IRVAOIL}(-1) + B(7072) * (\text{IRXOILB} - \text{IRXOILB}(-1)) \\ + B(7073) * ((\text{IRYOILB} - \text{IRXOILB}) - (\text{IRYOILB}(-1) - \text{IRXOILB}(-1))) \\ + B(7074) * \text{IRD02}$$

Observations: 44

R-squared	0.997480	Mean dependent var	41440.82
Adjusted R-squared	0.997291	S.D. dependent var	18297.57
S.E. of regression	952.2816	Sum squared resid	36273606
Durbin-Watson stat	2.429974		

$$\text{Equation: IRCCA} = B(7080) + B(7081) * (1 + B(7082) * \text{IRD9405}) * \text{IRK}(-1) \\ + B(7083) * (\text{IRWARCD} + \text{IRWARED} + \text{IRWARMD}) + B(7084) \\ * \text{IRD9405}$$

Observations: 44

R-squared	0.997053	Mean dependent var	28759.92
Adjusted R-squared	0.996751	S.D. dependent var	16607.72
S.E. of regression	946.6046	Sum squared resid	34946352
Durbin-Watson stat	0.546358		

$$\text{Equation: IRC} = B(7091) * (\text{IRYD} - \text{IRYD}(-1)) + B(7092) * \text{IRSP}(-1) + \text{IRC}(-1)$$

Observations: 44

R-squared	0.992415	Mean dependent var	94286.53
Adjusted R-squared	0.992234	S.D. dependent var	49704.69
S.E. of regression	4380.157	Sum squared resid	8.06E+08
Durbin-Watson stat	2.185584		

$$\text{Equation: IRXFY} = \text{IRXFY}(-1) + B(7101) * (\text{IRXFYSD} / \text{OECDP} - \\ \text{IRXFYSD}(-1) / \text{OECDP}(-1)) + B(7102) * \text{IRD7879}$$

Observations: 44

R-squared	0.961041	Mean dependent var	4270.748
Adjusted R-squared	0.960114	S.D. dependent var	5326.664
S.E. of regression	1063.816	Sum squared resid	47531587
Durbin-Watson stat	2.156459		

$$\text{Equation: IRMFY} = \text{IRMFY}(-1) + B(7111) * (\text{IRMFYSD} / \text{OECDP} - \text{IRMFYSD}(-1) / \text{OECDP}(-1)) + B(7112) * \text{IRD7377}$$

Observations: 44

R-squared	0.931728	Mean dependent var	4597.962
Adjusted R-squared	0.930102	S.D. dependent var	5003.115
S.E. of regression	1322.731	Sum squared resid	73483893

Durbin-Watson stat	1.627238		
Equation: $IRXOIL=IRXOIL(-1)+B(7122)*(IRXOILB-IRXOILB(-1))+B(7123)*IRD73+B(7124)*IRD83$			
Observations: 44			
R-squared	0.993982	Mean dependent var	39025.12
Adjusted R-squared	0.993688	S.D. dependent var	18460.02
S.E. of regression	1466.596	Sum squared resid	88187076
Durbin-Watson stat	2.041596		
Equation: $IRXNOILG=IRXNOILG(-1)+B(7131)*(IRXGNODOP-IRXGNODOP(-1))$			
Observations: 44			
R-squared	0.919739	Mean dependent var	6953.078
Adjusted R-squared	0.919739	S.D. dependent var	6351.892
S.E. of regression	1799.517	Sum squared resid	1.39E+08
Durbin-Watson stat	2.020752		
Equation: $IRXNFS=IRXNFS(-1)+B(7141)*(IRXNFSGOP-IRXNFSGOP(-1))$			
Observations: 44			
R-squared	0.963729	Mean dependent var	1386.083
Adjusted R-squared	0.963729	S.D. dependent var	2198.174
S.E. of regression	418.6390	Sum squared resid	7536119.
Durbin-Watson stat	2.062930		
Equation: $IRINPUT = IRINPUT(-1) + B(7151) * (IRGDPF - IRGDPF(-1)) + B(7152)*IRD79$			
Observations: 44			
R-squared	0.981679	Mean dependent var	105251.0
Adjusted R-squared	0.981242	S.D. dependent var	45672.94
S.E. of regression	6255.291	Sum squared resid	1.64E+09
Durbin-Watson stat	2.024889		
Equation: $IRII=B(7160)+B(7161)*(IRII(-1)/IROUTPUT(-1))*(IROUTPUT(-1)-IROUTPUT(-1))+B(7162)*IRII(-1)+B(7163)*IRYEAR+B(7164)*IRPGDPF+B(7165)*(IRD8285+IRD9394+IRD73)$			
Observations: 44			
R-squared	0.748988	Mean dependent var	10707.52
Adjusted R-squared	0.715960	S.D. dependent var	12903.64
S.E. of regression	6877.049	Sum squared resid	1.80E+09
Durbin-Watson stat	2.169334		
Equation: $IRGV = IRGV(-1)+ B(9011)* ( (IRGECV+IRGESV)-(IRGECV(-1)-(IRGESV(-1))))$			
Observations: 44			
R-squared	0.984524	Mean dependent var	16445.91
Adjusted R-squared	0.984524	S.D. dependent var	32824.08
S.E. of regression	4083.418	Sum squared resid	7.17E+08
Durbin-Watson stat	1.294772		
Equation: $IRIGV=IRIGV(-1)+B(9021)*(IRGEDV-IRGEDV(-1))+B(9022)*(IRFEOAV-IRFEOAV(-1))+B(9023)*IROLGV+B(9024)*IRD9497+B(9025)*IRD02$			

Observations: 44

R-squared	0.995704	Mean dependent var	12406.64
Adjusted R-squared	0.995263	S.D. dependent var	26041.93
S.E. of regression	1792.298	Sum squared resid	1.25E+08
Durbin-Watson stat	1.067963		

$$\text{Equation: IRSUBV} = \text{IRSUBV}(-1) + \text{B}(9031) * (\text{IRGECV} + \text{IRGESV} - \text{IRGECV}(-1) - \text{IRGESV})$$

Observations: 44

R-squared	0.982782	Mean dependent var	2235.707
Adjusted R-squared	0.982782	S.D. dependent var	4578.416
S.E. of regression	600.7605	Sum squared resid	15519267
Durbin-Watson stat	1.589819		

$$\text{Equation: IRCV} = \text{IRCV}(-1) + \text{B}(9041) * (\text{IRYDV} - \text{IRYDV}(-1)) + \text{B}(9042) * \text{IRSPV}(-1)$$

Observations: 44

R-squared	0.998997	Mean dependent var	58305.00
Adjusted R-squared	0.998973	S.D. dependent var	117039.8
S.E. of regression	3751.107	Sum squared resid	5.91E+08
Durbin-Watson stat	2.395573		

$$\text{Equation: IRVAOILV} = \text{IRVAOILV}(-1) + \text{B}(9051) * (\text{IRXOILD}/1000 * \text{IREO} - \text{IRXOILD}(-1)/1000 * \text{IREO}(-1)) + \text{B}(9052) * (\text{IRPDOIL} * (\text{IRYOILB} - \text{IRXOILB}) - \text{IRPDOIL}(-1) * (\text{IRYOILB}(-1) - \text{IRXOILB}(-1)))$$

Observations: 44

R-squared	0.989770	Mean dependent var	21729.30
Adjusted R-squared	0.989526	S.D. dependent var	52344.46
S.E. of regression	5356.993	Sum squared resid	1.21E+09
Durbin-Watson stat	1.777637		

$$\text{Equation: IRMGV} = \text{IRMGV}(-1) + \text{B}(9061) * (\text{IRMGD} * \text{IREENOIL} - \text{IRMGD}(-1) * \text{IREENOIL}(-1))$$

Observations: 44

R-squared	0.998884	Mean dependent var	20639.12
Adjusted R-squared	0.998884	S.D. dependent var	47921.75
S.E. of regression	1600.556	Sum squared resid	1.10E+08
Durbin-Watson stat	2.150298		

$$\text{Equation: IRMNFSV} = \text{IRMNFSV}(-1) + \text{B}(9071) * (\text{IRMNFSV} * \text{IREENOIL} - \text{IRMNFSV}(-1) * \text{IREENOIL}(-1))$$

Observations: 44

R-squared	0.999712	Mean dependent var	3274.553
Adjusted R-squared	0.999712	S.D. dependent var	8676.523
S.E. of regression	147.1187	Sum squared resid	930687.7
Durbin-Watson stat	1.780305		

$$\text{Equation: IRXFYV} = \text{IRXFYV}(-1) + \text{B}(9081) * (\text{IRXFYSD} * \text{IREENOIL} - \text{IRXFYSD}(-1) * \text{IREENOIL}(-1))$$

Observations: 44

R-squared	0.960298	Mean dependent var	1471.267
Adjusted R-squared	0.960298	S.D. dependent var	4035.218

S.E. of regression	804.0322	Sum squared resid	27798116
Durbin-Watson stat	2.634974		

Equation:  $IRMFYV = IRMFYV(-1) + B(9090) + B(9091) * (IRMFYSD * IREENOIL - IRMFYSD(-1) * IREENOIL(-1)) + B(9092) * IRD93 + B(9093) * IRD5992$

Observations: 44

R-squared	0.994461	Mean dependent var	2485.129
Adjusted R-squared	0.994045	S.D. dependent var	8059.784
S.E. of regression	621.9580	Sum squared resid	15473269
Durbin-Watson stat	2.200142		

Equation:  $IRITV = IRITV(-1) + B(9101) * (IRGRTIV - IRGRTIV(-1))$

Observations: 44

R-squared	0.946525	Mean dependent var	3180.018
Adjusted R-squared	0.946525	S.D. dependent var	6920.388
S.E. of regression	1600.309	Sum squared resid	1.10E+08
Durbin-Watson stat	0.772404		

Equation:  $IRIPV = IRIPV(-1) + IROLPV + B(9111) * (IRIRL - IRIRL(-1)) + B(9112) * (IRIRNB - IRIRNB(-1)) + B(9113) * (IROUTPUTV - IROUTPUTV(-1)) + B(9114) * IRD99 + B(9115) * IRD02$

Observations: 44

R-squared	0.996964	Mean dependent var	21107.84
Adjusted R-squared	0.996652	S.D. dependent var	45543.10
S.E. of regression	2635.057	Sum squared resid	2.71E+08
Durbin-Watson stat	1.115392		

Equation:  $IRXOILV = IRXOILV(-1) + B(9121) * (IRXOILD * IREO - IRXOILD(-1) * IREO(-1)) + B(9122) * IRD9900$

Observations: 44

R-squared	0.995857	Mean dependent var	19320.03
Adjusted R-squared	0.995758	S.D. dependent var	45820.48
S.E. of regression	2984.287	Sum squared resid	3.74E+08
Durbin-Watson stat	1.732997		

Equation:  $IRXNOILGV = B(9131) * (IRXGNOD * IREENOIL - IRXGNOD(-1) * IREENOIL(-1)) + IRXNOILGV(-1)$

Observations: 44

R-squared	0.982821	Mean dependent var	6437.762
Adjusted R-squared	0.982821	S.D. dependent var	13143.18
S.E. of regression	1722.672	Sum squared resid	1.28E+08
Durbin-Watson stat	2.182697		

Equation:  $IRXNFSV = IRXNFSV(-1) + B(9141) * (IRXNFSV * IREENOIL - IRXNFSV(-1) * IREENOIL(-1))$

Observations: 44

R-squared	0.998376	Mean dependent var	2034.733
Adjusted R-squared	0.998376	S.D. dependent var	6198.560
S.E. of regression	249.8319	Sum squared resid	2683888.
Durbin-Watson stat	2.770529		

Equation:  $IRIIV = IRIIV(-1) + B(9151) * (IRIIV(-1) / IRINPUTV(-1)) * (IRINPUTV$



$$-IRINPUTV(-1))+B(9152)*(IRIIV(-1)/IRGDPFV(-1))*(IRGDPFV(-1))+B(9153)*IRD00+B(9154)*IRD95+B(9156)*IRD03$$

Observations: 44

R-squared	0.976500	Mean dependent var	8696.881
Adjusted R-squared	0.974090	S.D. dependent var	22334.49
S.E. of regression	3595.102	Sum squared resid	5.04E+08
Durbin-Watson stat	1.400184		

$$\text{Equation: } IREM = IREM(-1)+B(20011)*(IRM2V-IRM2V(-1))+B(20012)*IRBOPD+B(20013)*IRGRDSV+B(20014)*IRD99+B(20015)*IRD0205$$

Observations: 44

R-squared	0.994791	Mean dependent var	1761.154
Adjusted R-squared	0.994257	S.D. dependent var	2756.093
S.E. of regression	208.8659	Sum squared resid	1701374.
Durbin-Watson stat	2.282224		

$$\text{Equation: } IREENOIL = IREO*IRD5978 + (1-IRD5978)*(B(20020) + B(20021)*IREM + (1-B(20021))*IREO) + B(20022)*IREENOIL(-1) + B(20023)*IRD9305$$

Observations: 44

R-squared	0.989139	Mean dependent var	1170.028
Adjusted R-squared	0.988324	S.D. dependent var	2174.642
S.E. of regression	234.9817	Sum squared resid	2208655.
Durbin-Watson stat	1.280406		

$$\text{Equation: } IRWPIM = IRWPIM(-1) + B(20031)*((IRMGD/(IRMGD + IRMNFSD))*IRPM) - ((IRMGD(-1)/(IRMGD(-1) + IRMNFSD(-1)))*IRPM(-1))$$

Observations: 44

R-squared	0.988340	Mean dependent var	30.52045
Adjusted R-squared	0.988340	S.D. dependent var	52.20129
S.E. of regression	5.636748	Sum squared resid	1366.236
Durbin-Watson stat	1.008951		

$$\text{Equation: } IRWPIX = IRWPIX(-1) + B(20041)*(((IRXGNOD/(IRXGD + IRXNFSD))*IRPX) - ((IRXGNOD(-1)/(IRXGD(-1) + IRXNFSD(-1)))*IRPX(-1)))$$

Observations: 44

R-squared	0.974917	Mean dependent var	42.23386
Adjusted R-squared	0.974917	S.D. dependent var	78.24315
S.E. of regression	12.39193	Sum squared resid	6603.080
Durbin-Watson stat	1.096229		

$$\text{Equation: } IRWPID = IRWPID(-1) + B(20051)*(IRPGDPNF-IRPGDPNF(-1))$$

Observations: 44

R-squared	0.998342	Mean dependent var	34.59636
Adjusted R-squared	0.998342	S.D. dependent var	60.93320
S.E. of regression	2.481269	Sum squared resid	264.7380
Durbin-Watson stat	1.082955		

$$\text{Equation: IRWPI} = B(20061) * \text{IRWPID} + B(20062) * \text{IRWPIM} + (1 - B(20061) - B(20062)) * \text{IRWPIX}$$

Observations: 45

R-squared	0.999990	Mean dependent var	33.14400
Adjusted R-squared	0.999990	S.D. dependent var	58.95290
S.E. of regression	0.189242	Sum squared resid	1.539945
Durbin-Watson stat	0.891991		

$$\text{Equation: IRCPI} = \text{IRCPI}(-1) + B(20071) * (\text{IRPGDPNF} - \text{IRPGDPNF}(-1)) + B(20072) * \text{IRD00}$$

Observations: 44

R-squared	0.999690	Mean dependent var	35.46295
Adjusted R-squared	0.999683	S.D. dependent var	61.57623
S.E. of regression	1.096394	Sum squared resid	50.48734
Durbin-Watson stat	1.665887		

$$\text{Equation: IRIRNB} = B(20080) + B(20081) * \text{IRIRNB}(-1) + B(20082) * (\text{IRSPV} - \text{IRSPV}(-1)) + (\text{IRCPI} - \text{IRCPI}(-1)) / \text{IRCPI}(-1) + B(20083) * \text{IRD7905} + B(20084) * \text{IRD9699}$$

Observations: 44

R-squared	0.919469	Mean dependent var	33.73991
Adjusted R-squared	0.911209	S.D. dependent var	12.05470
S.E. of regression	3.592030	Sum squared resid	503.2046
Durbin-Watson stat	2.349772		

$$\text{Equation: IRPCCA} = \text{IRPCCA}(-1) + B(20091) * (\text{IRPK} - \text{IRPK}(-1))$$

Observations: 44

R-squared	0.998937	Mean dependent var	0.343501
Adjusted R-squared	0.998937	S.D. dependent var	0.640731
S.E. of regression	0.020886	Sum squared resid	0.018757
Durbin-Watson stat	0.981792		

$$\text{Equation: IRPINPUT} = \text{IRPINPUT}(-1) + B(20101) * (\text{IRPGDPF} - \text{IRPGDPF}(-1))$$

Observations: 44

R-squared	0.997581	Mean dependent var	0.363349
Adjusted R-squared	0.997581	S.D. dependent var	0.660183
S.E. of regression	0.032467	Sum squared resid	0.045328
Durbin-Watson stat	2.316546		

$$\text{Equation: IRPOPAPOP} = B(31010) + B(31011) * \text{IRPOPAPOP}(-1) + B(31012) * \text{IRYEAR} + B(31012) * \text{IRD66}$$

Observations: 44

R-squared	0.973313	Mean dependent var	0.283942
Adjusted R-squared	0.972011	S.D. dependent var	0.016846
S.E. of regression	0.002818	Sum squared resid	0.000326
Durbin-Watson stat	1.067449		

$$\text{Equation: IRPOP} = B(31020) + B(31021) * \text{IRPOP}(-1)$$

Observations: 44

R-squared	0.999424	Mean dependent var	42972.48
Adjusted R-squared	0.999411	S.D. dependent var	14719.45
S.E. of regression	357.3454	Sum squared resid	5363221.

Durbin-Watson stat 0.257834

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$$\text{Equation: IRWINDPGDPM} = \text{IRWINDPGDPM}(-1) + \text{B}(31031) * (\text{IREMP} - \text{IREMP}(-1)) + \text{B}(31032) * (\text{IRGDPM} - \text{IRGDPM}(-1)) + \text{B}(31033) * \text{IRD7579} + \text{B}(31034) * \text{IRD7880}$$

Observations: 44

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R-squared	0.950250	Mean dependent var	82.80343
Adjusted R-squared	0.946518	S.D. dependent var	33.67609
S.E. of regression	7.787969	Sum squared resid	2426.098
Durbin-Watson stat	1.615398		

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$$\text{Equation: IREMP} = \text{IREMP}(-1) + \text{B}(31041) * (\text{IRWIND} - \text{IRWIND}(-1)) + \text{B}(31042) * \text{IRPOPA} + \text{B}(31043) * \text{IRD66} + \text{B}(31044) * \text{IRD76}$$

Observations: 44

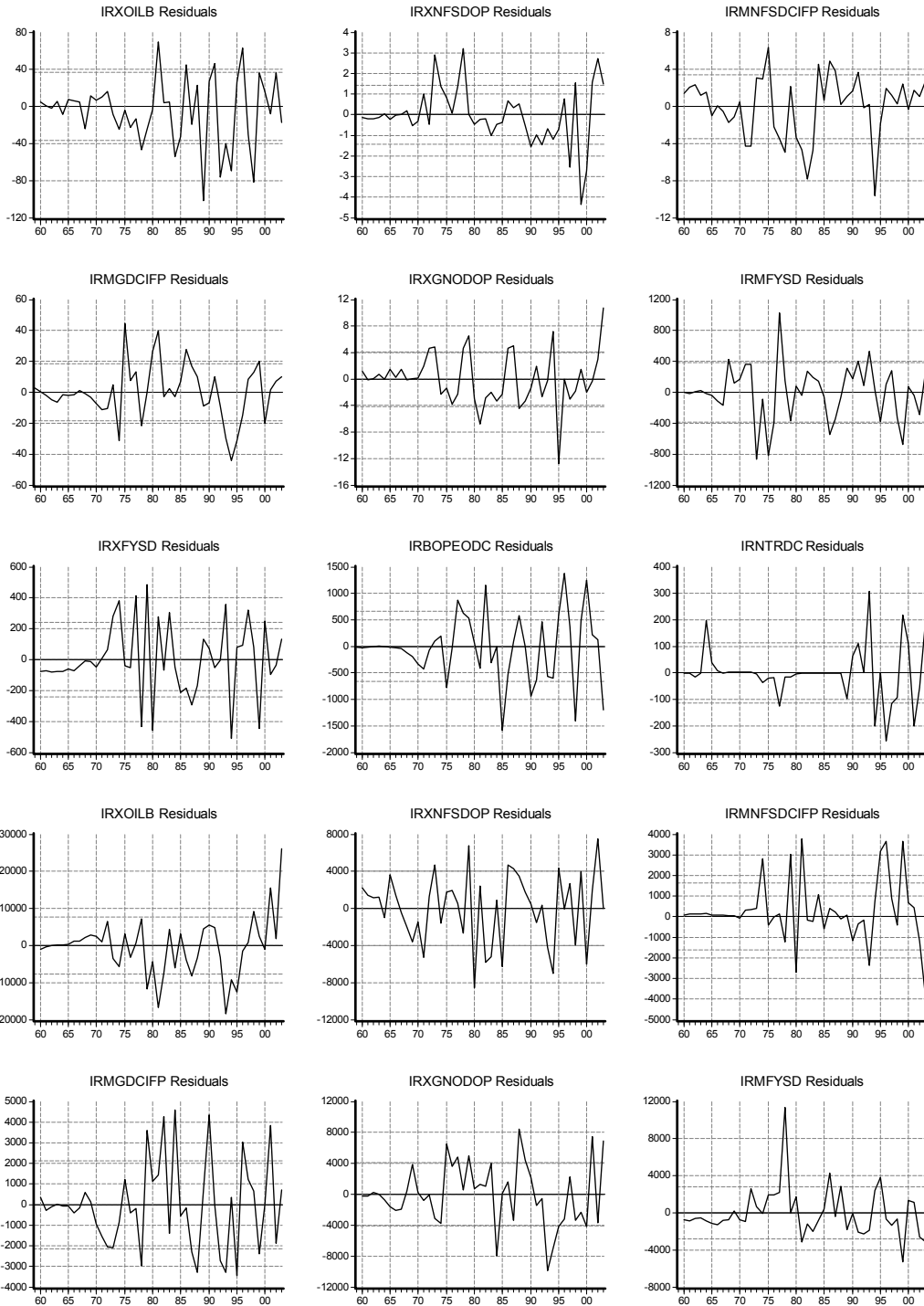
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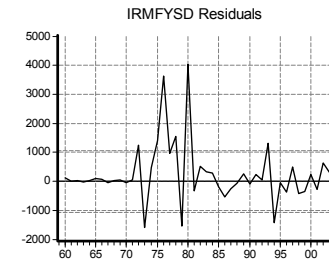
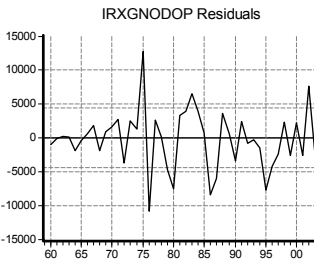
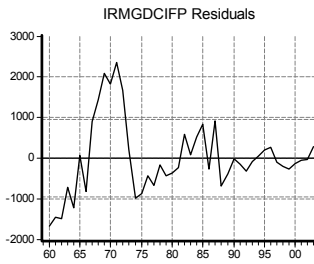
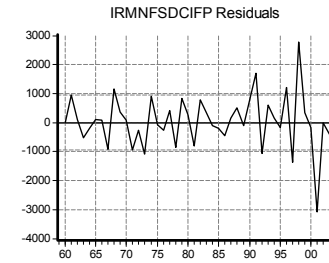
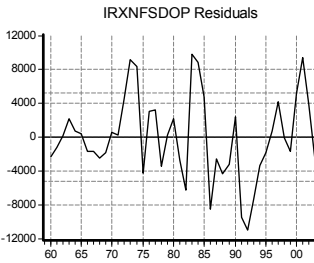
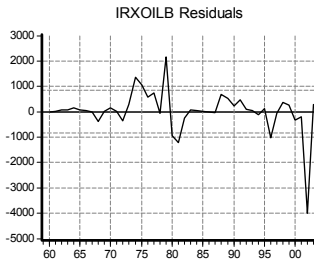
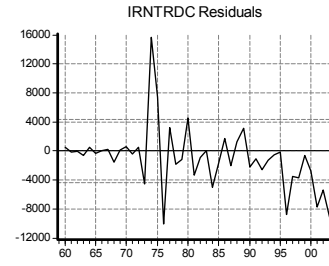
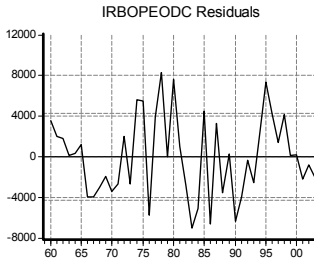
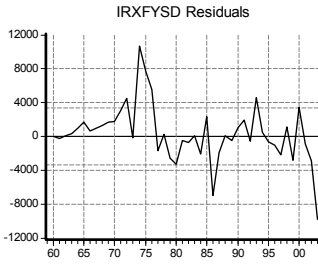
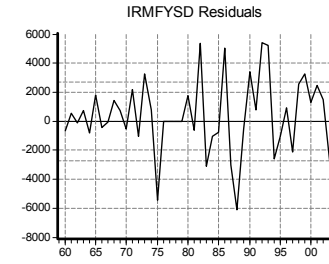
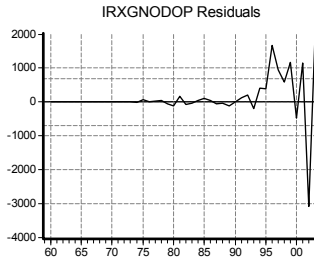
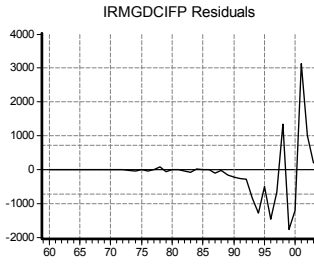
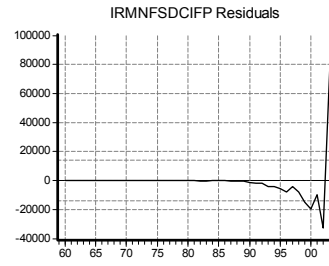
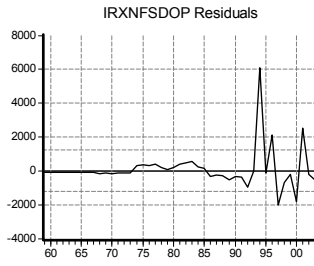
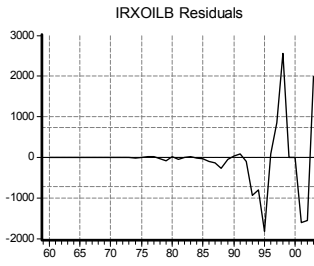
R-squared	0.998777	Mean dependent var	10874.54
Adjusted R-squared	0.998685	S.D. dependent var	3449.517
S.E. of regression	125.0936	Sum squared resid	625936.3
Durbin-Watson stat	1.558868		

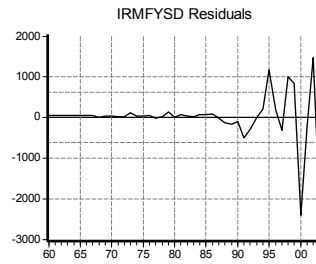
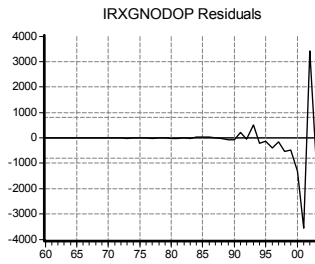
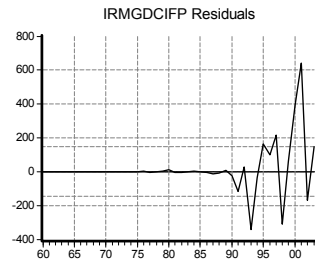
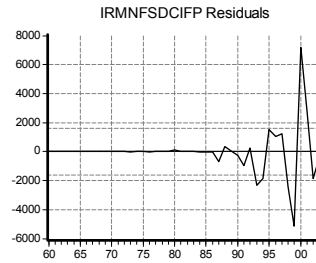
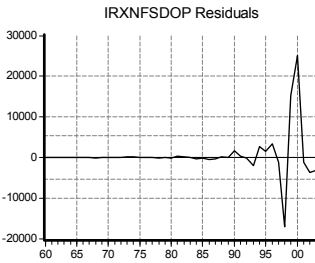
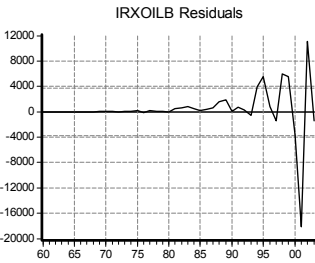
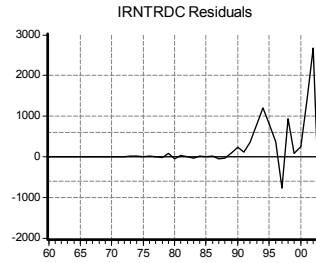
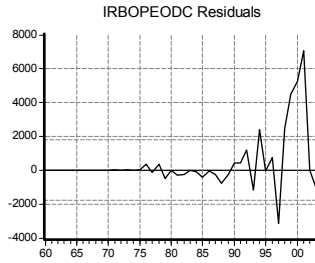
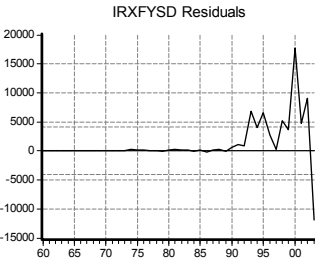
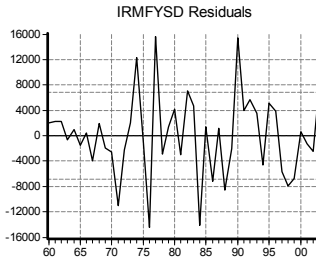
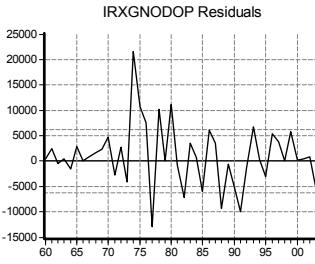
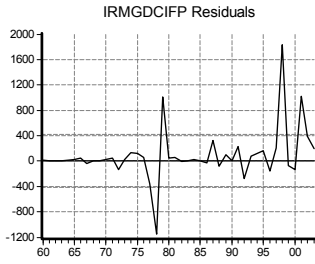
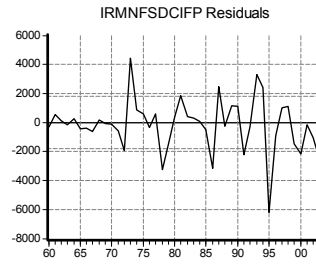
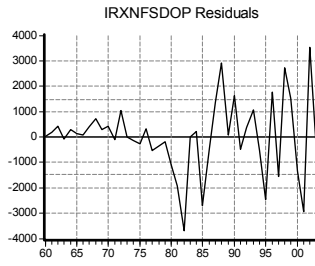
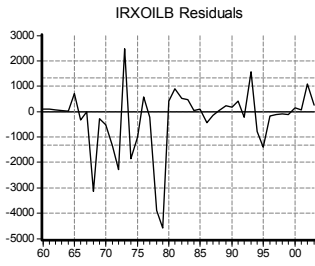
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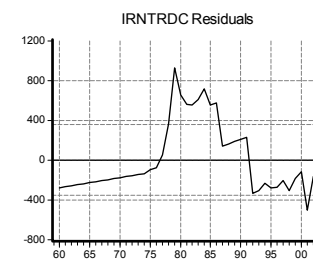
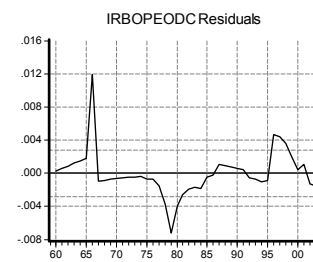
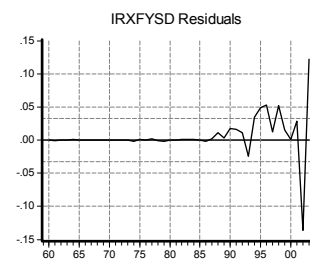
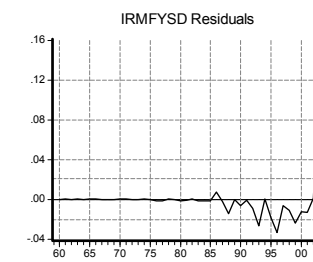
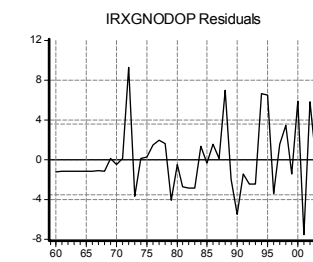
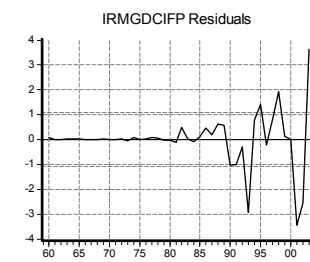
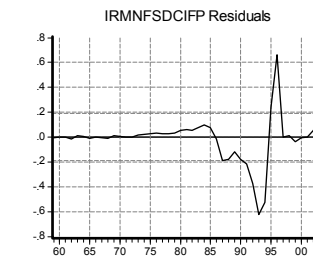
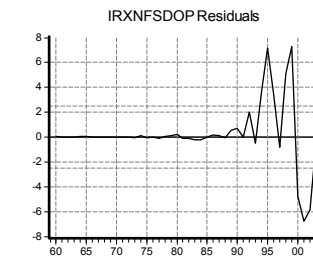
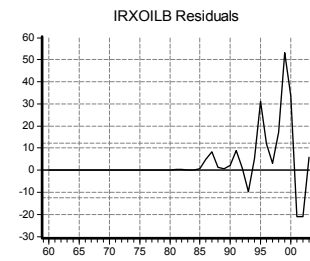
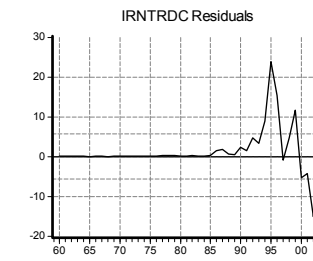
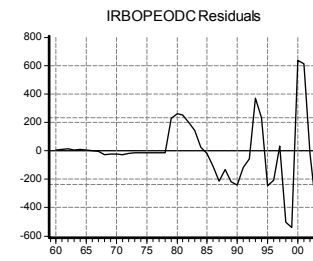
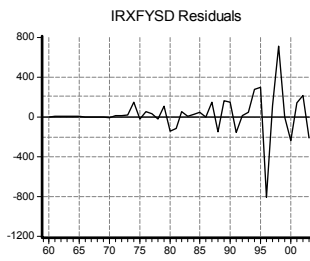
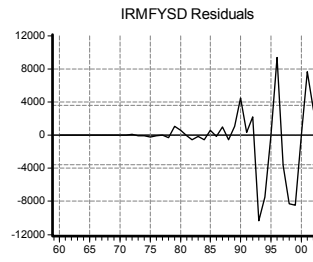
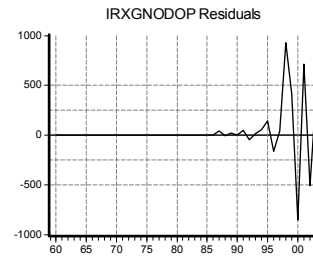
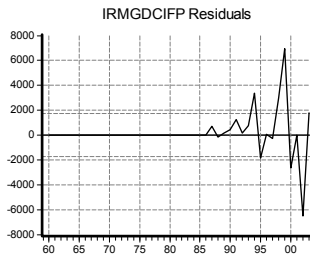
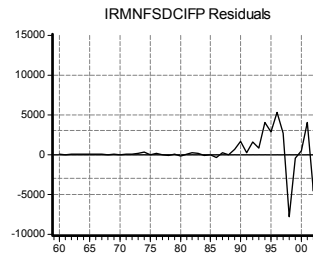
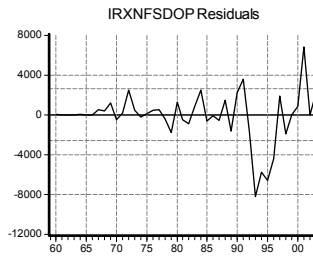
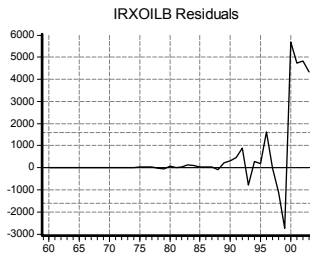
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# Plot of residuals

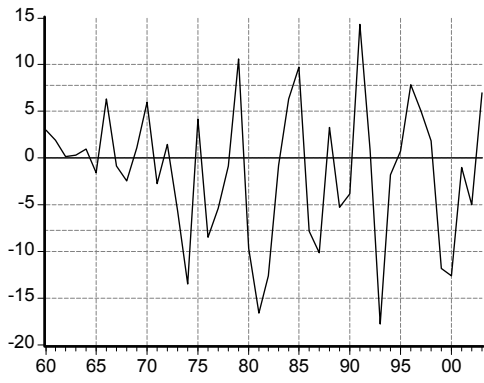




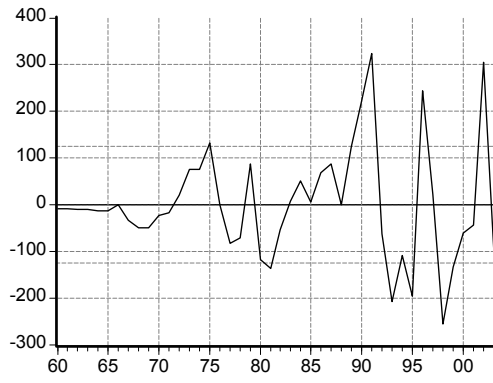




IRXOILB Residuals



IRXNFSDOP Residuals





## Numerical model

After estimation of parameters of regressions equations, we substitute them in equations and identities, then rewrite them to build a model consisting of variables, equations and numerical figures. With this model we can evaluate different scenarios and also make predictions. In other words, the numerical model is the estimation of structural form of the model and should be solved for its endogenous variables in order to find reduced form solution. If we solve this model for in-sample period, endogenous variables then, we would attain the ex-post simulation in which the endogenous variables solved values can be used for evaluation of the model and comparison with actual values. If we solve the model for out of sample period for endogenous variables, we can obtain forecasts. If we change exogenous variables within the sample and then solve the model for endogenous variables, then the solved endogenous variables would be on the basis of exogenous shocked variables. This procedure is called shock analysis. We can solve the models in two different static and dynamic ways. In static solution, the real quantities of lagged endogenous variables would be used for every year solution, while in dynamic solution the solved quantities of the same variables would be used for the next period solution as initial values. The solution methods are algorithms available in numerical analysis and computer softwares. In this model we used Gauss-Siedel methods for solving system of simultaneous equations.

The numerical macroeconometric model of Iran is as follows:

```
'Ver6_model_200
,
'FOREIGN SECTOR .....
,
'1:Balance of trade, million Dollars
IRTBD = IRXGD - IRMGD

'2:Balance of services, million Dollars
IRSBD = IRXSD - IRMSD

'3:Current account, million Dollars
IRCAD = IRTBD + IRSBD + IRNTRD

'4:Balance of payments, million Dollars
IRBOPD = IRCAD + IRKAD + IRBOPEOD

'5:Export of goods, million Dollars
IRXGD = IRXOILD + IRXGNOD

'6:Export of non-factor services, million Dollars
IRXNFSD = IRXNFSDOP * OECDP

'7:Import of non-factor services, million Dollars
```

$$\text{IRMNFSD} = \text{IRMNFSDCIFP} * \text{IRCIFP}$$

'8:Export of non-oil goods, million Dollars

$$\text{IRXGNOD} = \text{IRXGNODOP} * \text{OECDP}$$

'9:Import of goods, million Dollars

$$\text{IRMGD} = \text{IRMGDCIFP} * \text{IRCIFP}$$

'10:Export of services, million Dollars

$$\text{IRXSD} = \text{IRXNFSD} + \text{IRXFYSD}$$

'11:Import of services, million Dollars

$$\text{IRMSD} = \text{IRMNFSD} + \text{IRMFYSD}$$

'12:Balance of factor income services, million Dollars

$$\text{IRFYSBD} = \text{IRXFYSD} - \text{IRMFYSD}$$

'13:Balance of non-factor income services, million Dollars

$$\text{IRNFSD} = \text{IRXNFSD} - \text{IRMNFSD}$$

'14:Cumulative balance of payments, million Dollars

$$\text{IRBOPDC} = \text{IRBOPDC}(-1) + \text{IRBOPD}$$

'15:Balance of payments errors and omissions, million Dollars

$$\text{IRBOPEOD} = \text{IRBOPEODC} - \text{IRBOPEODC}(-1)$$

'16:Cumulative capital account, million Dollars

$$\text{IRKADC} = \text{IRKADC}(-1) + \text{IRKAD}$$

'17:Cumulative current account, million Dollars

$$\text{IRCADC} = \text{IRCADC}(-1) + \text{IRCAD}$$

'18:Cumulative balance of trade, million Dollars

$$\text{IRTBDC} = \text{IRTBDC}(-1) + \text{IRTBDC}$$

'19:Cumulative balance of services, million Dollars

$$\text{IRSBDC} = \text{IRSBDC}(-1) + \text{IRSBDC}$$

'20:Net transfers, million Dollars

$$\text{IRNTRD} = \text{IRNTRDC} - \text{IRNTRDC}(-1)$$

'21:Cumulative factor income services balance, million Dollars

$$\text{IRFYSBDC} = \text{IRFYSBDC}(-1) + \text{IRFYSBD}$$

'22:Cumulative non-factor income services balance, million Dollars

$$\text{IRNFSDC} = \text{IRNFSDC}(-1) + \text{IRNFSD}$$

'23:Export of oil, million Dollars

IRXOILD = IRWPOIL \* IRXOILB

'101:Export of oil, million barrels/year

IRXOILB = IRXOILB( - 1) + 0.938219660989029 \* (IRYOILB - IRYOILB( - 1))

'102:Export of non-factor services, million Dollars

IRXNFSDOP = IRXNFSDOP( - 1) + 0.000682569696017101 \* IREENOIL +  
5.17378500181287e-05 \* (IRGDPNF - IRGDPNF( - 1)) - 15.6697583249346 \* IRD79

'103:Import of non-factor services, million Dollars

IRMNFSDCIFP = IRMNFSDCIFP( - 1) - 3.05399812152603 - 0.0027138529810381  
\* (IREENOIL \* IRCIFP / IRWPI - IREENOIL( - 1) \* IRCIFP( - 1) / IRWPI( - 1))  
+ 0.000349992041300104 \* (IRGDPM - IRGDPM( - 1)) + 18.2507730337764 \*  
(IRD77 + IRD79 + IRD88 + IRD02)

'104:Real import of goods, million Dollars

IRMGDCIFP = 16.5110152782892 + 0.00758726034031777 \* (IRXGD + IRXSD) -  
0.0155999570899497 \* IREENOIL + 0.00040918946050072 \* IRGDPM -  
0.807827420 \* IRCIFP + 0.006168213941 \* IRKAD - 82.0998839343973 \* IRD79

'105:Real export of non-oil goods, million Dollars

IRXGNODOP = - 4.95552925025199 + 0.00184718905345488 \* IREX \* OECDP /  
IRWPI + 0.791899687 \* IRXGNODOP( - 1) + 2.49417350263666e-05 \* IRGDPNF

'106:Import of factor income services, million Dollars

IRMFYSD = 1768.12953292736 + (2.62096066240585 - 2.24044178954207 \* (1 -  
IRD5977)) \* IRKADC \* LIBOR / 100 + 0.220231610215998 \* IRMFYSD( - 1) +  
0.259732660714942 \* IRD5978 \* IRMGD - 1852.22601426248 \* IRD5977 +  
2379.0127815062 \* IRD0205

'107:Export of factor income services, million Dollars

IRXFYSD = 93.4647163913122 + 0.241705728627199 \* IRGEFIDC -  
1629.94273866802 \* (1 - IRD5978) + 0.543661394811902 \* IRXFYSD( - 1) +  
884.23070075558 \* IRD0105

'108:Cumulative balance of payments errors and omissions, million Dollars

IRBOPEODC = - 0.129445751393346 \* IRKADC - 0.214694669494791 \* IRTBDC  
- 0.0909884804990355 \* IRFYSBDC - 0.077252728537398 \* IRNFSBDC -  
4408.56150133931 \* IRD84 - 2495.11845225836 \* IRD9495  
@ADD IRBOPEODC IRBOPEODC\_A

'109:Cumulative net transfers, million Dollars

IRNTRDC = IRNTRDC( - 1) + (3967.79270985043 + 0.040286438055829 \*  
IRKADC + 0.0289326409649468 \* IRTBDC + 0.135731221538681 \* IRFYSBDC  
+ 0.0783889837385004 \* IRNFSBDC - 0.0999201347355668 \* IRBOPEODC) \* (1  
- 0.999548453757557 \* IRD5988) - 1268.85996639588 \* IRD95 +  
659.885269860748 \* IRD92  
@ADD IRNTRDC IRNTRDC\_A

'M O N E T A R Y   S E C T O R .....:

'201:Net claim of banking system to government sector (including public government), billion Rials

$$\text{IRM2NGV} = \text{IRM2NGGV} + \text{IRM2NGSV}$$

'202:Net claim of banking system to public government , billion Rials

$$\text{IRM2NGGV} = \text{IRGBDVC} + \text{IRFEOAV} + \text{IROLVC}$$

'203:Net claim of banking system to government sector (excluding public government) at constant prices, billion Rials

$$\text{IRM2NGSV} = \text{IRM2NGSVPGDPM} * \text{IRPGDPM}$$

'204:Net claim of banking system to private sector at constant prices, billion Rials

$$\text{IRM2NPV} = \text{IRM2NPVPGDPM} * \text{IRPGDPM}$$

'205:Cumulative obligatory loans in government budget, billion rials

$$\text{IROLVC} = \text{IROLVC}(-1) + \text{IROLV}$$

'206:Obligatory loans in government budget, billion rials

$$\text{IROLV} = \text{IROLPV} + \text{IROLGV}$$

'207:Demand deposits of private sector, billion Rials

$$\text{IRDDV} = \text{IRDDVPGDPM} * \text{IRPGDPM}$$

'208:Saving and time deposits of private sector, billion Rials

$$\text{IRSDV} = \text{IRSDVPGDPM} * \text{IRPGDPM}$$

'209:Currency in hands of public, billion Rials

$$\text{IRCUV} = \text{IRCUVPGDPM} * \text{IRPGDPM}$$

'210:Liquidity, billion Rials

$$\text{IRM2V} = \text{IRCUV} + \text{IRDDV} + \text{IRSDV}$$

'211:Net foreign assets of banking system, billion Rials

$$\text{IRM2NFAV} = \text{IRM2NFAD} / (((1 - \text{IRD93} - \text{IRD90} - \text{IRD91} - \text{IRD92}) / \text{IREO} + \text{IRD93} / 1748 + \text{IRD90} / 221.89 + \text{IRD91} / 351.9 + \text{IRD92} / 641.2) * 1000)$$

'212:Net worth and other items net of banking system, billion Rials

$$\text{IRM2NWV} = \text{IRM2V} - (\text{IRM2NPV} + \text{IRM2NGV} + \text{IRM2NFAV})$$

'301:Net claim of banking system to private sector at constant prices, billion Rials

$$\text{IRM2NPVPGDPM} = \text{IRM2NPVPGDPM}(-1) + 283.741168101271 * \text{IRIRL} + 15796.2097910306 * \text{IRD7576}$$

'302:Net claim of banking system to government sector (excluding public government) at constant prices, billion Rials

IRM2NGSVPGDPM = - 8231.79335917287 + 0.972870751248482 \*  
 IRM2NGSVPGDPM( - 1) + 902.12580917852 \* IRIRL - 17383.1355952897 \*  
 IRD9497 + 0.203181633455968 \* IRD5978 \* IRM2NGSVPGDPM( - 1) -  
 28307.4013405444 \* IRD0305

'303:Net foreign assets of banking system, million Dollars

IRM2NFAD = 0.462007339847666 \* IRBOPDC + 0.52727956183173 \*  
 IRM2NFAD( - 1) + 3703.50912902718 \* IRD8589 - 3417.567938637 \* IRD9705  
 @ADD IRM2NFAD IRM2NFAD\_A

'304:Real demand deposits of private sector, billion Rials

IRDDVPGDPM = 0.0533941481966076 \* IRGDPM + 0.764757356355431 \*  
 IRDDVPGDPM( - 1) - 1200.08473270475 \* IRIRS + 166.77751729199 \* IRIRNB

'305:Real saving and time deposits of private sector, billion Rials

IRSDVPGDPM = 5025.71620787825 + 0.142899784772385 \* IRGDPM -  
 2611.81984225487 \* IRIRS + 0.734613587671955 \* IRSDVPGDPM( - 1)

'306:Real currency in hands of public, billion Rials

IRCUVPGDPM = 22432.1853715911 + 0.652366601466275 \* IRCUVPGDPM( - 1)  
 + 0.042998998765147 \* IRGDPM - 10777.3860612993 \* IRD5977 -  
 909.958384804754 \* IRIRL - 316.513599316306 \* IRIRNB - 5943.09724903663 \*  
 IRD79

'G O V E R N M E N T S E C T O R :::  
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'401:Cumulative government budget deficit, billion Rials

IRGBDVC = IRGBDVC(-1) - IRGBDV

'402:Government revenue, billion Rials

IRGRV = IRGROILV + IRGRTV + IRGRMV + IRGRDSV + IRGRSV

'403:Government tax revenue, billion Rials

IRGRTV = IRGRTDV + IRGRTIV

'404:Government expenditure, billion Rials

IRGEV = IRGECV + IRGEDV + IRGESV + IRGESPV + IRGEFIV

'405:Government budget deficit, billion Rials

IRGBDV = IRGRV - IRGEV

'406:Government special expenditures, billion Rials

IRGESV = IRGRSV

'407:Cumulative government expenditures in foreign investment, million Dollars

IRGEFIDC = IRGEFIDC(-1) + IRGEFIV / IREO \* 1000

'501:Government indirect tax revenue, billion Rials

$$\text{IRGRTIV} = \text{IRGRTIV}(-1) + 0.0845209726751653 * (\text{IRMGV} - \text{IRMGV}(-1)) + 0.0620223728120182 * (\text{IRCV} - \text{IRMGV} - (\text{IRCV}(-1) - \text{IRMGV}(-1))) - 10574.5711878496 * \text{IRD00} + 9187.66180601514 * \text{IRD99}$$

'502:Government oil revenue, billion Rials

$$\text{IRGROILV} = 0.503499865086171 * (1 - \text{IRD93}) * \text{IREO} * (\text{IRXOILD} / 1000 - \text{IRGRDSV} / \text{IREM}) + 0.131925509284833 * \text{IRPDOIL} * (\text{IRYOILB} - \text{IRXOILB}) + 0.794729381077723 * \text{IRD93} * (0.58 * 1000 + 0.42 * (\text{IREO} - 1000)) * (\text{IRXOILD} / 1000 - \text{IRGRDSV} / \text{IREM}) - 7967.08565092122 * \text{IRD0005} + 10696.1383964262 * \text{IRD9597}$$

@ADD IRGROILV IRGROILV\_A

'503:Government miscellaneous revenue, billion Rials

$$\text{IRGRMV} = \text{IRGRMV}(-1) + 0.0992005759280093 * (\text{IROUTPUTV} - \text{IROUTPUTV}(-1))$$

'504:Government special revenue, billion Rials

$$\text{IRGRSV} = \text{IRGRSV}(-1) + 0.0275731372132124 * (\text{IROUTPUTV} - \text{IROUTPUTV}(-1))$$

'505:Government direct tax revenue, billion Rials

$$\text{IRGRTDV} = \text{IRGRTDV}(-1) + 0.0171195888589719 * (\text{IROUTPUTV} - \text{IROUTPUTV}(-1))$$

'R E A L S E C T O R ::

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'601: Aggregate demand at constant prices, billion Rials

$$\text{IRAD} = \text{IRINPUT} + \text{IRC} + \text{IRG} + \text{IRI} + \text{IRDIS} + \text{IRX} + \text{IRTOT}$$

'602: Aggregate supply at constant prices, billion Rials

$$\text{IRAS} = \text{IROUTPUT} + \text{IRNIT} + \text{IRM} + \text{IRTOT}$$

'603:Aggregate output at constant prices, billion Rials

$$\text{IROUTPUT} = \text{IRINPUT} + \text{IRGDPF}$$

'604:Gross national saving at constant prices, billion Rials

$$\text{IRGNS} = \text{IRI} + \text{IRII} + \text{IRBOT} + \text{IRNFY} + \text{IRTOT}$$

'605:Net national saving at constant prices, billion Rials

$$\text{IRNNS} = \text{IRGNS} - \text{IRCCA}$$

'606:Export at constant prices, billion Rials

$$\text{IRX} = \text{IRXOIL} + \text{IRXNOILG} + \text{IRXNFS}$$

'607:Import at constant prices, billion Rials

$$\text{IRM} = \text{IRMG} + \text{IRMNFS}$$

'608: Balance of trade at constant prices, billion Rials

$$\text{IRBOT} = \text{IRX} - \text{IRM}$$

'609: Gross domestic expenditure at market prices at constant prices, billion Rials

$$\text{IRGDEM} = \text{IRC} + \text{IRG} + \text{IRI} + \text{IRBOT} + \text{IRDIS}$$

'610: Private saving at constant prices, billion Rials

$$\text{IRSP} = \text{IRYD} - \text{IRC}$$

'611: Terms of trade, billion Rials

$$\text{IRTOT} = 2 * ( (\text{IRXV} * \text{IRM}) - (\text{IRMV} * \text{IRX}) ) / (\text{IRXV} + \text{IRMV})$$

'612: Gross domestic income at market prices at constant prices, billion Rials

$$\text{IRGDIM} = \text{IRGDPM} + \text{IRTOT}$$

'613: Discrepancies at constant prices, billion Rials

$$\text{IRDIS} = \text{IRGDPM} - (\text{IRC} + \text{IRG} + \text{IRI} + \text{IRBOT})$$

'614: Gross national product at market prices at constant prices, billion Rials

$$\text{IRGNPM} = \text{IRGDPM} + \text{IRNFY}$$

'615: Gross national income at market prices, billion Rials

$$\text{IRGNIM} = \text{IRGNPM} + \text{IRTOT}$$

'616: Net national income at factor cost at constant prices, billion Rials

$$\text{IRNNIF} = \text{IRGNIM} - \text{IRCCA} - \text{IRNIT}$$

'617: Net factor income at constant prices, billion Rials

$$\text{IRNFY} = \text{IRXFY} - \text{IRMFY}$$

'618: Net indirect taxes at constant prices, billion Rials

$$\text{IRNIT} = \text{IRIT} - \text{IRSUB}$$

'619: Capital stock at constant prices, billion Rials

$$\text{IRK} = \text{IRK}(-1) + \text{IRI} - \text{IRCCA}$$

'620: Gross domestic product at market prices at constant prices, billion Rials

$$\text{IRGDPM} = \text{IRGDPNF} + \text{IRVAOIL} + \text{IRNIT}$$

'621: Disposable income at constant prices, billion Rials

$$\text{IRYD} = \text{IRGDPNF} + \text{IRNFY} - \text{IRCCA} - \text{IRGRTDV} / \text{IRPIT}$$

'622: Investment at constant prices, billion Rials

$$\text{IRI} = \text{IRIP} + \text{IRIG}$$

'623: Indirect taxes at constant prices, billion Rials

$$\text{IRIT} = \text{IRITV} / \text{IRPIT}$$

'624: Subsidies at constant prices, billion Rials

IRSUB = IRSUBV / IRPSUB

'625:Gross domestic product at factor cost at constant prices, billion Rials

IRGDPF = IRGDPNF + IRVAOIL

'701:Government investment at constant prices, billion Rials

IRIG = IRIG( - 1) + 61.9404117914044 \* (IRGEDV / IRWPI - IRGEDV( - 1) / IRWPI( - 1)) + 18381.8267166231 \* IRD76 - 15923.2592452017 \* IRD77 + 26253.7391532268 \* IRD78 - 21355.6113562294 \* IRD79  
@ADD IRIG IRIG\_A

'702:Government consumption at constant prices, billion Rials

IRG = IRG( - 1) + 16.8074389456477 \* ((IRGECV + IRGESV) / IRWPI - (IRGECV( - 1) + IRGESV( - 1)) / IRWPI( - 1))  
@ADD IRG IRG\_A

'703:Non-oil gross domestic product at market prices at constant prices, billion Rials

IRGDPNF = - 37400.2494143445 + 0.0684531883732225 \* IRK( - 1) + 0.885108543493942 \* (IRIP + IRIG - IRM \* IRMACHIMV) + 9.21612492641659 \* IREMP + 0.251089935461097 \* IRM \* IRMACHIMV + 23054.6954966312 \* IRD79 - 17816.2851989548 \* IRD8789

'704:Import if goods at constant prices, billion Rials

IRMG = IRMG( - 1) + 372.470156609936 \* (IRMGDCIFP - IRMGDCIFP( - 1))  
@ADD IRMG IRMG\_A

'705:Import if non-factor services at constant prices, billion Rials

IRMNFS = 343.970028080269 \* (IRMNFSDCIFP - IRMNFSDCIFP( - 1)) + 0.964322749918179 \* IRMNFS( - 1)  
@ADD IRMNFS IRMNFS\_A

'706:Private investment at constant prices, billion Rials

IRIP = 12470.9997122356 + 0.202116871357174 \* IRGDPNF( - 1) + 1.73564194426407 \* IRM \* IRMACHIMV - 2298.97111013849 \* IRIRL - 19862.5134366786 \* IRD7779

'707:Value added of oil at constant prices, billion Rials

IRVAOIL = 0.995004257665674 \* IRVAOIL( - 1) + 40.8979705445623 \* (IRXOILB - IRXOILB( - 1)) + 7.7494888618803 \* ((IRYOILB - IRXOILB) - (IRYOILB( - 1) - IRXOILB( - 1))) + 4261.25996476045 \* IRD02  
@ADD IRVAOIL IRVAOIL\_A

'708:Capital consumption allowances at constant prices, billion Rials

IRCCA = 5286.01614857171 + 0.0358810913464453 \* (1 - 0.372029574287411 \* IRD9405) \* IRK( - 1) + 0.0151046091932582 \* (IRWARCD + IRWARDED + IRWARMD) + 14706.7631752993 \* IRD9405

'709:Private consumption at constant prices, billion Rials



$$\text{IRC} = 0.329782294753259 * (\text{IRYD} - \text{IRYD}(-1)) + 0.101947036926304 * \text{IRSP}(-1) + \text{IRC}(-1)$$

'710:Export of factor income from abroad at constant prices, billion Rials

$$\text{IRXFY} = \text{IRXFY}(-1) + 244.489147792064 * (\text{IRXFYSD} / \text{OECDP} - \text{IRXFYSD}(-1) / \text{OECDP}(-1)) - 5058.13331466782 * \text{IRD7879}$$

@ADD IRXFY IRXFY\_A

'711:Import of factor income from abroad at constant prices, billion Rials

$$\text{IRMFY} = \text{IRMFY}(-1) + 165.240221381024 * (\text{IRMFYSD} / \text{OECDP} - \text{IRMFYSD}(-1) / \text{OECDP}(-1)) + 2780.46261143527 * \text{IRD7377}$$

@ADD IRMFY IRMFY\_A

'712:Oil export at constant prices, billion Rials

$$\text{IRXOIL} = \text{IRXOIL}(-1) + 39.2760541522738 * (\text{IRXOILB} - \text{IRXOILB}(-1)) - 5884.91789740142 * \text{IRD73} + 4822.32018610658 * \text{IRD83}$$

@ADD IRXOIL IRXOIL\_A

'713:Export of goods at constant prices, billion Rials

$$\text{IRXNOILG} = \text{IRXNOILG}(-1) + 472.401973079406 * (\text{IRXGNODOP} - \text{IRXGNODOP}(-1))$$

@ADD IRXNOILG IRXNOILG\_A

'714:Export of non factor services at constant prices, billion Rials

$$\text{IRXNFS} = \text{IRXNFS}(-1) + 174.249591522684 * (\text{IRXNFSDOP} - \text{IRXNFSDOP}(-1))$$

@ADD IRXNFS IRXNFS\_A

'715:Input of production at constant prices, billion Rials

$$\text{IRINPUT} = \text{IRINPUT}(-1) + 0.481403708420153 * (\text{IRGDPF} - \text{IRGDPF}(-1)) - 37556.9240086233 * \text{IRD79}$$

'716:Changes in inventory at constant prices, billion Rials

$$\begin{aligned} \text{IRII} = & - 897246.888600686 + 1.91462681045212 * (\text{IRII}(-1) / \text{IROUTPUT}(-1)) \\ & * (\text{IROUTPUT} - \text{IROUTPUT}(-1)) + 0.333426054756428 * \text{IRII}(-1) + \\ & 668.937410197644 * \text{IRYEAR} - 8342.25190018718 * \text{IRPGDPF} - \\ & 19719.7282419588 * (\text{IRD8285} + \text{IRD9394} + \text{IRD73}) \end{aligned}$$

'N O M I N A L   V A L U E S ::

'801: Aggregate demand at current prices, billion Rials

$$\text{IRADV} = \text{IRINPUTV} + \text{IRCV} + \text{IRGV} + \text{IRIV} + \text{IRDISV} + \text{IRXV}$$

'802: Aggregate supply at current prices, billion Rials

$$\text{IRASV} = \text{IROUTPUTV} + \text{IRNITV} + \text{IRMV}$$

'803: Aggregate output at current prices, billion Rials

$$\text{IROUTPUTV} = \text{IRINPUTV} + \text{IRGDPFV}$$

'804: Aggregate input at current prices, billion Rials  
 $IRINPUTV = IRPINPUT * IRINPUT$

'805: Gross national saving at current prices, billion Rials  
 $IRGNSV = IRIV + IRIIV + IRBOTV + IRNFYV$

'806: Net national saving at current prices, billion Rials  
 $IRNNSV = IRGNSV - IRCCAV$

'807: Export at current prices, billion Rials  
 $IRXV = IRXOILV + IRXNOILGV + IRXNFSV$

'808: Import at current prices, billion Rials  
 $IRMV = IRMGV + IRMNFSV$

'809: Balance of trade at current prices, billion Rials  
 $IRBOTV = IRXV - IRMV$

'810: Gross domestic expenditure at market prices at current prices, billion Rials  
 $IRGDEMV = IRCV + IRGV + IRIV + IRBOTV + IRDISV$

'811: Private saving at current prices, billion Rials  
 $IRSPV = IRYDV - IRCV$

'812: Capital stock at current prices, billion Rials  
 $IRKV = IRKV(-1) * (1 + (IRPI - IRPI(-1)) / IRPI(-1)) + IRIV - IRCCAV$

'813: Gross domestic income at market prices at current prices, billion Rials  
 $IRGDIMV = IRGDPMV$

'814: Gross national income at market prices at current prices, billion Rials  
 $IRGNIMV = IRGNPMV$

'815: Net national income at factor cost at current prices, billion Rials  
 $IRNNIFV = IRGNIMV - IRCCAV - IRNITV$

'816: Non-oil gross domestic product at market prices at current prices, billion Rials  
 $IRGDPNFV = IRPGDPNF * IRGDPNF$

'817: Gross national products at market prices at current prices, billion Rials  
 $IRGNPMV = IRGDPMV + IRNFYV$

'818: Gross domestic products at market prices at current prices, billion Rials  
 $IRGDPMV = IRGDPNFV + IRVAOILV + IRNITV$

'819: Disposable income at current prices, billion Rials  
 $IRYDV = IRGDPNFV + IRNFYV - IRCCAV - IRGRTDV$

'820:Capital consumption allowances at current prices, billion Rials  
 $IRCCAV = IRCCA * IRPCCA$

'821:Investment at current prices, billion Rials  
 $IRIV = IRIGV + IRIPV$

'822:Discrepancies at current prices, billion Rials  
 $IRDISV = IRGDPMV - (IRCV + IRGV + IRIV + IRBOTV)$

'823:Net indirect taxes at current prices, billion Rials  
 $IRNITV = IRITV - IRSUBV$

'824:Net factor income at current prices, billion Rials  
 $IRNFYV = IRXFYV - IRMFYV$

'825:Gross domestic product at factor cost at current prices, billion Rials  
 $IRGDPFV = IRGDPNFV + IRVAOILV$

'901:Government consumption at current prices, billion Rials  
 $IRGV = IRGV(-1) + 0.152953091937047 * ((IRGECV + IRGESV) - (IRGECV(-1) - (IRGESV(-1))))$

'902:Government investment at current prices, billion Rials  
 $IRIGV = IRIGV(-1) + 0.841843897868361 * (IRGEDV - IRGEDV(-1)) + 0.451966289810558 * (IRFEOAV - IRFEOAV(-1)) + 0.675673007904196 * IROLGV - 9016.32694413595 * IRD9497 + 27815.2885737334 * IRD02$

'903:Subsidies at current prices, billion Rials  
 $IRSUBV = IRSUBV(-1) + 0.0501705584836369 * (IRGECV + IRGESV - IRGECV(-1) - IRGESV)$

'904:Private consumption at current prices, billion Rials  
 $IRCV = IRCV(-1) + 0.368968347253475 * (IRYDV - IRYDV(-1)) + 0.357412468175053 * IRSPV(-1)$

'905:Value added of oil sector at current prices, billion Rials  
 $IRVAOILV = IRVAOILV(-1) + 0.712555384021554 * (IRXOILD / 1000 * IREO - IRXOILD(-1) / 1000 * IREO(-1)) + 0.40239276135968 * (IRPDOIL * (IRYOILB - IRXOILB) - IRPDOIL(-1) * (IRYOILB(-1) - IRXOILB(-1)))$

'906:Import of goods at current prices, billion Rials  
 $IRMGV = IRMGV(-1) + 0.00100606412832397 * (IRMGD * IREENOIL - IRMGD(-1) * IREENOIL(-1))$   
@ADD IRMGV IRMGV\_A

'907:Import of non-factor services at current prices, billion Rials  
 $IRMNFSV = IRMNFSV(-1) + 0.000983273632247925 * (IRMNFSV * IREENOIL - IRMNFSV(-1) * IREENOIL(-1))$

@ADD IRMNFSV IRMNFSV\_A

'908:Export of factor income from abroad at current prices, billion Rials

$IRXFYV = IRXFYV(-1) + 0.00117529015971641 * (IRXFYSD * IREENOIL - IRXFYSD(-1) * IREENOIL(-1))$

@ADD IRXFYV IRXFYV\_A

'909:Import of factor income from abroad at current prices, billion Rials

$IRMFYV = IRMFYV(-1) - 1210.9640986965 + 0.00128875560429438 * (IRMFYSD * IREENOIL - IRMFYSD(-1) * IREENOIL(-1)) + 2290.31546284609 * IRD93 + 1163.85519285212 * IRD5992$

@ADD IRMFYV IRMFYV\_A

'910:Indirect taxes at current prices, billion Rials

$IRITV = IRITV(-1) + 0.423050505191631 * (IRGRTIV - IRGRTIV(-1))$

'911:Private investment at current prices, billion Rials

$IRIPV = IRIPV(-1) + IROLPV - 846.853992362359 * (IRIRL - IRIRL(-1)) - 251.912031089979 * (IRIRNB - IRIRNB(-1)) + 0.121572113358385 * (IROUTPUTV - IROUTPUTV(-1)) - 9378.27570338482 * IRD99 - 11455.4621081743 * IRD02$

'912:Oil export at current prices, billion Rials

$IRXOILV = IRXOILV(-1) + 0.000644306240555994 * (IRXOILD * IREO - IRXOILD(-1) * IREO(-1)) + 25627.5191471187 * IRD9900$

@ADD IRXOILV IRXOILV\_A

'913:Non-oil goods export at current prices, billion Rials

$IRXNOILGV = 0.000870491409896767 * (IRXGNOD * IREENOIL - IRXGNOD(-1) * IREENOIL(-1)) + IRXNOILGV(-1)$

@ADD IRXNOILGV IRXNOILGV\_A

'914:Non-factor services export at current prices, billion Rials

$IRXNFSV = IRXNFSV(-1) + 0.000964161304207437 * (IRXNFSD * IREENOIL - IRXNFSD(-1) * IREENOIL(-1))$

@ADD IRXNFSV IRXNFSV\_A

'915:Changes in inventory at current prices, billion Rials

$IRIIV = IRIIV(-1) - 2.60866226095188 * (IRIIV(-1) / IRINPUTV(-1)) * (IRINPUTV - IRINPUTV(-1)) + 3.11847667431389 * (IRIIV(-1) / IRGDPFV(-1)) * (IRGDPFV - IRGDPFV(-1)) + 30557.1220505119 * IRD00 + 14290.9065728284 * IRD95 + 33592.6188238164 * IRD03$

'P R I C E :::  
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'1001: Implicit price deflator corresponding aggregate demand and supply

$IRPA = IRADV / IRAS$

'1002: Gross domestic product at factor cost implicit price deflator  
 $IRPGDPF = IRGDPFV / IRGDPF$

'1003:Gross national saving implicit price deflator  
 $IRPGNS = IRGNSV / IRGNS$

'1004:Net national saving implicit price deflator  
 $IRPNNS = IRNNSV / IRNNS$

'1005:Import of goods implicit price deflator  
 $IRPMG = IRMGV / IRMG$

'1006:Import of non factor services implicit price deflator  
 $IRPMNFS = IRMNFSV / IRMNFS$

'1007:Export of oil implicit price deflator  
 $IRPXOIL = IRXOILV / IRXOIL$

'1008:Export of non-oil goods implicit price deflator  
 $IRPXNOILG = IRXNOILGV / IRXNOILG$

'1009:Export of non-factor services implicit price deflator  
 $IRPXNFS = IRXNFSV / IRXNFS$

'1010: Balance of trade implicit price deflator  
 $IRPBOT = IRBOTV / IRBOT$

'1011: Gross domestic expenditure at market prices implicit price deflator  
 $IRPGDEM = IRGDEM V / IRGDEM$

'1012: Private saving implicit price deflator  
 $IRPSP = IRSPV / IRSP$

'1013:Capital stock implicit price deflator  
 $IRPK = IRKV / IRK$

'1014:Gross domestic product implicit price deflator  
 $IRGDPM = IRGDPMV / IRGDPM$

'1015:Private consumption implicit price deflator  
 $IRPC = IRCV / IRC$

'1016:Government investment implicit price deflator  
 $IRPIG = IRIGV / IRIG$

'1017:Private investment implicit price deflator  
 $IRPIP = IRIPV / IRIP$

'1018:Government consumption implicit price deflator  
 $IRPG = IRGV / IRG$

'1019:Net indirect taxes implicit price deflator  
 $IRPNIT = IRNITV / IRNIT$

'1020:Import implicit price deflator  
 $IRPM = IRMV / IRM$

'1021:Export implicit price deflator  
 $IRPX = IRXV / IRX$

'1022:Net factor income from abroad implicit price deflator  
 $IRPNFY = IRNFYV / IRNFY$

'1023:Export of factor income from abroad implicit price deflator  
 $IRPXFY = IRXFYV / IRXFY$

'1024:Import of factor income from abroad implicit price deflator  
 $IRPFY = IRMFYV / IRMFY$

'1025:Oil value added implicit price deflator  
 $IRPVAOIL = IRVAOILV / IRVAOIL$

'1026:Investment implicit price deflator  
 $IRPI = IRIV / IRI$

'1027:Inflation rate, consumer price index  
 $IRINFCPI = (IRCPI - IRCPI(-1)) / IRCPI(-1)$

'1028:Inflation rate, wholesale price index  
 $IRINFWPI = (IRWPI - IRWPI(-1)) / IRWPI(-1)$

'1029:Gross national product implicit price deflator  
 $IRPGNPM = IRGNPMV / IRGNPM$

'1030:Discrepancies implicit price deflator  
 $IRPDIS = IRDISV / IRDIS$

'1031:Gross domestic income implicit price deflator  
 $IRPGDIM = IRGDIMV / IRGDIM$

'1032:Gross national income implicit price deflator  
 $IRPGNIM = IRGNIMV / IRGNIM$

'1033:Disposable income implicit price deflator  
 $IRPYD = IRYDV / IRYD$

'1034:Net national income implicit price deflator

$$\text{IRPNNIF} = \text{IRNNIFV} / \text{IRNNIF}$$

'1035:Non-oil gross domestic product implicit price deflator

$$\text{IRPGDPNF} = (\text{IRCV} + \text{IRGV} + \text{IRIV} + \text{IRXV} - \text{IRMV} + \text{IRDISV} - \text{IRVAOILV} - \text{IRNITV}) / \text{IRGDPNF}$$

'1036: Inirect taxes implicit price deflator

$$\text{IRPIT} = \text{IRPGDPF}$$

'1037: Subsidies implicit price deflator

$$\text{IRPSUB} = \text{IRPGDPF}$$

'1038: Output implicit price deflator

$$\text{IRPOUTPUT} = \text{IROUTPUTV} / \text{IROUTPUT}$$

'1039: Changes in inventory implicit price deflator

$$\text{IRPII} = \text{IRIIV} / \text{IRII}$$

'2001:Market exchange rate, Rials/Dollar

$$\begin{aligned} \text{IREM} = & \text{IREM}(-1) + 0.0547785267815805 * (\text{IRM2V} - \text{IRM2V}(-1)) - \\ & 0.0319670923705237 * \text{IRBOPD} - 0.082960389084925 * \text{IRGRDSV} + \\ & 1990.75013343989 * \text{IRD99} - 5344.13293610647 * \text{IRD0205} \end{aligned}$$

'2002:Effective exchange rate for non-oil goods and services, Rials/Dollar

$$\begin{aligned} \text{IREENOIL} = & \text{IREO} * \text{IRD5978} + (1 - \text{IRD5978}) * (-277.256338639297 + \\ & 0.6014144394007 * \text{IREM} + (1 - 0.6014144394007) * \text{IREO}) + 0.191949356847768 \\ & * \text{IREENOIL}(-1) - 908.976270602465 * \text{IRD9305} \end{aligned}$$

'2003:Wholesale price index for imported goods

$$\begin{aligned} \text{IRWPIM} = & \text{IRWPIM}(-1) + 38.8944948825532 * (((\text{IRMGD} / (\text{IRMGD} + \\ & \text{IRMNFSD})) * \text{IRPM}) - ((\text{IRMGD}(-1) / (\text{IRMGD}(-1) + \text{IRMNFSD}(-1)))) * \\ & \text{IRPM}(-1))) \end{aligned}$$

'2004:Wholesale price index for exported goods

$$\begin{aligned} \text{IRWPIX} = & \text{IRWPIX}(-1) + 185.08600446346 * (((\text{IRXGNOD} / (\text{IRXGD} + \\ & \text{IRXNFSD})) * \text{IRPX}) - ((\text{IRXGNOD}(-1) / (\text{IRXGD}(-1) + \text{IRXNFSD}(-1)))) * \\ & \text{IRPX}(-1))) \end{aligned}$$

'2005:Wholesale price index for domestically produced and consumed goods

$$\text{IRWPID} = \text{IRWPID}(-1) + 83.8734605388956 * (\text{IRPGDPNF} - \text{IRPGDPNF}(-1))$$

'2006:Wholesale price index

$$\begin{aligned} \text{IRWPI} = & 0.714236497328726 * \text{IRWPID} + 0.245998924780819 * \text{IRWPIM} + (1 - \\ & 0.714236497328726 - 0.245998924780819) * \text{IRWPIX} \\ & @\text{ADD IRWPI IRWPI\_A} \end{aligned}$$

'2007:Consumer price index

$$\text{IRCPI} = \text{IRCPI}(-1) + 99.8795501547877 * (\text{IRPGDPNF} - \text{IRPGDPNF}(-1)) - 13.496357346761 * \text{IRD00}$$

'2008:Non-organized market interest rate

$$\text{IRIRNB} = 12.568231353827 + 0.429251081760716 * \text{IRIRNB}(-1) + 0.000428095004912412 * (\text{IRSPV} - \text{IRSPV}(-1)) + (\text{IRCPI} - \text{IRCPI}(-1)) / \text{IRCPI}(-1) + 10.6201577223518 * \text{IRD7905} - 6.86660754420637 * \text{IRD9699}$$

'2009:Capital consumption allowances implicit price deflator

$$\text{IRPCCA} = \text{IRPCCA}(-1) + 1.04981684653527 * (\text{IRPK} - \text{IRPK}(-1))$$

'2010: Input implicit price deflator

$$\text{IRPINPUT} = \text{IRPINPUT}(-1) + 0.810102965608117 * (\text{IRPGDPF} - \text{IRPGDPF}(-1))$$

'L A B O R   M A R K E T :::  
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'3001:Wage index

$$\text{IRWIND} = \text{IRWINDPGDPM} * \text{IRPGDPM}$$

'3002:Active population, thousands

$$\text{IRPOPA} = \text{IRPOPAPOP} * \text{IRPOP}$$

'3003:Unemployment, thousands

$$\text{IRUNEMP} = \text{IRPOPA} - \text{IREMP}$$

'3004:Unemployment rate, percent

$$\text{IRUNEMPR} = \text{IRUNEMP} / \text{IRPOPA} * 100$$

'3101:Active population ratio

$$\text{IRPOPAPOP} = -0.335100049170576 + 1.09508062161122 * \text{IRPOPAPOP}(-1) + 0.000226764218467866 * \text{IRYEAR} + 0.000226764218467866 * \text{IRD66}$$

'3102:Population, thousands

$$\text{IRPOP} = 752.858231454658 + 1.00656839258299 * \text{IRPOP}(-1)$$

'3103:Real wage index

$$\text{IRWINDPGDPM} = \text{IRWINDPGDPM}(-1) - 0.0104607095774733 * (\text{IREMP} - \text{IREMP}(-1)) + 0.000388807999265757 * (\text{IRGDPM} - \text{IRGDPM}(-1)) + 13.8937284860481 * \text{IRD7579} + 16.682940458345 * \text{IRD7880}$$

'3104:Employment, thousands

$$\text{IREMP} = \text{IREMP}(-1) + 15.2318146460452 * (\text{IRWIND} - \text{IRWIND}(-1)) + 0.0153834643670234 * \text{IRPOPA} + 681.554737445635 * \text{IRD66} + 373.298130746925 * \text{IRD76}$$



## Evaluations

After estimation of econometric models, we usually use some statistics and measures to evaluate its performance. We used the following conventional model performance evaluation statistics:

$Y_t$	Actual endogenous variable
$\hat{y}_t$	Simulated endogenous variable resulted from model solution for an arbitrary in-sample period.
$e_t$	Difference between simulated and real variables ( $\hat{y}_t - y_t$ )
$N$	Number of observations in simulation
$M$	Number of applied non-zero observations in simulation.
$L$	Number of observations in simulation with positive actual value.
$t$	Year index.

$$\bar{Y} = \frac{\sum_{t=1}^N Y_t}{N} \quad \text{Mean value of actual endogenous variable.}$$

$$\bar{\hat{Y}} = \frac{\sum_{t=1}^N \hat{Y}_t}{N} \quad \text{Mean value of endogenous simulated variable.}$$

$$\bar{e} = \frac{\sum_{t=1}^N e_t}{N} \quad \text{Mean value of endogenous variable simulated error.}$$

$$Var(e) = \frac{\sum_{t=1}^N (e_t - \bar{e})^2}{N} \quad \text{The simulation error variance.}$$

$$Sdv(e) = \sqrt{Var(e)} \quad \text{The simulation error standard deviation.}$$

Max(e)                      Maximum simulation error

Med(e)                      Median of simulation error

Min(e)                      Minimum simulation error

$$Skw(e) = \frac{\sum_{t=1}^N (e_t - \bar{e})^3}{(N-1)[Var(e)]^{1.5}}$$

Simulation error skewness.

$$Kur(e) = \frac{\sum_{t=1}^N (e_t - \bar{e})^4}{(N-1)[Var(e)]^2}$$

Simulation error kurtosis.

$$Rms(e) = \sqrt{\frac{\sum_{t=1}^N e_t^2}{N}}$$

Simulation root mean squared error.

$$Mp(e) = \frac{100 \sum_{t=1}^L \left( \frac{e_t}{Y_t} \right)}{L}$$

Simulation mean percentage error.

$$Rmsp(e) = 100 \sqrt{\frac{\sum_{t=1}^M \left( \frac{e_t}{Y_t} \right)}{M}}$$

Simulation root mean squared percentage error.

$$MA(e) = \frac{\sum_{t=1}^N |e_t|}{N}$$

Mean absolute simulation error.

$$MAP(e) = \frac{100 \cdot \sum_{t=1}^L \left| \frac{e_t}{Y_t} \right|}{L}$$

Mean absolute simulation percentage error.

$$Cor(Y_t, \hat{Y}_t) = \frac{Cov(Y_t, \hat{Y}_t)}{\sqrt{Var(Y_t) \cdot Var(\hat{Y}_t)}}$$

Correlation between actual and simulated.

$$Cov(Y_t, \hat{Y}_t) = \frac{\sum_{t=1}^N (Y_t - \bar{Y}_t)(\hat{Y}_t - \bar{\hat{Y}}_t)}{N}$$

Actual and simulation covariance.

$$Theil - U = \frac{\sqrt{\frac{\sum_{t=1}^N e_t^2}{N}}}{\sqrt{\frac{\sum_{t=1}^N Y_t^2}{N} + \frac{\sum_{t=1}^N \hat{Y}_t^2}{N}}} \quad \text{Theil-U inequality statistics.}$$

$$Theil - U - Bias = \frac{N \cdot (\bar{\hat{Y}} - \bar{Y})^2}{\sum_{t=1}^N (\hat{Y}_t - Y_t)^2} \quad \text{Theil-U- bias proportion inequality statistics.}$$

$$Theil - U - Var = \frac{[Sdv(\hat{Y}) - Sdv(Y)]^2}{\sum_{t=1}^N (\hat{Y}_t - Y_t)^2} \quad \text{Theil-U- variance proportion inequality statistics.}$$

$$Theil - U - Cov = \frac{2N[1 - Cor(Y_t, \hat{Y}_t)]Sdv(\hat{Y}).Sdv(Y)}{\sum_{t=1}^N e_t^2} \quad \text{Theil-U-Covariance proportion inequality statistics.}$$

## Evaluations for 1959-2003 ex-post simulation

This model has been evaluated after a dynamic simulation for the period of 1959-2003 with the above mentioned criteria. All of calculations were presented in the following tables. In these tables, the rows show two hundred endogenous variables. In the first column in the left side of the table we showed the arrangement number of the above variables and in the next column the name of the related variables are shown. In the next column, the number of observations and the observations with non zero value are inserted. The next columns are respectively to show mean of actual, mean of simulated, mean of simulated error, VAR (error), SDV (error), median (error), max (error), min(error), skewness (error), kurtosis (error), RMS Error, mean percent error, RMS percent error, mean absolute error, mean absolute percent error, Corr (act,sim), Cov (act,sim), Theil U-Stat., Theil U-Bias, Theil U-Var, Theil U-Cov. statistics were showed in the table. Examining these statistics would show the model explanatory power for the 1959-2003 sample period.

No.	Actual	Obs.	Non zero obs	Mean actual	Mean simulated	Mean error	VAR (error)	SDV (error)
1	IRAD	45	45	359540	263755.2	-95784.8	1.641E+11	405079.39
2	IRADV	45	45	198658.5	189260.1	-9398.31	1.457E+09	38168.672
3	IRAS	45	45	359540	263755.2	-95784.8	1.641E+11	405079.39
4	IRASV	45	45	198658.5	189260.1	-9398.31	1.457E+09	38168.672
5	IRBOPD	45	45	522.3511	-146.853	-669.204	5003912.6	2236.9427
6	IRBOPDC	45	45	4705.976	-3379.48	-8085.45	158477021	12588.766
7	IRBOPEOD	45	41	-367.711	-436.623	-68.9119	242307.48	492.24738
8	IRBOPEODC	45	45	-5610.77	-6335.58	-724.813	1321236.5	1149.4505
9	IRBOT	45	45	-4796.37	-7450.2	-2653.84	90028127	9488.3153
10	IRBOTV	45	45	3792.503	-1813.42	-5605.92	166999964	12922.847
11	IRC	45	45	92781.19	97709.64	4928.443	111750291	10571.201
12	IRCAD	45	45	1250.489	650.197	-600.292	7134345.6	2671.0196
13	IRCADC	45	45	20969.77	13609.13	-7360.64	153731937	12398.868
14	IRCCA	45	45	28199.61	28439.9	240.2964	4358218	2087.6346
15	IRCCAV	45	45	16257.45	12761.8	-3495.64	24431646	4942.8379
16	IRCPI	45	45	34.69289	32.935	-1.75789	43.8969	6.62547
17	IRCUV	45	45	5865.053	6604.851	739.7972	6940534.3	2634.4894
18	IRCUVPGDPM	45	45	16699.87	16411.72	-288.158	16584509	4072.4082
19	IRCV	45	45	57014.28	60028.45	3014.174	257556505	16048.567
20	IRDDV	45	45	19265.76	19501.25	235.4863	24730044	4972.9312
21	IRDDVPGDPM	45	45	28121.89	29326.57	1204.679	12684630	3561.5488
22	IRDIS	45	45	15117.91	10520.37	-4597.54	143621697	11984.227
23	IRDISV	45	45	9105.618	22825.48	13719.86	789310337	28094.667
24	IREENOIL	45	45	1146.108	1314.097	167.9884	350223.18	591.79657
25	IREM	45	45	1723.701	1932.674	208.973	666177.4	816.19691
26	IREMP	45	45	10770.17	10671.42	-98.75	168019.98	409.9024
27	IRFYSBD	45	45	-653.979	-626.965	27.01357	128443.39	358.39
28	IRFYSBDC	45	45	-10676.1	-9564	1112.107	577809.04	760.13751
29	IRG	45	45	31498.86	33381.32	1882.46	4587794.6	2141.9138
30	IRGBDV	45	45	-2103.41	9123.42	11226.83	580921004	24102.303
31	IRGBDVC	45	45	11727.93	-46951	-58678.9	1.318E+10	114823.31
32	IRGDEM	45	45	197308.4	202451.9	5143.432	244660627	15641.631
33	IRGDEM V	45	45	118764.7	118029.6	-735.145	516109239	22718.038
34	IRGDIM	45	45	204752.3	130554.2	-74198.1	1.624E+11	403040.32
35	IRGDIM V	45	45	118764.7	118029.6	-735.145	516109239	22718.038
36	IRGDPF	45	45	192965.1	199872.6	6907.519	199341270	14118.827
37	IRGDPF V	45	45	117841.1	117159	-682.026	582368542	24132.313
38	IRGDPM	45	45	197308.4	202451.9	5143.432	244660627	15641.631
39	IRGDPM V	45	45	118764.7	118029.6	-735.145	516109239	22718.038
40	IRGDPNF	45	45	152114	156129.4	4015.389	133652779	11560.83
41	IRGDPNF V	45	45	96593.87	99654.28	3060.418	675285269	25986.252
42	IRGEFIDC	45	31	4999.901	4999.901	0.00011	0	0.00016
43	IRGESV	45	45	3482.426	4203.977	721.5518	1110170.8	1053.6464
44	IRGEV	45	45	30501.54	31223.09	721.5524	1110177	1053.6494
45	IRGNIM	45	45	204432.6	130389.6	-74043	1.624E+11	403042.81

No.	Actual	Obs. zero obs	Non zero obs	Mean actual	Mean simulated	Mean error	VAR (error)	SDV (error)
46	IRGNIMV	45	45	117773.3	116390.8	-1382.5	474578059	21784.813
47	IRGNPM	45	45	196988.7	202287.2	5298.541	246914500	15713.513
48	IRGNPMV	45	45	117773.3	116390.8	-1382.5	474578059	21784.813
49	IRGNS	45	45	75492.13	478.0784	-75014	1.645E+11	405639.19
50	IRGNSV	45	45	44075.97	33355.79	-10720.2	345507031	18587.819
51	IRGRMV	45	45	4339.247	15093.2	10753.96	501177484	22386.994
52	IRGROILV	45	45	10158.62	10732.77	574.1552	11390265	3374.9466
53	IRGRSV	45	45	3482.426	4203.977	721.5518	1110170.8	1053.6464
54	IRGRTDV	45	45	3819.364	2606.536	-1212.83	5798907.3	2408.092
55	IRGRTIV	45	45	3386.873	4498.415	1111.542	4679584.8	2163.2348
56	IRGRTV	45	45	7206.238	7104.951	-101.287	4494869.1	2120.1106
57	IRGRV	45	45	28398.13	40346.51	11948.38	610393530	24706.144
58	IRGV	45	45	16081.16	8565.765	-7515.39	214762617	14654.781
59	IRI	45	45	62706.86	68290.77	5583.909	141723649	11904.774
60	IRIG	45	45	21926.33	23247.23	1320.9	8696613.2	2949.0021
61	IRIGV	45	45	12131.44	10719.65	-1411.79	23278214	4824.7501
62	IRII	45	45	10457.49	11699.83	1242.345	44865455	6698.168
63	IRIIV	45	45	8503.74	8384.71	-119.029	24490187	4948.7561
64	IRINFCPI	45	43	0.14221	0.15135	0.00914	0.02874	0.16952
65	IRINFWPI	45	40	0.14189	0.14256	0.00067	0.01295	0.11378
66	IRINPUT	45	45	103352	74011.07	-29341	353981957	18814.408
67	IRINPUTV	45	45	56510.39	35324.37	-21186	1.563E+09	39540.112
68	IRIP	45	45	40780.52	45043.53	4263.007	97198935	9858.952
69	IRIPV	45	45	20639.74	17703.67	-2936.07	15285256	3909.6363
70	IRIRNB	45	45	33.43458	34.32851	0.89392	31.35844	5.59986
71	IRIT	45	45	7484.884	4217.617	-3267.27	4612824	2147.7486
72	IRITV	45	45	3109.742	1915.199	-1194.54	9257777.6	3042.6596
73	IRIV	45	45	32771.18	28423.32	-4347.86	36287817	6023.937
74	IRK	45	45	683472	707827.7	24355.73	7.029E+09	83836.389
75	IRKADC	45	45	-10653	-10653	0	0	0
76	IRKV	45	45	466164.4	355903.7	-110261	2.641E+10	162503.24
77	IRM	45	45	51435.58	59189.93	7754.352	215748112	14688.367
78	IRM2NFAD	45	45	4710.948	-2422.69	-7133.64	131938424	11486.445
79	IRM2NFAV	45	45	4338.231	-15749.7	-20087.9	2.996E+09	54731.232
80	IRM2NGGV	45	45	38862.17	-20536.7	-59398.9	1.387E+10	117751.15
81	IRM2NGSV	45	45	-18361.6	-31866.9	-13505.3	654200926	25577.352
82	IRM2NGSVPGDPM	45	45	-40241.6	-84088.7	-43847.1	576649460	24013.527
83	IRM2NGV	45	45	20500.53	-52403.6	-72904.2	2.047E+10	143067.14
84	IRM2NPV	45	45	40296.21	51323.02	11026.81	354225971	18820.892
85	IRM2NPVPGDPM	45	45	63571.92	81271.39	17699.48	662753468	25743.999
86	IRM2N WV	45	45	-9280.56	76536.45	85817.01	3.705E+10	192476.34
87	IRM2V	45	45	55854.41	59706.12	3851.718	191826501	13850.144
88	IRMFY	45	45	4511.859	4447.588	-64.2711	1090678.7	1044.3556
89	IRMFYSD	45	45	1583.423	1558.998	-24.4256	125001.07	353.55491
90	IRMFYV	45	45	2430.121	3393.362	963.2413	12570016	3545.4218

No.	Actual	Obs. zero obs	Non zero obs	Mean actual	Mean simulated	Mean error	VAR (error)	SDV (error)
91	IRMG	45	45	46429.29	53010.67	6581.386	171500250	13095.81
92	IRMGD	45	45	11077.52	13010.18	1932.659	13268467	3642.5908
93	IRMGDCIFP	45	45	126.4949	144.1644	17.66956	1236.1801	35.15935
94	IRMGV	45	45	20181.47	30949.13	10767.66	612156955	24741.806
95	IRMNFS	45	45	5006.29	6179.257	1172.967	20612791	4540.1312
96	IRMNFSDCIFP	45	45	1271.546	1875.069	603.523	1547361.2	1243.9298
97	IRMNFSDCIFP	45	45	13.92817	18.5937	4.66553	184.9566	13.59987
98	IRMNFSV	45	45	3201.861	4957.052	1755.191	25518102	5051.5445
99	IRMSD	45	45	2854.969	3434.066	579.0975	1752499.3	1323.82
100	IRMV	45	45	23383.33	35906.18	12522.85	879969992	29664.288
101	IRNFSBD	45	45	-871.626	-1589.54	-717.918	1921584.6	1386.2123
102	IRNFSBDC	45	45	-12859	-25330	-12471	202459026	14228.81
103	IRNFY	45	45	-319.753	-164.632	155.1212	2254686.5	1501.5613
104	IRNFYV	45	45	-991.458	-1638.82	-647.364	4317618.1	2077.8879
105	IRNIT	45	45	4343.327	2579.235	-1764.09	7802445	2793.2857
106	IRNITV	45	45	923.6839	870.5748	-53.1091	2825108.7	1680.806
107	IRNINF	45	45	171889.7	99370.44	-72519.2	1.621E+11	402631.41
108	IRNINFV	45	45	100592.1	102758.4	2166.261	557681938	23615.29
109	IRNNS	45	45	47292.52	-27961.8	-75254.3	1.642E+11	405238.41
110	IRNNSV	45	45	27818.52	20593.99	-7224.53	217664012	14753.441
111	IRNTRD	45	33	378.7378	-98.5028	-477.241	525787.28	725.11191
112	IRNTRDC	45	43	3890.609	496.7809	-3393.83	39359438	6273.7101
113	IROLV	45	24	3265.857	2545.857	-720	23328000	4829.9068
114	IROLVC	45	24	20902.27	20182.27	-719.996	23327933	4829.8999
115	IROUTPUT	45	45	296317.2	273883.7	-22433.4	520995236	22825.32
116	IROUTPUTV	45	45	174351.4	152483.4	-21868	2.209E+09	47002.603
117	IRPA	45	45	0.36548	0.34286	-0.02262	0.00683	0.08265
118	IRPBOT	45	45	0.05712	-0.04273	-0.09985	6.2237	2.49473
119	IRPC	45	45	0.35479	0.338	-0.01679	0.00858	0.09261
120	IRPCCA	45	45	0.33598	0.22462	-0.11135	0.0164	0.12804
121	IRPDIS	45	45	1.04948	6.91047	5.86099	308.38927	17.56102
122	IRPG	45	45	0.39219	0.19316	-0.19903	0.14321	0.37843
123	IRPGDEM	45	45	0.37423	0.34153	-0.03271	0.00684	0.08272
124	IRPGDIM	45	45	0.36622	0.35536	-0.01087	0.00856	0.09251
125	IRPGDPF	45	45	0.37423	0.34153	-0.03271	0.00684	0.08272
126	IRPGDPM	45	45	0.37423	0.34153	-0.03271	0.00684	0.08272
127	IRPGDPNF	45	45	0.35686	0.34227	-0.01458	0.0041	0.06405
128	IRPGNIM	45	45	0.365	0.35182	-0.01318	0.00838	0.09152
129	IRPGNPM	45	45	0.37298	0.33862	-0.03436	0.00719	0.08479
130	IRPGNS	45	45	0.36024	0.21829	-0.14195	0.02706	0.16451
131	IRPI	45	45	0.3334	0.22096	-0.11244	0.0151	0.1229
132	IRPIG	45	45	0.34774	0.28693	-0.06081	0.02717	0.16484
133	IRPII	45	45	0.56763	0.50111	-0.06652	0.53659	0.73252
134	IRPINPUT	45	45	0.35545	0.27955	-0.07591	0.02236	0.14954
135	IRPIP	45	45	0.32667	0.19208	-0.13458	0.01344	0.11591

No.	Actual	Obs. Non zero obs	Mean actual	Mean simulated	Mean error	VAR (error)	SDV (error)	
136	IRPIT	45	45	0.37422	0.34153	-0.0327	0.00684	0.08273
137	IRPK	45	45	0.35532	0.21531	-0.14001	0.02862	0.16919
138	IRPM	45	45	0.39579	0.43851	0.04272	0.0465	0.21564
139	IRPMFY	45	45	0.40502	0.56215	0.15713	0.22834	0.47785
140	IRPMG	45	45	0.39668	0.43088	0.0342	0.04354	0.20867
141	IRPMNFS	45	45	0.38861	0.49682	0.10821	0.07956	0.28206
142	IRPNFY	45	45	0.3828	0.74088	0.35808	1.28213	1.13231
143	IRPNIT	45	45	0.37423	0.34153	-0.0327	0.00684	0.08273
144	IRPNNIF	45	45	0.37035	0.72509	0.35474	5.68213	2.38372
145	IRPNNS	45	45	0.38072	0.25797	-0.12275	0.10124	0.31819
146	IRPOP	45	45	42489.36	42845.85	356.4918	4163844.5	2040.5501
147	IRPOPA	45	45	11992.78	8225.947	-3766.84	25737430	5073.2071
148	IRPOPAPOP	45	45	0.28436	0.21356	-0.0708	0.00518	0.07196
149	IRPOUTPUT	45	45	0.36783	0.32494	-0.04289	0.00959	0.09793
150	IRPSP	45	45	0.36577	0.19124	-0.17453	10.12772	3.18241
151	IRPSUB	45	45	0.37423	0.34153	-0.03271	0.00684	0.08272
152	IRPVAOIL	45	45	0.51465	0.3596	-0.15505	0.1431	0.37829
153	IRPX	45	45	0.45183	0.42661	-0.02523	0.00876	0.09359
154	IRPXFY	45	45	0.38001	0.46574	0.08573	0.08722	0.29532
155	IRPXNFS	45	45	0.3871	0.53684	0.14973	0.16799	0.40987
156	IRPXNOILG	45	45	0.4107	0.3776	-0.03309	0.03161	0.17778
157	IRPXOIL	45	45	0.49012	0.44807	-0.04204	0.00914	0.09559
158	IRPYD	45	45	0.35969	0.36479	0.0051	0.00538	0.07334
159	IRSD	45	45	-1525.6	-2216.51	-690.905	2121331.5	1456.4792
160	IRSDC	45	45	-23535.1	-34894	-11358.9	191675170	13844.68
161	IRSDV	45	45	30723.59	33600.03	2876.434	63157011	7947.1385
162	IRSDVPGDPM	45	45	49165.55	51087.1	1921.553	123227353	11100.782
163	IRSP	45	45	24511.14	25427.92	916.7808	44013923	6634.299
164	IRSPV	45	45	18511.32	22618.68	4107.355	169425981	13016.374
165	IRSUB	45	45	3141.558	1638.382	-1503.18	2152981.6	1467.3042
166	IRSUBV	45	45	2186.053	1044.625	-1141.43	4608500.7	2146.7419
167	IRTBD	45	45	2397.356	2965.209	567.8533	5350420.7	2313.0976
168	IRTBDC	45	45	40614.28	48006.39	7392.104	85943641	9270.5793
169	IRTOT	45	44	7443.9	-71897.7	-79341.6	1.63E+11	403698.13
170	IRUNEMP	45	45	1222.61	-2445.48	-3668.09	24764810	4976.4254
171	IRUNEMPR	45	45	9.31794	-47.1121	-56.43	12882.359	113.50048
172	IRVAOIL	45	45	40851.13	43743.26	2892.131	11434343	3381.4706
173	IRVAOILV	45	45	21247.19	17504.73	-3742.45	110066568	10491.261
174	IRWIND	45	45	31.97945	53.29253	21.31308	2205.9866	46.96793
175	IRWINDPGDPM	45	45	81.53179	108.7226	27.19078	1208.9983	34.77065
176	IRWPI	45	45	33.144	24.86301	-8.28099	262.33415	16.19673
177	IRWPID	45	45	33.84333	28.69427	-5.14907	147.34179	12.13844
178	IRWPIM	45	45	29.86111	15.39317	-14.468	632.31273	25.14583
179	IRWPIX	45	45	41.3	15.0395	-26.2605	2225.0584	47.17052
180	IRX	45	45	46639.21	51739.73	5100.517	106664548	10327.853

No.	Actual	Obs. Non zero obs	Mean actual	Mean simulated	Mean error	VAR (error)	SDV (error)
181	IRXFY	45	4192.106	4282.956	90.8501	1109288.6	1053.2277
182	IRXFYSD	45	929.4446	932.0326	2.58798	50427.189	224.55999
183	IRXFYV	45	1438.663	1754.54	315.8766	2375768.6	1541.3528
184	IRXGD	45	13474.88	15975.39	2500.513	9793516.2	3129.4594
185	IRXGNOD	45	1471.464	2085.9	614.4355	1259365.4	1122.2145
186	IRXGNODOP	45	16.97739	20.84504	3.86765	165.8338	12.87765
187	IRXNFS	45	1357.197	1059.685	-297.512	793892.15	891.00626
188	IRXNFSD	45	399.9199	285.5246	-114.395	215708.75	464.44456
189	IRXNFSDOP	45	4.94229	3.2349	-1.70739	26.14676	5.11339
190	IRXNFV	45	1989.535	3131.393	1141.859	15700776	3962.4205
191	IRXNOILG	45	6828.874	8655.96	1827.086	37008076	6083.4263
192	IRXNOILGV	45	6294.921	9479.104	3184.183	48431881	6959.3017
193	IRXOIL	45	38453.14	42024.08	3570.943	17650497	4201.2495
194	IRXOILB	45	908.7681	999.6872	90.9191	11441.992	106.96725
195	IRXOILD	45	12003.42	13889.49	1886.078	4640569.3	2154.1981
196	IRXOILV	45	18891.38	21482.27	2590.89	53399601	7307.5031
197	IRXSD	45	1329.364	1217.557	-111.807	259495.21	509.40672
198	IRXV	45	27175.84	34092.76	6916.929	311292867	17643.494
199	IRYD	45	117292.3	123137.6	5845.225	112870068	10624.033
200	IRYDV	45	75525.6	82647.13	7121.529	763555865	27632.515



No.	Actual	Median (error)	Max(error)	Min(error)	Skewness(error)	Kurtosis (error)
1	IRAD	-20731.3721	50311.3	-2723074	-6.19305	40.22119
2	IRADV	-623.46037	152329.7	-105546	0.57208	9.90294
3	IRAS	-20731.3721	50311.3	-2723074	-6.19305	40.22119
4	IRASV	-623.46037	152329.7	-105546	0.57208	9.90294
5	IRBOPD	-28.8549	3488.738	-8028.79	-1.23058	5.12388
6	IRBOPDC	-1314.467	5279.64	-34491.9	-1.10008	2.5972
7	IRBOPEOD	13.69492	1554.435	-1288.62	0.65382	5.01756
8	IRBOPEODC	-403.63	822.976	-3101.03	-0.81466	2.39739
9	IRBOT	-2064.62021	22230.57	-25814.5	-0.2536	3.62682
10	IRBOTV	-201.51127	7684.969	-57578.4	-2.31577	8.34177
11	IRC	3689.8501	26859.4	-20428.3	0.37599	2.8483
12	IRCAD	-7.71746	4777.359	-9583.23	-1.22143	5.39341
13	IRCADC	-1167.01	5907.58	-33447.3	-1.17654	2.69155
14	IRCCA	-131.16299	4966.53	-2708.24	0.76838	2.65441
15	IRCCAV	-1664.42854	0	-22077.4	-2.22333	7.3121
16	IRCPI	0.19368	15.9257	-20.9571	-1.38523	6.06765
17	IRCUV	45.4008	14590.97	-3369.07	3.75828	18.87012
18	IRCUVPGDPM	1.49224	7611.571	-13757.6	-0.93323	5.07263
19	IRCV	997.81787	80352.6	-26045.6	2.84135	14.22282
20	IRDDV	42.31412	29703.6	-8214.74	4.50514	28.37361
21	IRDDVPGDPM	724.16337	10014.45	-5960.95	0.42098	2.89723
22	IRDIS	-2229.31098	19096.16	-33961	-0.648	3.23966
23	IRDISV	4711.72847	154547.2	-2273.42	3.42836	15.75102
24	IREENOIL	18.18861	3348.548	-421.107	3.89322	20.04003
25	IREM	-5.47712	4427.33	-421.773	3.80855	18.44564
26	IREMP	35.164	694.4429	-1003.78	-0.9304	2.96095
27	IRFYSBD	88.60074	901.1836	-961.797	-0.69739	4.06246
28	IRFYSBDC	927.73663	2787.018	0	0.59246	2.28263
29	IRG	1568.40538	6332.864	-424.558	0.78772	2.41969
30	IRGBDV	1214.9699	127442.8	0	3.15586	13.74467
31	IRGBDVC	-7851.533	0	-505207	-2.54043	8.90156
32	IRGDEM	304.21025	39763.9	-18700.4	0.77331	2.64803
33	IRGDEM V	479.37505	119385.7	-53170	2.77338	18.88478
34	IRGDIM	-7765.45657	82394.53	-2698620	-6.26971	40.86141
35	IRGDIM V	479.37505	119385.7	-53170	2.77338	18.88478
36	IRGDPF	3267.42887	42573	-17653.4	0.81298	3.11657
37	IRGDPF V	511.93889	127493.1	-52986	2.86093	19.08505
38	IRGDPM	304.21025	39763.9	-18700.4	0.77331	2.64803
39	IRGDPM V	479.37505	119385.7	-53170	2.77338	18.88478
40	IRGDPNF	2501.23077	35068.3	-17500.9	0.7833	3.54703
41	IRGDPNF V	473.46737	146900.7	-37488.8	3.91687	22.07172
42	IRGEFIDC	0.00022	0.0003	-0.00041	-1.46269	5.3121
43	IRGESV	214.0183	3904.08	-2.94802	1.53032	4.02136
44	IRGEV	214.018	3904.1	-2.94802	1.53033	4.02139
45	IRGNIM	-6916.79224	82040.92	-2698128	-6.26727	40.83947

No.	Actual	Median (error)	Max(error)	Min(error)	Skewness(error)	Kurtosis (error)
46	IRGNIMV	479.85736	108585.2	-54491.9	2.18023	16.24775
47	IRGNPM	270.56585	39875.9	-22854.5	0.65429	2.72124
48	IRGNPMV	479.85736	108585.2	-54491.9	2.18023	16.24775
49	IRGNS	-5839.65747	66098.69	-2715556	-6.26552	40.81199
50	IRGNSV	-4502.2247	3960.477	-91004.9	-2.67653	10.34406
51	IRGRMV	1002.262	109002.5	-1.10022	2.77661	10.72254
52	IRGROILV	0.472	15537.9	-3728.13	3.72104	16.7989
53	IRGRSV	214.0183	3904.08	-2.94802	1.53032	4.02136
54	IRGRTDV	-84.4747	62.2729	-7945.49	-1.87094	4.96565
55	IRGRTIV	105.8189	9568.19	-381.88	2.46945	8.57545
56	IRGRTV	51.7025	5080.71	-7593.7	-1.66458	7.94344
57	IRGRV	1424.1	128239.7	0	3.00139	12.67806
58	IRGV	-658.55819	16.97955	-56570.6	-2.05409	6.05733
59	IRI	1354.69268	32488.21	-16588.5	0.48241	2.39846
60	IRIG	723.22	9112.858	-3119.87	0.8423	3.02445
61	IRIGV	-2.89014	2125.845	-17983.2	-2.73836	9.17845
62	IRII	246.303	15068.57	-12478.4	0.28173	2.3553
63	IRIIV	18.05512	14926.93	-11070.3	0.72552	5.62072
64	IRINFCPI	-0.02776	0.64156	-0.23921	1.33414	5.7091
65	IRINFWPI	-0.02187	0.28083	-0.19473	0.39832	2.53222
66	IRINPUT	-33296.4929	0	-60732.5	0.17849	1.66159
67	IRINPUTV	-1710.2058	346.3943	-126615	-1.77118	4.51729
68	IRIP	1962.29302	28008.95	-14862.9	0.35251	2.65108
69	IRIPV	-4024.528	6731.66	-12810.6	-0.03928	3.31479
70	IRIRNB	0.89955	21.85164	-11.357	0.86082	6.56508
71	IRIT	-3261.919	1748.38	-7145.27	0.23108	2.15184
72	IRITV	-124.5001	320.5	-15300.7	-3.39364	14.15676
73	IRIV	-3680.962	5601.32	-26674	-1.64309	6.28595
74	IRK	-10022.6757	240462.7	-63313.3	1.39512	3.61438
75	IRKADC	0	0	0	3.04427	11.40765
76	IRKV	-46185.8435	0	-701983	-2.16724	7.16765
77	IRM	2420.53369	46699.9	-27252	0.63271	3.42313
78	IRM2NFAD	-260.90114	3917.386	-32420	-1.22462	2.93307
79	IRM2NFAV	-17.622	276.0776	-258000	-3.69286	16.09275
80	IRM2NGGV	-7851.533	0	-537607	-2.62709	9.50407
81	IRM2NGSV	-4542.847	0	-126693	-3.03596	12.27113
82	IRM2NGSVPGDPM	-44700.9063	0	-90380	0.13621	2.10678
83	IRM2NGV	-13162.69	0	-664300	-2.70023	9.99426
84	IRM2NPV	1723.778	71296.3	-361.374	1.66108	4.47194
85	IRM2NPVPGDPM	14102.53618	68955.39	-16735.8	0.52813	2.00864
86	IRM2NWB	11710.281	957169.7	0	3.27259	13.63707
87	IRM2V	230.833	78646.4	-3333.6	4.40759	22.15535
88	IRMFY	0	2678.269	-3791.07	-0.79664	5.93627
89	IRMFYSD	0	736.751	-1362.8	-0.849	6.02455
90	IRMFYV	26.12739	19402.14	-1228.64	4.05222	19.35003

No.	Actual	Median (error)	Max(error)	Min(error)	Skewness(error)	Kurtosis (error)
91	IRMG	2615.80657	43520.21	-22122.4	0.89438	3.80651
92	IRMGD	345.07	12286.53	-3646.78	1.26734	4.0384
93	IRMGDCIFP	7.02288	116.8421	-59.3938	0.89438	3.80651
94	IRMGV	215.89862	116957	-5735.72	2.70034	10.21266
95	IRMNFS	-319.60008	16444.13	-5129.58	1.89111	6.03274
96	IRMNFSD	0	3984.431	-1027.85	1.52337	4.52738
97	IRMNFSDCIFP	0	44.78278	-16.7402	1.32932	4.34831
98	IRMNFV	-0.51822	27455.43	-2536.04	3.62178	17.101
99	IRMSD	37.9684	4080.673	-2075.6	1.15923	4.10198
100	IRMV	186.19854	144412.5	-7541.67	2.84149	11.2297
101	IRNFSBD	-202.62	795.5814	-4652.83	-1.71756	4.84995
102	IRNFSBDC	-8924.32763	3822.119	-32341.9	-0.17692	1.23271
103	IRNFY	332.99847	2717.27	-4807.29	-1.71828	6.64568
104	IRNFYV	-11.77517	1017.443	-10801.1	-3.63418	16.16728
105	IRNIT	-1853.43361	5162.259	-6010.74	0.65959	2.84349
106	IRNITV	-21.90532	4492.35	-8106.95	-1.91049	14.00982
107	IRNINF	-5282.86828	87421.17	-2694672	-6.27291	40.88594
108	IRNINFV	1271.3705	131038.2	-36535.9	3.3505	20.76729
109	IRNNS	-5487.99111	66953.72	-2713685	-6.26911	40.84269
110	IRNNSV	-2907.47446	5611.339	-76658.8	-3.11282	13.52133
111	IRNTRD	-0.11342	0.2356	-1907.29	-1.00249	2.23193
112	IRNTRDC	0.04295	1.64417	-21475.8	-1.71603	4.512
113	IROLV	0	0	-32400	-6.41006	42.06667
114	IROLVC	0	0.05	-32400	-6.41006	42.06667
115	IROUTPUT	-16985.2114	16262.2	-66544	-0.45831	1.83893
116	IROUTPUTV	-171.87064	16024.6	-179601	-1.95198	5.46837
117	IRPA	0.00255	0.21679	-0.33512	-1.39243	7.84433
118	IRPBOT	-0.00018	7.09361	-11.9182	-1.6312	14.4768
119	IRPC	0.01511	0.09272	-0.33256	-2.19089	6.57586
120	IRPCCA	-0.06681	0	-0.53964	-2.2057	6.63956
121	IRPDIS	0.24034	89.36713	-3.97329	3.42545	14.49739
122	IRPG	-0.01684	0.004	-1.38842	-1.89656	5.27929
123	IRPGDEM	0.00415	0.0189	-0.33212	-2.04244	6.12759
124	IRPGDIM	0.00656	0.30301	-0.33114	-0.33659	7.30976
125	IRPGDPF	0.00415	0.0189	-0.33212	-2.04244	6.12761
126	IRPGDPM	0.00415	0.0189	-0.33212	-2.04244	6.12759
127	IRPGDPNF	0.00705	0.1582	-0.1876	-1.20755	5.30699
128	IRPGNIM	0.00663	0.28118	-0.33427	-0.6165	6.97872
129	IRPGNPM	0.00346	0.01766	-0.33526	-2.02583	5.98226
130	IRPGNS	-0.07798	0	-0.69465	-1.84226	5.64495
131	IRPI	-0.0722	0	-0.54636	-2.18861	6.94121
132	IRPIG	0	0.14553	-0.5742	-1.86989	5.55892
133	IRPII	-0.00069	2.06146	-4.21938	-3.55456	25.14844
134	IRPINPUT	0.00188	0.01576	-0.52366	-1.69455	4.41465
135	IRPIP	-0.10426	0	-0.58913	-2.10015	7.6361

No.	Actual	Median (error)	Max(error)	Min(error)	Skewness(error)	Kurtosis (error)
136	IRPIT	0.00413	0.01887	-0.33214	-2.04244	6.12773
137	IRPK	-0.07495	0	-0.67898	-2.00094	5.85093
138	IRPM	0.00227	1.25559	-0.33618	3.91714	23.27008
139	IRPMFY	0.0057	2.28212	-0.19313	3.22493	12.92721
140	IRPMG	0.00239	1.19851	-0.38798	3.6642	22.78372
141	IRPMNFS	0.0084	1.56247	-0.09863	3.54587	17.11452
142	IRPNFY	0.01197	5.13597	-1.42241	2.52682	9.97981
143	IRPNIT	0.00408	0.01885	-0.33218	-2.04265	6.12898
144	IRPNNIF	0.01176	15.97942	-0.29934	6.39658	41.95439
145	IRPNNS	-0.0453	0.87644	-0.92647	0.26736	5.53778
146	IRPOP	278.32	3516.31	-2943.32	0.02038	1.65761
147	IRPOPA	-1343.057	257.837	-18385.5	-1.38531	3.87215
148	IRPOPAPOP	-0.04107	0	-0.27662	-1.3859	3.93249
149	IRPOUTPUT	0.00326	0.01897	-0.37814	-1.93936	5.55432
150	IRPSP	0.03128	7.69096	-19.6366	-4.85297	32.63743
151	IRPSUB	0.00415	0.0189	-0.33212	-2.04243	6.12751
152	IRPVAOIL	-0.00158	0.02088	-1.50655	-2.52547	7.93753
153	IRPX	-0.00023	0.29819	-0.39596	-1.32349	11.46092
154	IRPXFY	0.00366	1.54759	-0.12226	3.60772	16.07359
155	IRPXNFS	0.00464	1.84137	-0.49922	2.67526	10.63578
156	IRPXNOILG	-0.00983	0.78845	-0.5722	1.06603	13.72031
157	IRPXOIL	-0.00125	0.00004	-0.42617	-2.57935	8.79087
158	IRPYD	0.01785	0.25852	-0.19396	-0.24128	6.27586
159	IRSB	-374.984	1258.363	-4846.28	-1.6077	4.75308
160	IRSBDC	-8476.29	4873.57	-31249.1	-0.1539	1.23577
161	IRSDV	128.5694	41117.7	-1510.09	3.60763	15.94693
162	IRSDVPGDPM	-636.05511	24900.14	-15070.8	0.67405	2.37299
163	IRSP	2063.08028	12204.55	-14239.8	-0.46743	2.48046
164	IRSPV	299.47153	74580.6	-5625.83	4.03778	20.60472
165	IRSUB	-1117.72977	186.8274	-5185.69	-0.68325	2.44954
166	IRSUBV	-35.35535	29.9587	-8511.77	-1.8813	5.59324
167	IRTBD	-4.6504	5937.26	-6806.65	-0.47551	4.46704
168	IRTBDC	6551.47	25553.4	-4838.73	0.40102	1.66718
169	IRTOT	-13344.6589	82184.95	-2710722	-6.28967	41.0277
170	IRUNEMP	-1578.0995	187.2583	-19080	-1.59013	4.65311
171	IRUNEMPR	-14.67505	2.31005	-595.853	-3.19028	13.69023
172	IRVAOIL	2256.25281	9813.519	-1261.41	0.57925	1.89233
173	IRVAOILV	23.005	2026.267	-48030	-3.16934	12.50708
174	IRWIND	3.18875	215.5242	-0.01301	2.9005	10.77632
175	IRWINDPGDPM	24.49658	82.99468	-20.5689	0.17389	1.4525
176	IRWPI	-0.1852	0.73213	-56.2	-1.81977	4.86172
177	IRWPID	0.35078	3.0644	-43.9391	-1.98822	5.59331
178	IRWPIM	-1.88479	0.0172	-86.1646	-1.74731	4.59385
179	IRWPIX	-0.79026	0	-170.286	-1.91037	5.32391
180	IRX	1005.95484	25812.5	-9497.38	0.74753	2.25656

No.	Actual	Median (error)	Max(error)	Min(error)	Skewness(error)	Kurtosis (error)
181	IRXFY	142.203	1503.64	-3184.69	-0.98738	3.91725
182	IRXFYSD	50.177	438.9201	-548.391	-0.48181	2.80456
183	IRXFYV	15.55457	8601.02	-1204.97	4.11665	20.79869
184	IRXGD	1332.37	9862.64	-721.985	0.82234	2.35656
185	IRXGNOD	25.7657	3111.489	-592.611	1.01594	2.6586
186	IRXGNODOP	0.43377	29.57689	-16.7404	0.60554	2.29191
187	IRXNFS	-38.96226	1771.391	-1599.97	0.36602	2.43334
188	IRXNFSD	-21.8907	1069.445	-896.519	0.66115	3.29513
189	IRXNFSDOP	-0.2236	10.16582	-9.18205	0.36602	2.43334
190	IRXNFV	0.99712	22726.42	-273.509	4.19119	21.34006
191	IRXNOILG	204.912	13972.19	-7908.2	0.60554	2.29191
192	IRXNOILGV	-2.47652	27384.59	-172.879	2.27951	7.23543
193	IRXOIL	2802.80613	12107.4	-1512.99	0.59762	1.89418
194	IRXOILB	71.3616	308.264	-38.522	0.59762	1.89418
195	IRXOILD	1012.56	6882.34	-129.374	0.86106	2.52456
196	IRXOILV	48.783	36723.1	-5.66722	3.84774	17.16266
197	IRXSD	-90.02	1032.333	-1036.54	0.4561	2.84351
198	IRXV	22.97105	86834.1	-43.0868	3.28608	13.68507
199	IRYD	4732.51866	31836.71	-21822	0.23845	3.51451
200	IRYDV	1523.28792	154933.1	-29719.7	3.89517	20.07788

No.	Actual	RMS Error	Mean percent error	RMS percent error	Mean absolute error	MA percent error	Corr (act,sim)
1	IRAD	411846.6	-0.2538	1.05649	106122.5	0.27464	0.35708
2	IRADV	38894.75	0.10414	0.38611	16824.88	0.25835	0.99591
3	IRAS	411846.6	-0.2538	1.05649	106122.5	0.27464	0.35708
4	IRASV	38894.75	0.10414	0.38611	16824.88	0.25835	0.99591
5	IRBOPD	2310.963	NA	NA	1458.824	NA	0.65415
6	IRBOPDC	14843.51	NA	NA	9127.508	NA	0.00312
7	IRBOPEOD	491.6012	NA	NA	329.422	NA	0.94122
8	IRBOPEODC	1348.047	NA	NA	928.3989	NA	0.98273
9	IRBOT	9750.402	NA	NA	7141.727	NA	0.94317
10	IRBOTV	13954.04	NA	NA	6803.266	NA	-0.11143
11	IRC	11556.66	0.03691	0.09271	8307.525	0.07606	0.98939
12	IRCAD	2708.534	NA	NA	1690.612	NA	0.8323
13	IRCADC	14300.16	NA	NA	8421.26	NA	0.73636
14	IRCCA	2078.247	0.0075	0.12813	1641.613	0.08835	0.99483
15	IRCCAV	6009.014	-3.72697	5.61612	3495.645	3.72697	0.99592
16	IRCPI	6.78318	0.17426	0.37701	3.33062	0.25398	0.99443
17	IRCUV	2708.062	0.29454	0.56105	946.9121	0.35667	0.98678
18	IRCUVPGDPM	4037.202	0.02581	0.20501	2670.329	0.15591	0.92981
19	IRCV	16152.96	0.65305	0.98016	7084.953	0.67974	0.99458
20	IRDDV	4923.001	0.36586	0.6696	1620.289	0.40696	0.99475
21	IRDDVPGDPM	3722.096	0.05471	0.12149	2775.177	0.10625	0.98541
22	IRDIS	12710.92	NA	NA	8984.369	NA	0.60546
23	IRDISV	30983.94	NA	NA	13986.51	NA	0.98519
24	IREENOIL	608.819	-0.11985	1.23418	244.0734	0.58281	0.98892
25	IREM	833.6925	-0.47	1.39226	340.4201	0.6063	0.98439
26	IREMP	417.1783	-0.00458	0.03085	289.0556	0.02335	0.99365
27	IRFYSBD	355.4136	NA	NA	266.7782	NA	0.88639
28	IRFYSBDC	1342.293	NA	NA	1112.107	NA	0.99712
29	IRG	2833.637	0.04113	0.07258	1999.351	0.05507	0.99529
30	IRGBDV	26344.89	NA	NA	11226.83	NA	-0.51953
31	IRGBDVC	127807	NA	NA	58678.89	NA	-0.95862
32	IRGDEM	16299.65	0.00827	0.06114	11598.74	0.05041	0.99281
33	IRGDEM V	22476.22	0.27638	0.49734	8860.53	0.31136	0.99648
34	IRGDIM	405385.1	-0.34126	1.79814	86871.12	0.38651	0.22023
35	IRGDIM V	22476.22	0.27638	0.49734	8860.53	0.31136	0.99648
36	IRGDPF	15576.43	0.02056	0.05748	10986.34	0.04867	0.99457
37	IRGDPF V	23872.41	0.297	0.5295	9511.06	0.33217	0.99602
38	IRGDPM	16299.65	0.00827	0.06114	11598.74	0.05041	0.99281
39	IRGDPM V	22476.22	0.27638	0.49734	8860.53	0.31136	0.99648
40	IRGDPNF	12116.36	0.00881	0.06469	8614.978	0.05522	0.99566
41	IRGDPNF V	25877.5	0.30529	0.51731	9577.193	0.33766	0.99508
42	IRGEFIDC	0.00019	NA	NA	0.00015	NA	1

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43	IRGESV	1267.335	2.00363	3.33771	721.7823	2.01706	0.99599
44	IRGEV	1267.337	0.09443	0.12751	721.7829	0.09753	0.99995
45	IRGNIM	405359.1	-0.33486	1.78943	86804.84	0.38293	0.21598
46	IRGNIMV	21585.72	0.28607	0.52115	8689.76	0.32216	0.99648
47	IRGNPM	16416.52	0.01165	0.06085	11462.3	0.04825	0.99199
48	IRGNPMV	21585.72	0.28607	0.52115	8689.76	0.32216	0.99648
49	IRGNS	408061	-1.07123	5.82702	83734.97	1.17652	0.12248
50	IRGNSV	21277.95	-2.66833	4.1159	11106.01	2.93753	0.99684
51	IRGRMV	24610.72	6.72728	7.60086	10754	6.73018	0.78327
52	IRGROILV	3386.267	-0.01519	0.1689	1143.086	0.11888	0.99826
53	IRGRSV	1267.335	2.00363	3.33771	721.7823	2.01706	0.99599
54	IRGRTDV	2672.264	0.04001	0.57342	1221.046	0.43492	0.97934
55	IRGRTIV	2410.626	0.8127	1.00329	1128.514	0.81418	0.98849
56	IRGRTV	2098.867	0.36472	0.57196	1002.255	0.42844	0.99035
57	IRGRV	27195.46	0.8034	0.95282	11948.38	0.8034	0.9892
58	IRGV	16323.95	-0.2498	0.37161	7520.869	0.3319	0.98365
59	IRI	13028.98	0.0615	0.17885	9430.056	0.13783	0.95773
60	IRIG	3201.27	0.0045	0.14282	2309.613	0.11566	0.98833
61	IRIGV	4975.347	0.08003	0.43816	2014.757	0.28693	0.9956
62	IRII	6738.833	NA	NA	5320.046	NA	0.85539
63	IRIIV	4894.908	NA	NA	2595.164	NA	0.97466
64	IRINFCPI	0.16788	NA	NA	0.12061	NA	0.3164
65	IRINFWPI	0.11251	NA	NA	0.09119	NA	0.61662
66	IRINPUT	34742.01	-0.25791	0.2963	29340.96	0.25791	0.9289
67	IRINPUTV	44469.37	-0.14263	0.41	21273.76	0.37579	0.98735
68	IRIP	10640.12	0.09671	0.2422	7804.006	0.18077	0.92449
69	IRIPV	4854.493	-5.14086	7.49842	3881.044	5.17484	0.99642
70	IRIRNB	5.60898	0.03119	0.13164	3.68509	0.10064	0.90679
71	IRIT	3896.839	-0.39218	0.4402	3368.436	0.40946	0.5896
72	IRITV	3237.126	-0.26055	0.35027	1209.765	0.30534	0.98262
73	IRIV	7374.64	-2.85518	4.12152	4977.049	2.86826	0.9976
74	IRK	86403.43	-0.02315	0.10139	54533.4	0.08329	0.99365
75	IRKADC	0	NA	NA	0	NA	1
76	IRKV	194879.2	-2.64337	3.76539	110260.7	2.64337	0.99398
77	IRM	16464.62	0.14749	0.32848	11349.75	0.21961	0.9049
78	IRM2NFAD	13412.5	NA	NA	8054.802	NA	0.29453
79	IRM2NFAV	57727.51	NA	NA	20154.18	NA	-0.95278
80	IRM2NGGV	130711.3	NA	NA	59398.89	NA	-0.82004
81	IRM2NGSV	28671.51	NA	NA	13505.28	NA	0.97785
82	IRM2NGSVPGDPM	49863.85	NA	NA	43847.1	NA	0.96686
83	IRM2NGV	159148.9	NA	NA	72904.17	NA	-0.94188
84	IRM2NPV	21632.03	0.45401	0.56438	11054.43	0.4679	0.99543

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85	IRM2NPVPGDPM	31004.79	0.21413	0.40418	22773.36	0.31525	0.89977
86	IRM2N WV	208778.4	NA	NA	85817.01	NA	-0.9728
87	IRM2V	14226.72	0.30192	0.56861	4324.928	0.33981	0.99843
88	IRMFY	1034.685	0.0267	0.30549	689.8691	0.21298	0.97782
89	IRMFYSD	350.4567	0.09879	0.36364	247.8498	0.24725	0.96391
90	IRMFYV	3635.728	0.04959	2.47932	1163.66	1.30707	0.99515
91	IRMG	14525.97	0.16649	0.33654	9605.509	0.21316	0.89934
92	IRMGD	4087.638	0.14181	0.28973	2540.968	0.19328	0.93631
93	IRMGDCIFP	38.99901	0.14181	0.28973	25.78866	0.19328	0.91628
94	IRMGV	26730.06	0.03655	1.36186	11693.14	0.74072	0.99641
95	IRMNFS	4640.106	0.03552	1.6144	2805.257	0.99435	0.75342
96	IRMNFS D	1370.115	-0.40705	3.03991	840.5527	1.91576	0.78051
97	IRMNFSDCIFP	14.23424	-0.40705	3.0399	9.61862	1.91576	0.76516
98	IRMNFSV	5294.5	-1.03536	3.44006	2029.766	1.99159	0.99713
99	IRMSD	1431.401	0.1533	0.71562	921.4006	0.47555	0.88198
100	IRMV	31894.15	-0.05537	1.55393	13714.29	0.8001	0.99684
101	IRNFSBD	1547.349	NA	NA	889.3713	NA	0.68867
102	IRNFSBDC	18801.23	NA	NA	13782.02	NA	0.98411
103	IRNFY	1492.865	NA	NA	1021.565	NA	0.72436
104	IRNFYV	2154.24	NA	NA	745.0192	NA	0.98961
105	IRNIT	3277.358	NA	NA	2775.165	NA	0.42709
106	IRNITV	1662.874	NA	NA	728.9233	NA	0.75467
107	IRN NIF	404683.3	-0.38252	2.13268	84275.42	0.44177	0.18265
108	IRN NIFV	23451.69	0.65694	1.02032	10322.8	0.68778	0.99544
109	IRNNS	407715.7	NA	NA	82845.19	NA	0.12176
110	IRNNSV	16279.46	NA	NA	7960.398	NA	0.99363
111	IRNTRD	861.3139	NA	NA	477.3136	NA	0.46991
112	IRNTRDC	7071.269	NA	NA	3394.626	NA	-0.01785
113	IROLV	4829.907	NA	NA	720	NA	0.74317
114	IROLVC	4829.899	NA	NA	720.0022	NA	0.99353
115	IROUTPUT	31822.58	-0.07721	0.10251	23564.51	0.0796	0.98554
116	IROUTPUTV	51364.98	0.14062	0.4216	23227.46	0.28241	0.99411
117	IRPA	0.0848	0.21318	0.48769	0.04132	0.3303	0.99353
118	IRPBOT	2.46888	NA	NA	0.917	NA	-0.00052
119	IRPC	0.0931	0.61406	0.94534	0.05047	0.67635	0.99078
120	IRPCCA	0.16861	-3.76302	5.60713	0.11135	3.76302	0.99524
121	IRPDIS	18.32723	NA	NA	6.28453	NA	0.67354
122	IRPG	0.42384	-0.26477	0.40453	0.19995	0.36229	0.9751
123	IRPGDEM	0.08809	0.28016	0.53075	0.04126	0.34389	0.99607
124	IRPGDIM	0.09212	0.68567	2.15512	0.05053	0.78973	0.99221
125	IRPGDPF	0.08809	0.27991	0.53023	0.04126	0.34363	0.99607
126	IRPGDPM	0.08809	0.28016	0.53075	0.04126	0.34389	0.99607



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127	IRPGDPNF	0.065	0.30089	0.51869	0.03373	0.34753	0.99546
128	IRPGNIM	0.09145	0.66377	2.03821	0.05024	0.76904	0.99267
129	IRPGNPM	0.09061	0.28348	0.54176	0.04224	0.34946	0.99616
130	IRPGNS	0.21589	-3.60519	5.26774	0.14195	3.60519	0.99189
131	IRPI	0.16556	-3.12122	4.56054	0.11244	3.12122	0.99399
132	IRPIG	0.17397	0.09345	0.44141	0.08679	0.32425	0.99203
133	IRPII	0.72739	NA	NA	0.2517	NA	0.90844
134	IRPINPUT	0.16622	0.13728	0.39357	0.08188	0.30825	0.99089
135	IRPIP	0.17678	-5.52923	8.27544	0.13458	5.52923	0.98943
136	IRPIT	0.08809	0.28361	0.53793	0.04127	0.3475	0.99607
137	IRPK	0.21816	-2.88172	4.12625	0.14001	2.88172	0.99372
138	IRPM	0.21746	-0.12772	1.26533	0.08645	0.60236	0.98118
139	IRPMFY	0.49795	0.07917	2.26838	0.19652	1.25863	0.98202
140	IRPMG	0.20916	-0.1171	1.23491	0.08217	0.57862	0.97999
141	IRPMNFS	0.29916	0.13299	1.64424	0.12647	1.00922	0.98925
142	IRPNFY	1.17553	NA	NA	0.52865	NA	0.85611
143	IRPNIT	0.0881	0.28372	0.53854	0.04127	0.34769	0.99607
144	IRPNNIF	2.38363	16.56804	105.6588	0.40941	16.66316	0.19741
145	IRPNNS	0.33773	-1.78276	12.68593	0.21407	5.4886	0.90638
146	IRPOP	2049	0.022	0.05771	1771.752	0.04763	0.99438
147	IRPOPA	6273.32	-0.22502	0.34556	3819.717	0.23252	-0.38221
148	IRPOPAPOP	0.10038	-0.24828	0.34253	0.0708	0.24828	0.10666
149	IRPOUTPUT	0.1059	0.23623	0.46992	0.05063	0.32522	0.9949
150	IRPSP	3.15169	NA	NA	0.73764	NA	0.26363
151	IRPSUB	0.08809	0.27991	0.53023	0.04126	0.34363	0.99607
152	IRPVAOIL	0.40492	0.24735	0.69524	0.15945	0.49572	0.98301
153	IRPX	0.09592	-0.04535	0.07831	0.03905	0.06633	0.99548
154	IRPXFY	0.30435	0	1.93815	0.11232	1.02002	0.9849
155	IRPXNFS	0.43206	0.2239	1.62356	0.19795	0.82018	0.95435
156	IRPXNOILG	0.17889	-0.615	1.90181	0.08174	0.92998	0.97276
157	IRPXOIL	0.10345	-0.04368	0.06567	0.04205	0.04559	0.99891
158	IRPYD	0.0727	0.77106	1.16078	0.04685	0.81172	0.99343
159	IRSD	1597.354	NA	NA	988.982	NA	0.66718
160	IRSDC	17788.78	NA	NA	13393	NA	0.98754
161	IRSDV	8368.237	0.27855	0.54033	3089.992	0.3264	0.99949
162	IRSDVPGDPM	11143.67	0.01545	0.18342	8057.046	0.15166	0.94892
163	IRSP	6623.92	NA	NA	5460.883	NA	0.94001
164	IRSPV	13510.42	NA	NA	4979.931	NA	0.98612
165	IRSUB	2089.181	-0.35721	0.43212	1522.924	0.38216	0.8835
166	IRSUBV	2410.176	-0.14819	0.52633	1143.667	0.45303	0.97367
167	IRTBD	2356.688	NA	NA	1618.091	NA	0.88029
168	IRTBDC	11776.12	NA	NA	8626.174	NA	0.99016

No.	Actual	RMS Error	Mean percent error	RMS percent error	Mean absolute error	MA percent error	Corr (act,sim)
169	IRTOT	406995.9	NA	NA	83839.86	NA	-0.0902
170	IRUNEMP	6137.536	-1.9262	2.82526	3707.771	2.01599	-0.81632
171	IRUNEMPR	125.6202	-4.77155	10.54145	56.93246	4.85174	-0.39135
172	IRVAOIL	4420.935	0.08011	0.11841	3146.53	0.08576	0.98326
173	IRVAOILV	11028.44	0.30971	0.6862	4017.4	0.4643	0.98568
174	IRWIND	51.10002	0.44254	0.51119	21.31369	0.44577	0.98803
175	IRWINDPGDPM	43.83458	0.24626	0.50299	34.33807	0.40434	0.86947
176	IRWPI	18.02995	0.01658	0.31171	8.52485	0.24475	0.98066
177	IRWPID	13.06064	0.19022	0.42423	6.01427	0.30413	0.9867
178	IRWPIM	28.76774	-0.41315	0.54507	14.46871	0.41395	0.93338
179	IRWPIX	53.52781	-0.66052	0.68744	26.2605	0.66052	0.96336
180	IRX	11415.32	0.10421	0.21487	8136.641	0.16515	0.91295
181	IRXFY	1045.414	0.39668	0.89061	794.502	0.51683	0.98113
182	IRXFYSD	222.0659	0.57638	1.29711	174.6276	0.71669	0.97209
183	IRXFYV	1556.519	0.79315	2.9025	551.2073	1.83963	0.99133
184	IRXGD	3978.498	0.0896	0.21812	2704.756	0.18346	0.98149
185	IRXGNOD	1268.428	0.04556	0.99433	852.6662	0.80232	0.96245
186	IRXGNODOP	13.30817	0.04556	0.99433	10.39392	0.80232	0.92078
187	IRXNFS	929.9266	-2.98784	7.07735	724.7431	3.37591	0.9674
188	IRXNFSD	473.288	-2.61937	5.29719	341.6173	3.1721	0.94905
189	IRXNFSDOP	5.33675	-2.61937	5.29719	4.15922	3.1721	0.90132
190	IRXNFV	4081.141	-0.63491	10.79683	1247.603	4.87059	0.99682
191	IRXNOILG	6286.805	-0.11284	1.33904	4910.108	1.08299	0.90963
192	IRXNOILGV	7582.522	-0.17954	1.86766	3222.689	1.14376	0.99687
193	IRXOIL	5478.129	0.10866	0.16022	3880.017	0.11576	0.9745
194	IRXOILB	139.4776	0.11218	0.16841	98.78842	0.12085	0.97263
195	IRXOILD	2845.125	0.11218	0.16841	1906.233	0.12085	0.98561
196	IRXOILV	7676.305	0.05508	0.08718	2591.81	0.06033	0.99947
197	IRXSD	515.9743	0.27173	1.09556	403.9607	0.72887	0.95077
198	IRXV	18767.5	0.04694	0.15175	6930.232	0.11771	0.99961
199	IRYD	12022	0.03587	0.09863	9051.361	0.08168	0.99377
200	IRYDV	28236.57	0.81412	1.20226	10984.54	0.83581	0.9938

No.	Actual	Cov (act,sim)	Theil U- Stat.	Theil U- Bias	Theil U- Var	Theil U- Cov
1	IRAD	26311453029	0.45679	0.05409	0.38732	0.55859
2	IRADV	1.73366E+11	0.04227	0.05839	0.00113	0.94049
3	IRAS	26311453029	0.45679	0.05409	0.38732	0.55859
4	IRASV	1.73366E+11	0.04227	0.05839	0.00113	0.94049
5	IRBOPD	4279596.684	0.44319	0.08386	0.06879	0.84735
6	IRBOPDC	193686.6852	0.78367	0.29671	0.1417	0.56158
7	IRBOPEOD	1896840.793	0.16655	0.01965	0	0.98035
8	IRBOPEODC	22371778.17	0.08807	0.2891	0.27826	0.43264
9	IRBOT	729582871.7	0.171	0.07408	0.00108	0.92484
10	IRBOTV	-7718710.77	0.78166	0.1614	0.04785	0.79075
11	IRC	2780215860	0.05298	0.18187	0.37184	0.44629
12	IRCAD	17304888.33	0.29015	0.04912	0.00029	0.95059
13	IRCADC	203178555.6	0.29709	0.26494	0.02359	0.71147
14	IRCCA	294109089.3	0.03136	0.01337	0.27851	0.70812
15	IRCCAV	896957370.2	0.08995	0.33841	0.4583	0.20328
16	IRCPI	3515.33902	0.04958	0.06716	0.07766	0.85518
17	IRCUV	112191457.9	0.10927	0.07463	0.51555	0.40982
18	IRCUVPGDPM	98972486.42	0.10341	0.00509	0.07811	0.91679
19	IRCV	14215139139	0.06063	0.03482	0.37164	0.59353
20	IRDDV	1679572779	0.05416	0.00229	0.2659	0.73182
21	IRDDVPGDPM	346078748.6	0.05425	0.10475	0.15529	0.73996
22	IRDIS	107752323.6	0.34213	0.13083	0	0.86917
23	IRDISV	1221276427	0.37802	0.19608	0.76566	0.03826
24	IREENOIL	5481538.098	0.11415	0.07613	0.59242	0.33145
25	IREM	8828995.555	0.11833	0.06283	0.53434	0.40283
26	IREMP	11290273.05	0.01856	0.05603	0.11509	0.82888
27	IRFYSBD	481890.6269	0.1819	0.00578	0.01634	0.97788
28	IRFYSBDC	68130227.25	0.05135	0.68643	0.09504	0.21852
29	IRG	286636982.3	0.03869	0.44133	0.22088	0.3378
30	IRGBDV	-61711156	0.92621	0.1816	0.29828	0.52011
31	IRGBDVC	-1707181706	0.99474	0.21079	0.36213	0.42708
32	IRGDEM	8462676673	0.037	0.09957	0.43889	0.46153
33	IRGDEMV	62952788147	0.04044	0.00107	0.11915	0.87978
34	IRGDIM	9113701885	0.61682	0.0335	0.57378	0.39272
35	IRGDIMV	62952788147	0.04044	0.00107	0.11915	0.87978
36	IRGDPF	8543569176	0.03585	0.19666	0.41851	0.38484
37	IRGDPFV	62002155826	0.04327	0.00082	0.12972	0.86946
38	IRGDPM	8462676673	0.037	0.09957	0.43889	0.46153
39	IRGDPMV	62952788147	0.04044	0.00107	0.11915	0.87978
40	IRGDPNF	7746100878	0.0341	0.10983	0.42968	0.4605
41	IRGDPNFV	41101581947	0.05729	0.01399	0.37951	0.60651

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42	IRGEFIDC	13360222.13	0	0	0	1
43	IRGESV	77584293.69	0.06577	0.32415	0.28647	0.38937
44	IRGEV	4969916229	0.00823	0.32415	0.33636	0.33948
45	IRGNIM	8937591246	0.61746	0.03336	0.57175	0.39489
46	IRGNIMV	60927305662	0.03945	0.0041	0.07206	0.92383
47	IRGNPM	8374056738	0.03733	0.10417	0.39381	0.50202
48	IRGNPMV	60927305662	0.03945	0.0041	0.07206	0.92383
49	IRGNS	2274365400	0.82853	0.03379	0.77049	0.19571
50	IRGNSV	7519641217	0.11142	0.25383	0.64095	0.10522
51	IRGRMV	452939178.9	0.45291	0.19094	0.39522	0.41384
52	IRGROILV	678007559.1	0.06022	0.02875	0.76549	0.20576
53	IRGRSV	77584293.69	0.06577	0.32415	0.28647	0.38937
54	IRGRTDV	42723892.85	0.18028	0.20599	0.54157	0.25245
55	IRGRTIV	69529061.75	0.12949	0.21261	0.50866	0.27872
56	IRGRTV	223799972.3	0.06303	0.00233	0.00802	0.98965
57	IRGRV	5591688925	0.16306	0.19303	0.64185	0.16512
58	IRGV	581418595.7	0.29025	0.21196	0.7155	0.07254
59	IRI	1231787674	0.08717	0.18368	0.17576	0.64056
60	IRIG	196339259.4	0.06007	0.17025	0.37745	0.4523
61	IRIGV	540746819.8	0.09552	0.08052	0.72659	0.19289
62	IRII	125661595.9	0.20478	0.03399	0.0304	0.93561
63	IRIIV	456604167.7	0.10534	0.00059	0.00842	0.99099
64	IRINFCPI	0.00552	0.41714	0.00297	0.15061	0.84643
65	IRINFWPI	0.01013	0.29372	0.00003	0.00449	0.99547
66	IRINPUT	1549140877	0.17765	0.71324	0.09029	0.19647
67	IRINPUTV	8938720371	0.20743	0.22697	0.65719	0.11584
68	IRIP	509265389.4	0.1087	0.16052	0.1047	0.73477
69	IRIPV	2014596457	0.04963	0.3658	0.01945	0.61475
70	IRIRNB	142.39944	0.07762	0.0254	0.04406	0.93054
71	IRIT	1879058.944	0.3164	0.70298	0.12475	0.17227
72	IRITV	26187924.97	0.27359	0.13617	0.77544	0.08839
73	IRIV	4634239538	0.04933	0.34759	0.24263	0.40978
74	IRK	2.63055E+11	0.04989	0.07946	0.47037	0.45017
75	IRKADC	101194446.9	0	0	0	1
76	IRKV	7.33022E+11	0.10208	0.32012	0.44612	0.23376
77	IRM	968646790.5	0.12806	0.22181	0.02714	0.75104
78	IRM2NFAD	14941027.43	0.72635	0.28288	0.31925	0.39787
79	IRM2NFAV	-509509134	0.99241	0.12109	0.25219	0.62672
80	IRM2NGGV	-3013163402	0.96043	0.2065	0.01065	0.78284
81	IRM2NGSV	1789084666	0.28115	0.22187	0.67951	0.09861
82	IRM2NGSVPGDPM	1157837218	0.34621	0.77323	0.19484	0.03193

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83	IRM2NGV	-3626345583	0.9909	0.20984	0.19979	0.59036
84	IRM2NPV	9784593074	0.09876	0.25984	0.54822	0.19194
85	IRM2NPVPGDPM	1602274474	0.1839	0.32588	0.30276	0.37136
86	IRM2NWB	-3925663756	0.99727	0.16896	0.46576	0.36528
87	IRM2V	14407154753	0.05331	0.0733	0.70281	0.22389
88	IRMFY	22931388.21	0.07841	0.00386	0.02424	0.9719
89	IRMFYSD	1570971.956	0.08654	0.00486	0.03734	0.9578
90	IRMFYV	88438824.32	0.1816	0.07019	0.86461	0.0652
91	IRMG	739553274.9	0.12651	0.20528	0.0101	0.78462
92	IRMGD	69652009.84	0.13768	0.22355	0.20932	0.56713
93	IRMGDCIFP	5932.26886	0.12377	0.20528	0.08193	0.71279
94	IRMGV	3316955573	0.20806	0.16227	0.80423	0.0335
95	IRMNFS	22455623.21	0.29318	0.0639	0.25343	0.68267
96	IRMNFSD	1977234.506	0.30309	0.19403	0.21358	0.59239
97	IRMNFSDCIFP	213.24141	0.30179	0.10743	0.24654	0.64603
98	IRMNFSV	113714618.6	0.22637	0.1099	0.86672	0.02338
99	IRMSD	5969206.444	0.1752	0.16367	0.0566	0.77972
100	IRMV	4645189118	0.21037	0.15416	0.81689	0.02895
101	IRNFSBD	1218547.966	0.41482	0.21527	0.32458	0.46015
102	IRNFSBDC	359484987	0.33735	0.43998	0.52717	0.03285
103	IRNFY	2876146.359	0.37146	0.0108	0.00702	0.98218
104	IRNFYV	23955354.02	0.20779	0.0903	0.80128	0.10842
105	IRNIT	1052823.278	0.41014	0.28973	0.4473	0.26297
106	IRNITV	3134611.869	0.36599	0.00102	0.26194	0.73704
107	IRNINF	6566468895	0.66323	0.03211	0.60903	0.35886
108	IRNINFV	46266484428	0.04918	0.00853	0.22009	0.77138
109	IRNNS	1928377781	0.87491	0.03407	0.79859	0.16734
110	IRNNSV	3247311491	0.13038	0.19694	0.64587	0.15719
111	IRNTRD	227868.1083	0.57575	0.30701	0	0.69299
112	IRNTRDC	-223509.863	0.76967	0.23035	0.25977	0.50988
113	IROLV	27330973.59	0.35526	0.02222	0.16799	0.80979
114	IROLVC	1409757705	0.05627	0.02222	0.19011	0.78767
115	IROUTPUT	17324853862	0.0506	0.49696	0.00109	0.50195
116	IROUTPUTV	1.19036E+11	0.06706	0.18125	0.2837	0.53505
117	IRPA	0.44829	0.05583	0.07116	0.11708	0.81176
118	IRPBOT	-0.00153	0.71326	0.00164	0.03185	0.96651
119	IRPC	0.36413	0.06664	0.03251	0.18522	0.78227
120	IRPCCA	0.32174	0.13236	0.43613	0.45554	0.10833
121	IRPDIS	45.12374	0.75498	0.10227	0.7675	0.13023
122	IRPG	0.29581	0.32687	0.22052	0.69538	0.08411
123	IRPGDEM	0.44976	0.05781	0.13785	0.40479	0.45737

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124	IRPGDIM	0.43517	0.06105	0.01391	0.18071	0.80538
125	IRPGDPF	0.44976	0.05781	0.13785	0.40478	0.45736
126	IRPGDPM	0.44976	0.05781	0.13785	0.40479	0.45737
127	IRPGDPNF	0.39424	0.04514	0.05035	0.09908	0.85057
128	IRPGNIM	0.42718	0.06114	0.02079	0.22472	0.75449
129	IRPGNPM	0.44118	0.05999	0.14378	0.44195	0.41427
130	IRPGNS	0.38075	0.15682	0.43229	0.43414	0.13357
131	IRPI	0.30392	0.13322	0.46122	0.40462	0.13416
132	IRPIG	0.31736	0.13327	0.12217	0.70934	0.16849
133	IRPII	2.51801	0.20785	0.00836	0.03237	0.95927
134	IRPINPUT	0.33498	0.12489	0.20857	0.56859	0.22285
135	IRPIP	0.29993	0.14453	0.5796	0.21542	0.20497
136	IRPIT	0.44977	0.05782	0.13776	0.40485	0.45739
137	IRPK	0.31417	0.17154	0.41191	0.5047	0.08339
138	IRPM	0.76084	0.11135	0.03859	0.34437	0.61704
139	IRPMFY	1.27505	0.1983	0.09957	0.71212	0.18831
140	IRPMG	0.7467	0.10808	0.02673	0.27626	0.69701
141	IRPMNFS	0.84987	0.14461	0.13083	0.66275	0.20642
142	IRPNFY	2.74314	0.30934	0.09279	0.23993	0.66728
143	IRPNIT	0.44977	0.05782	0.1378	0.40485	0.45736
144	IRPNNIF	0.32439	0.72634	0.02215	0.51359	0.46426
145	IRPNNS	0.40524	0.22693	0.1321	0.13398	0.73392
146	IRPOP	196112399.8	0.0228	0.03027	0.44207	0.52766
147	IRPOPA	-2632753.81	0.2976	0.36054	0.1556	0.48386
148	IRPOPAPOP	0.00013	0.19687	0.49746	0.29236	0.21018
149	IRPOUTPUT	0.41461	0.07219	0.16398	0.45725	0.37877
150	IRPSP	0.57536	0.78292	0.00307	0.67334	0.32359
151	IRPSUB	0.44976	0.05781	0.13785	0.40477	0.45738
152	IRPVAOIL	1.08814	0.17597	0.14663	0.62398	0.22939
153	IRPX	0.9184	0.04541	0.06917	0.02461	0.90623
154	IRPXFY	0.77484	0.15363	0.07935	0.66408	0.25657
155	IRPXNFS	0.72922	0.21591	0.1201	0.50619	0.37371
156	IRPXNOILG	0.55185	0.1052	0.03423	0.00005	0.96573
157	IRPXOIL	1.21301	0.04316	0.16516	0.58787	0.24697
158	IRPYD	0.39638	0.04992	0.00492	0.00304	0.99204
159	IRSD	1808318.466	0.3187	0.18708	0.10583	0.70709
160	IRSDC	747913658.5	0.21873	0.40774	0.53263	0.05963
161	IRSDV	4709862029	0.05513	0.11815	0.81285	0.06899
162	IRSDVPGDPM	900734967.1	0.09458	0.02973	0.18939	0.78088
163	IRSP	336835671.6	0.1057	0.01916	0.00091	0.97994
164	IRSPV	1850172875	0.14002	0.09242	0.62226	0.28532

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165	IRSUB	2231129.695	0.35576	0.51769	0.3475	0.13481
166	IRSUBV	10965082.26	0.3126	0.22428	0.67362	0.1021
167	IRTBD	19054106.21	0.21925	0.05806	0.00882	0.93312
168	IRTBDC	1270063220	0.10311	0.39403	0.42401	0.18196
169	IRTOT	-998743616	0.94404	0.038	0.81625	0.14574
170	IRUNEMP	-2628158.39	0.96324	0.35718	0.33234	0.31047
171	IRUNEMPR	-147.00791	0.96355	0.20179	0.73197	0.06624
172	IRVAOIL	328082732	0.04797	0.42796	0.00037	0.57167
173	IRVAOILV	2263880719	0.10646	0.11516	0.34401	0.54083
174	IRWIND	5467.76034	0.28818	0.17396	0.77529	0.05075
175	IRWINDPGDPM	1759.58259	0.20648	0.38478	0.34026	0.27496
176	IRWPI	2625.53689	0.15115	0.21095	0.47043	0.31862
177	IRWPID	3062.81945	0.10202	0.15543	0.36042	0.48415
178	IRWPIM	1484.6395	0.30621	0.25293	0.491	0.25607
179	IRWPIX	2370.45173	0.43674	0.24068	0.69639	0.06293
180	IRX	493111605.6	0.10487	0.19964	0.0787	0.72166
181	IRXFY	25092322.77	0.07918	0.00755	0.10941	0.88303
182	IRXFYSD	746259.0163	0.0868	0.00014	0.13079	0.86907
183	IRXFYV	20948251.83	0.15828	0.04118	0.80749	0.15132
184	IRXGD	110158306.6	0.10943	0.39502	0.34246	0.26252
185	IRXGNOD	4393431.271	0.22487	0.23465	0.55227	0.21308
186	IRXGNODOP	332.69244	0.24298	0.08446	0.5923	0.32324
187	IRXNFS	5798014.616	0.1684	0.10236	0.4458	0.45185
188	IRXNFSD	796786.6984	0.23643	0.05842	0.55968	0.3819
189	IRXNFSDOP	69.26034	0.26916	0.10236	0.36514	0.5325
190	IRXNFV	60083479.55	0.2429	0.07828	0.89867	0.02305
191	IRXNOILG	63363358.88	0.26914	0.08446	0.59701	0.31852
192	IRXNOILGV	252326880.5	0.20973	0.17635	0.79608	0.02758
193	IRXOIL	329541137.6	0.0619	0.42491	0.00034	0.57475
194	IRXOILB	198717.9283	0.06604	0.42491	0.0002	0.57489
195	IRXOILD	82341857.54	0.08967	0.43946	0.26345	0.29709
196	IRXOILV	2329546302	0.07318	0.11392	0.84395	0.04213
197	IRXSD	2231848.123	0.12927	0.04696	0.08489	0.86816
198	IRXV	5086731300	0.12012	0.13584	0.85289	0.01128
199	IRYD	4709861669	0.04337	0.2364	0.35473	0.40887
200	IRYDV	26298946125	0.07793	0.06361	0.52473	0.41166

## Evaluation of model forecasting power

The next tables are summaries of the above statistics for different simulations within the sample period. Let's suppose we want to predict for next N years within the sample. We separate N years periods from the ending year of sample period, and then make dynamic simulation. We do select another N years period and repeat the operations until covering whole sample. When, N=1 the two dynamic and static simulators are coincided. In dynamic simulation the previous years simulated values are used as initiation for current years simulation, but in static simulation the previous years actual values are used as initial values.

In this section, we try to evaluate the prediction power of the model for the next 1, 2, 3, 5, 10 and 42 years which are the different N numbers. The following tables are summaries of calculated statistics for each of the above situations. We concluded that the model has the prediction power for different years ahead and we have more accuracy for the shorter forecast periods. The prediction accuracy is different for different variables.

Statistical evaluation for dynamic simulations for periods of 1 year in 1959-2003								
Eq. No.	Variable	RMS percent error	MA percent error	Corr (act,sim)	Theil U-Stat.	Theil U-Bias	Theil U-Var	Theil U-Cov
1	195IRXOILD	5.2%	3.5%	99.7%	2.3%	1.0%	0.8%	98.3%
2	93IRMGDCIFP	18.7%	14.0%	95.2%	7.6%	0.5%	0.8%	98.7%
3	186IRXGNODOP	39.2%	26.6%	96.0%	9.0%	0.6%	0.6%	98.9%
4	87IRM2V	13.0%	9.4%	99.9%	1.5%	3.5%	8.2%	88.3%
5	38IRGDPM	3.6%	3.0%	99.6%	1.7%	0.4%	0.2%	99.4%
6	40IRGDPNF	5.2%	4.1%	99.7%	1.8%	1.2%	0.2%	98.6%
7	68IRIP	16.8%	13.3%	95.3%	7.1%	0.2%	6.9%	93.0%
8	11IRC	5.8%	4.1%	99.5%	2.3%	1.2%	0.2%	98.6%
9	25IREM	44.8%	23.3%	99.6%	4.1%	4.1%	5.7%	90.3%
10	16IRCPI	10.1%	7.8%	99.9%	2.2%	5.4%	1.6%	93.1%
11	170IRUNEMP	17.0%	11.2%	98.1%	5.0%	0.2%	0.0%	99.8%
12	26IREMP	1.0%	0.8%	99.9%	0.6%	0.2%	0.4%	99.4%
13	70IRIRNB	11.4%	8.4%	91.6%	6.8%	1.0%	2.2%	96.7%



Statistical evaluation for dynamic simulations for periods of 2 years in 1959-2003								
Eq. No.	Variable	RMS percent error	MA percent error	Corr (act,sim)	Theil U-Stat.	Theil U-Bias	Theil U-Var	Theil U-Cov
1	195 IRXOILD	5.8%	4.1%	99.5%	2.7%	2.5%	1.6%	95.8%
2	93 IRMGDCIFP	20.0%	15.0%	94.6%	8.1%	1.3%	0.5%	98.2%
3	186 IRXGNODOP	54.0%	36.5%	94.0%	11.1%	1.5%	0.1%	98.4%
4	87 IRM2V	19.1%	12.9%	99.9%	2.0%	3.7%	10.2%	86.1%
5	38 IRGDPM	4.2%	3.5%	99.4%	2.1%	1.1%	0.1%	98.9%
6	40 IRGDPNF	5.9%	4.7%	99.6%	2.1%	3.0%	0.1%	96.8%
7	68 IRIP	19.3%	14.7%	94.1%	7.8%	0.7%	5.8%	93.6%
8	11 IRC	6.7%	5.1%	99.3%	2.8%	3.7%	0.2%	96.1%
9	25 IREM	63.6%	31.3%	99.6%	4.4%	5.3%	14.0%	80.7%
10	16 IRCPI	15.8%	11.7%	99.8%	2.8%	9.2%	12.0%	78.8%
11	170 IRUNEMP	22.4%	15.3%	95.9%	7.4%	0.0%	0.0%	100.0%
12	26 IREMP	1.5%	1.1%	99.8%	0.9%	0.1%	0.4%	99.5%
13	70 IRIRNB	11.8%	9.0%	90.7%	7.1%	1.0%	2.3%	96.8%

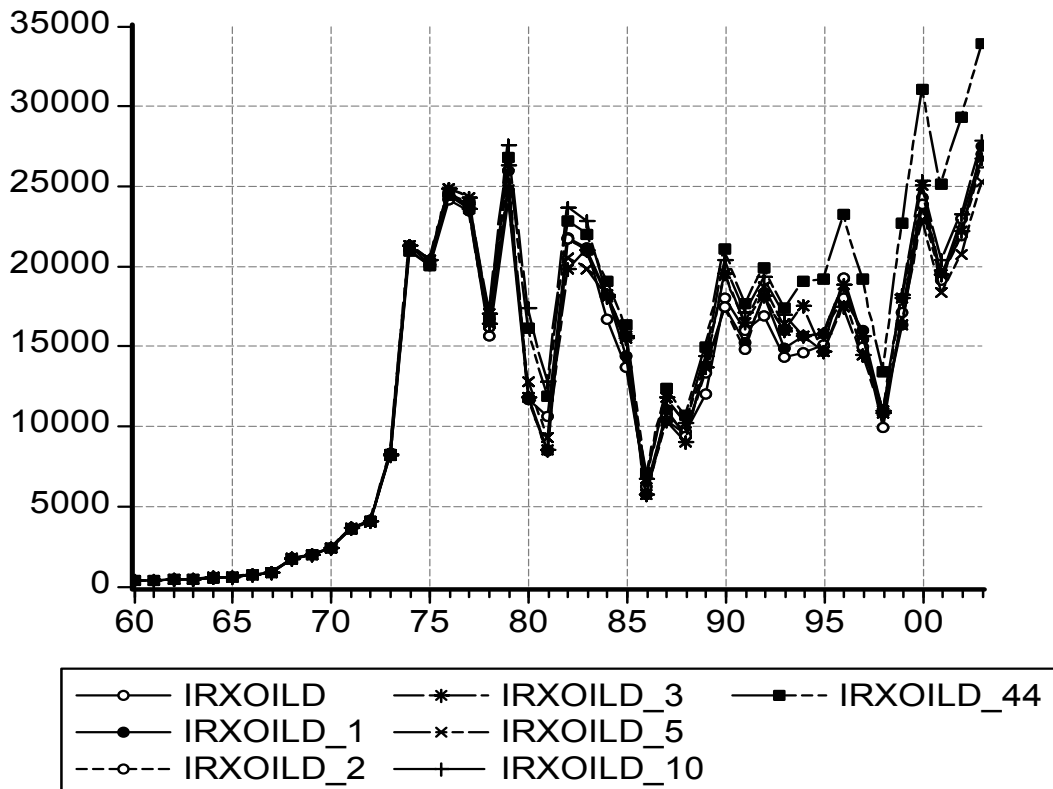
Statistical evaluation for dynamic simulations for periods of 3 years in 1959-2003								
Eq. No.	Variable	RMS percent error	MA percent error	Corr (act,sim)	Theil U-Stat.	Theil U-Bias	Theil U-Var	Theil U-Cov
1	195 IRXOILD	7.1%	5.1%	99.3%	3.4%	5.1%	3.4%	91.5%
2	93 IRMGDCIFP	21.8%	15.3%	93.6%	8.5%	4.0%	0.0%	96.0%
3	186 IRXGNODOP	76.1%	47.2%	91.8%	13.4%	6.7%	2.8%	90.6%
4	87 IRM2V	24.1%	15.8%	99.9%	2.2%	6.2%	42.4%	51.4%
5	38 IRGDPM	4.6%	3.7%	99.2%	2.3%	3.3%	0.7%	96.0%
6	40 IRGDPNF	6.1%	4.9%	99.5%	2.3%	8.0%	0.1%	91.9%
7	68 IRIP	20.9%	15.2%	93.0%	8.1%	2.3%	3.6%	94.1%
8	11 IRC	7.2%	5.8%	99.1%	3.1%	5.3%	1.0%	93.7%
9	25 IREM	84.0%	41.7%	99.5%	6.0%	13.2%	34.5%	52.3%
10	16 IRCPI	20.3%	14.0%	99.8%	3.0%	9.9%	2.5%	87.6%
11	170 IRUNEMP	28.4%	18.8%	92.9%	9.3%	0.4%	0.1%	99.5%
12	26 IREMP	1.8%	1.4%	99.7%	1.0%	0.5%	0.4%	99.1%
13	70 IRIRNB	11.2%	8.9%	92.9%	6.1%	0.0%	0.0%	100.0%

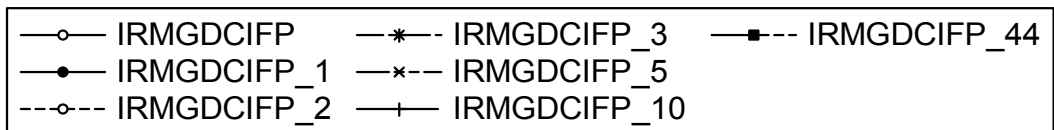
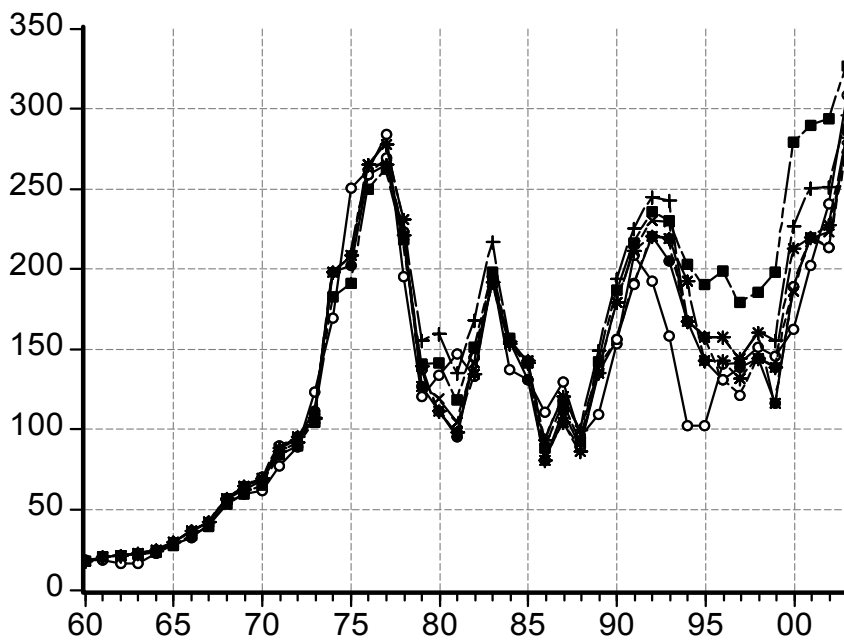
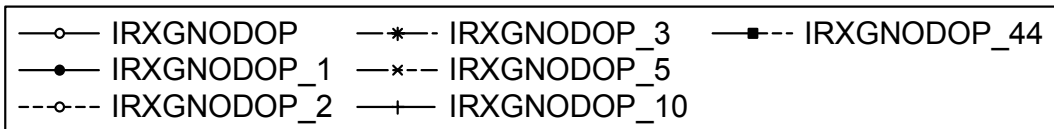
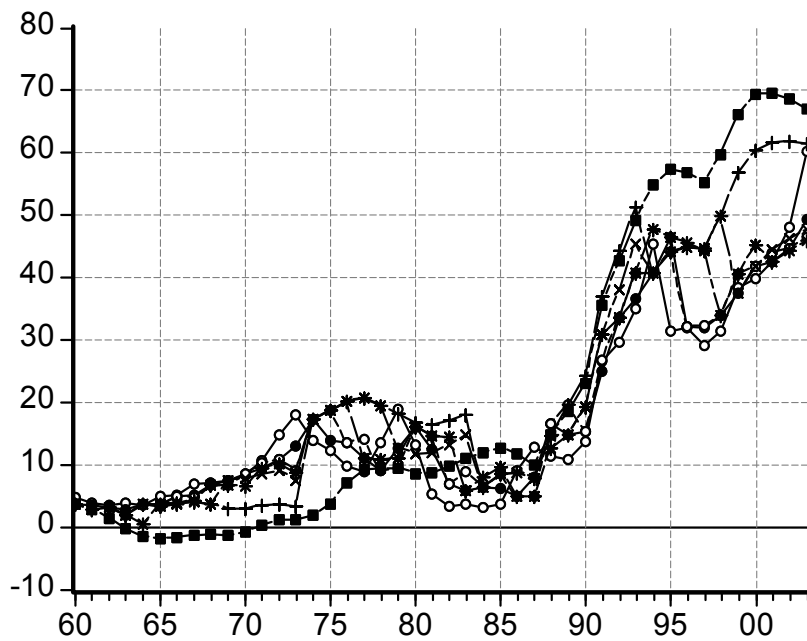
Statistical evaluation for dynamic simulations for periods of 5 years in 1959-2003								
Eq. No.	Variable	RMS percent error	MA percent error	Corr (act,sim)	Theil U-Stat.	Theil U-Bias	Theil U-Var	Theil U-Cov
1	195IRXOILD	6.9%	5.6%	99.1%	3.4%	5.1%	0.6%	94.2%
2	93IRMGDCIFP	19.1%	13.7%	93.6%	8.0%	7.3%	0.0%	92.7%
3	186IRXGNODOP	83.7%	52.3%	89.9%	14.9%	14.1%	2.2%	83.7%
4	87IRM2V	30.7%	18.7%	100.0%	1.8%	12.4%	45.8%	41.9%
5	38IRGDPM	3.7%	3.0%	99.5%	1.8%	18.5%	1.0%	80.5%
6	40IRGDPNF	5.8%	4.4%	99.7%	1.9%	28.2%	1.3%	70.5%
7	68IRIP	19.6%	14.6%	93.0%	7.7%	4.7%	5.4%	89.9%
8	11IRC	7.2%	5.8%	99.2%	3.1%	19.1%	5.4%	75.5%
9	25IREM	136.5%	63.8%	99.5%	4.6%	13.5%	5.5%	81.0%
10	16IRCPI	20.0%	14.6%	99.7%	3.7%	5.3%	0.1%	94.5%
11	170IRUNEMP	32.4%	22.7%	92.9%	9.3%	0.6%	15.8%	83.6%
12	26IREMP	2.0%	1.6%	99.7%	1.2%	0.1%	12.2%	87.7%
13	70IRIRNB	11.3%	9.1%	92.4%	6.2%	0.0%	0.0%	100.0%

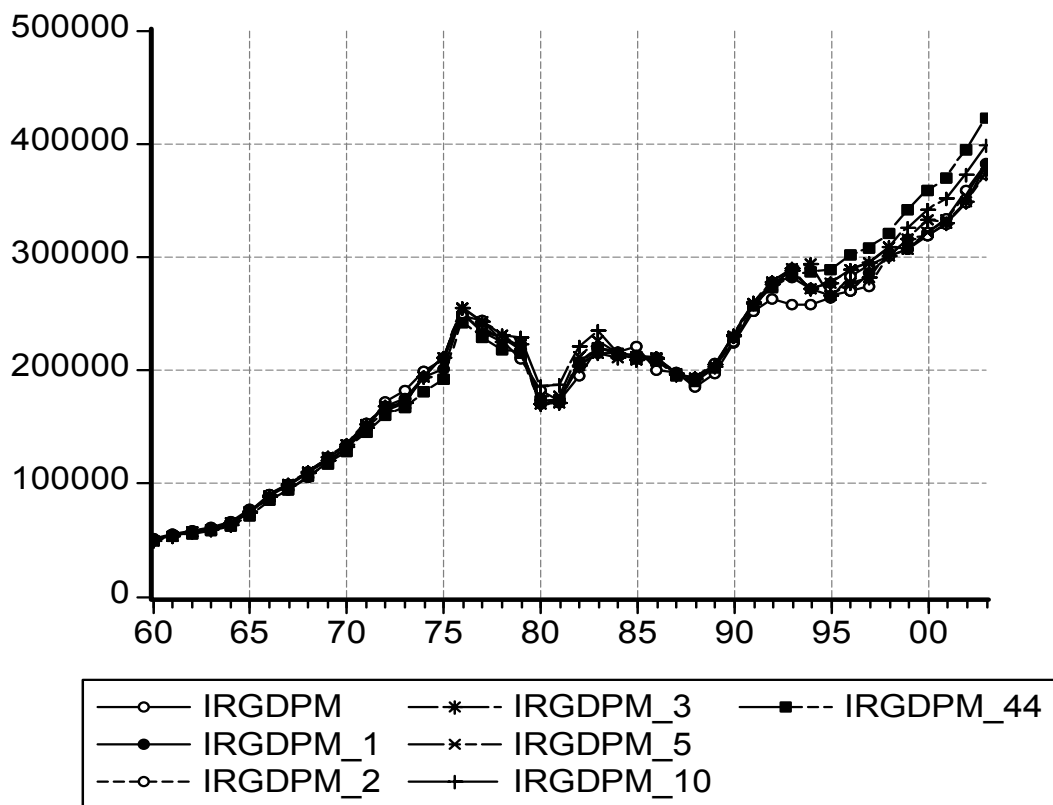
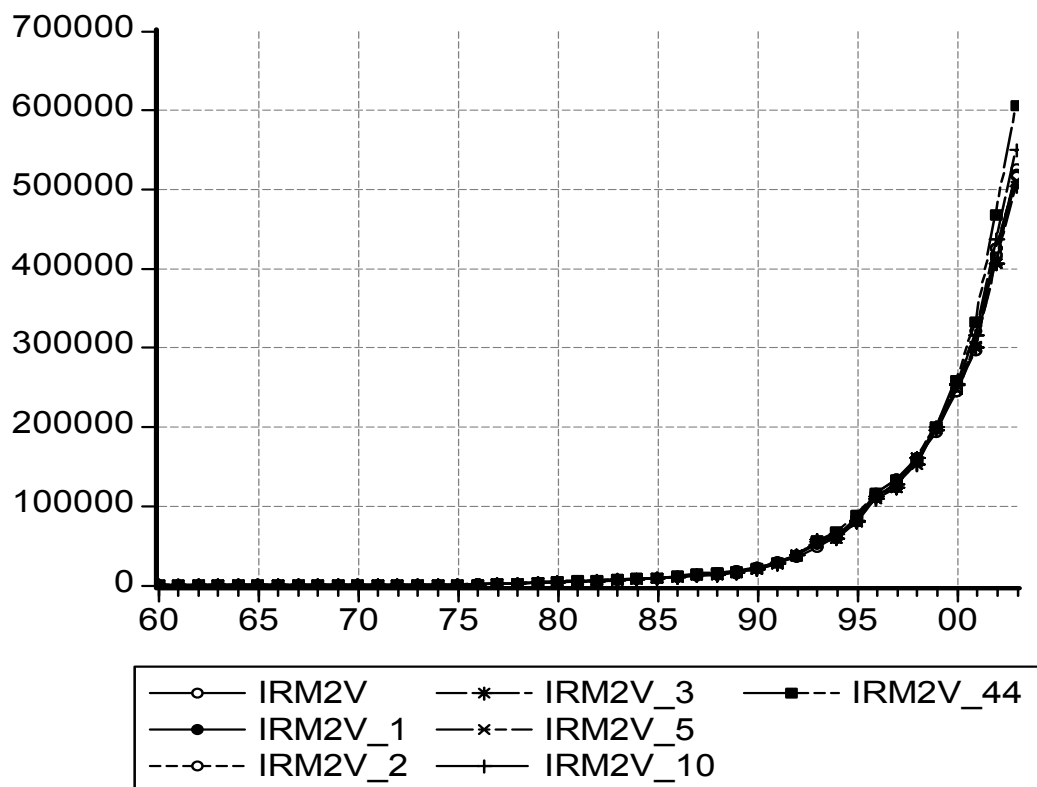
Statistical evaluation for dynamic simulations for periods of 10 years in 1959-2003								
Eq. No.	Variable	RMS percent error	MA percent error	Corr (act,sim)	Theil U-Stat.	Theil U-Bias	Theil U-Var	Theil U-Cov
1	195IRXOILD	11.5%	7.4%	99.1%	4.9%	43.6%	8.9%	47.6%
2	93IRMGDCIFP	21.9%	16.0%	93.7%	9.2%	28.9%	2.2%	69.0%
3	186IRXGNODOP	110.6%	71.8%	91.1%	19.1%	28.0%	24.9%	47.0%
4	87IRM2V	42.6%	27.1%	99.9%	2.0%	1.5%	41.9%	56.6%
5	38IRGDPM	5.0%	4.1%	99.5%	2.5%	37.7%	17.8%	44.5%
6	40IRGDPNF	6.8%	5.6%	99.6%	2.8%	43.6%	15.4%	40.9%
7	68IRIP	22.0%	17.0%	93.2%	8.4%	24.4%	0.1%	75.5%
8	11IRC	9.0%	8.2%	99.3%	4.3%	42.1%	23.4%	34.5%
9	25IREM	140.5%	72.5%	99.3%	5.8%	2.0%	27.8%	70.1%
10	16IRCPI	27.7%	19.9%	99.6%	4.7%	18.3%	23.6%	58.1%
11	170IRUNEMP	38.7%	29.9%	80.7%	15.7%	8.7%	10.6%	80.6%
12	26IREMP	2.5%	2.0%	99.5%	1.4%	0.1%	5.1%	94.7%
13	70IRIRNB	11.8%	9.6%	91.9%	6.4%	0.2%	0.5%	99.3%

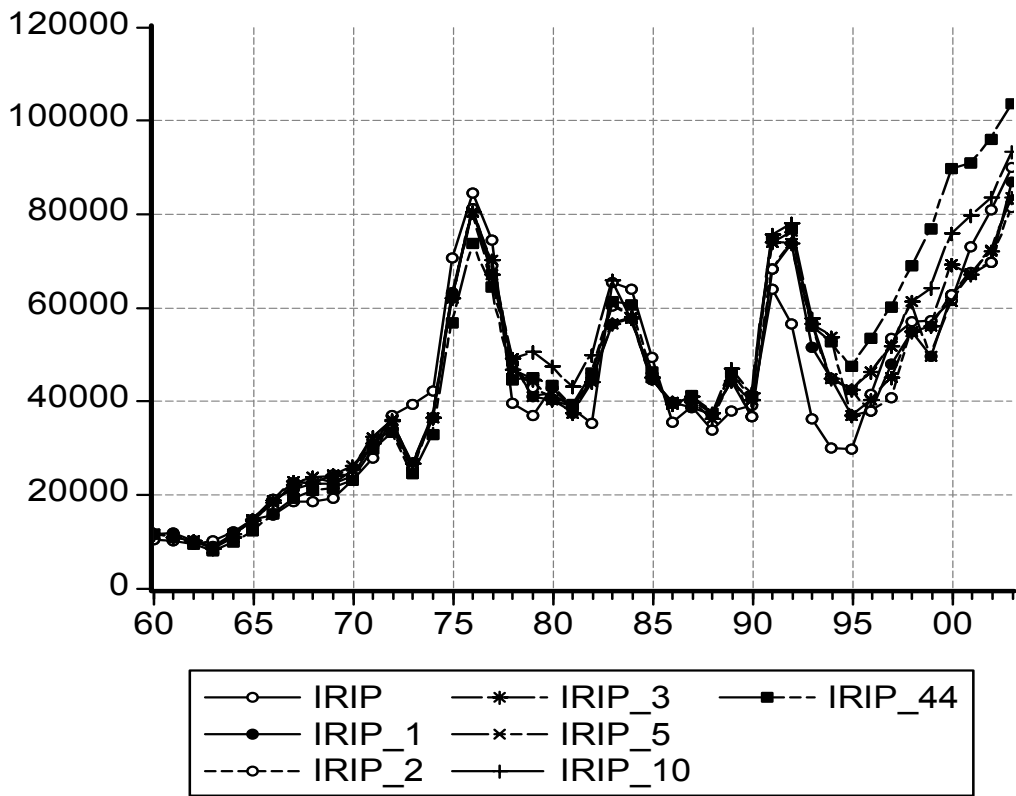
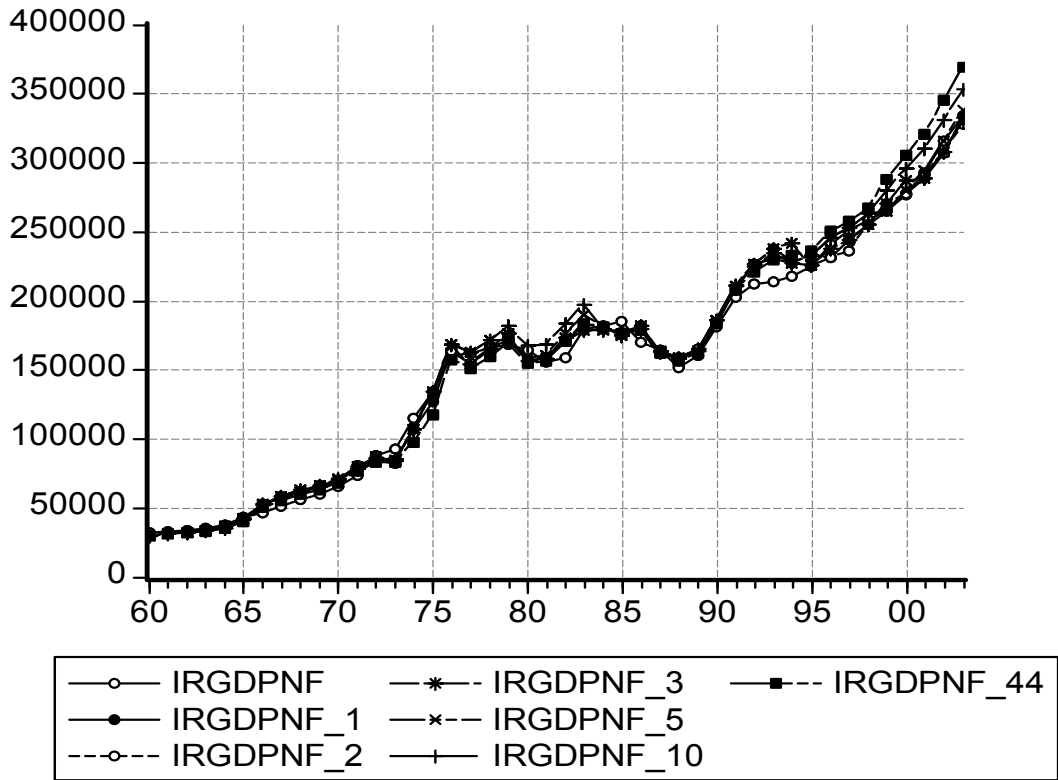
Statistical evaluation for dynamic simulation for period of 44 years in 1959-2003								
Eq. No.	Variable	RMS percent error	MA percent error	Corr (act,sim)	Theil U-Stat	Theil U-Bias	Theil U-Var	Theil U-Cov
1	195IRXOILD	17.0%	12.4%	98.5%	9.0%	44.9%	25.4%	29.7%
2	93IRMGDCIFP	29.3%	19.8%	91.2%	12.4%	21.0%	7.7%	71.3%
3	186IRXGNODOP	100.6%	82.1%	92.0%	24.3%	8.6%	59.2%	32.1%
4	87IRM2V	57.5%	34.8%	99.8%	5.3%	7.5%	70.2%	22.3%
5	38IRGDPM	6.2%	5.2%	99.3%	3.7%	10.2%	45.2%	44.7%
6	40IRGDPNF	6.5%	5.6%	99.6%	3.4%	11.2%	43.6%	45.2%
7	68IRIP	24.5%	18.5%	92.1%	10.9%	16.4%	10.1%	73.5%
8	11IRC	9.4%	7.8%	98.9%	5.3%	18.6%	37.1%	44.3%
9	25IREM	140.8%	62.0%	98.4%	11.8%	6.4%	53.4%	40.2%
10	16IRCPI	38.1%	26.0%	99.4%	5.0%	6.9%	7.6%	85.5%
11	170IRUNEMP	285.7%	206.2%	-81.7%	96.3%	36.5%	33.1%	30.3%
12	26IREMP	3.1%	2.4%	99.3%	1.9%	5.7%	11.5%	82.8%
13	70IRIRNB	13.3%	10.3%	90.4%	7.8%	2.6%	4.4%	93.0%

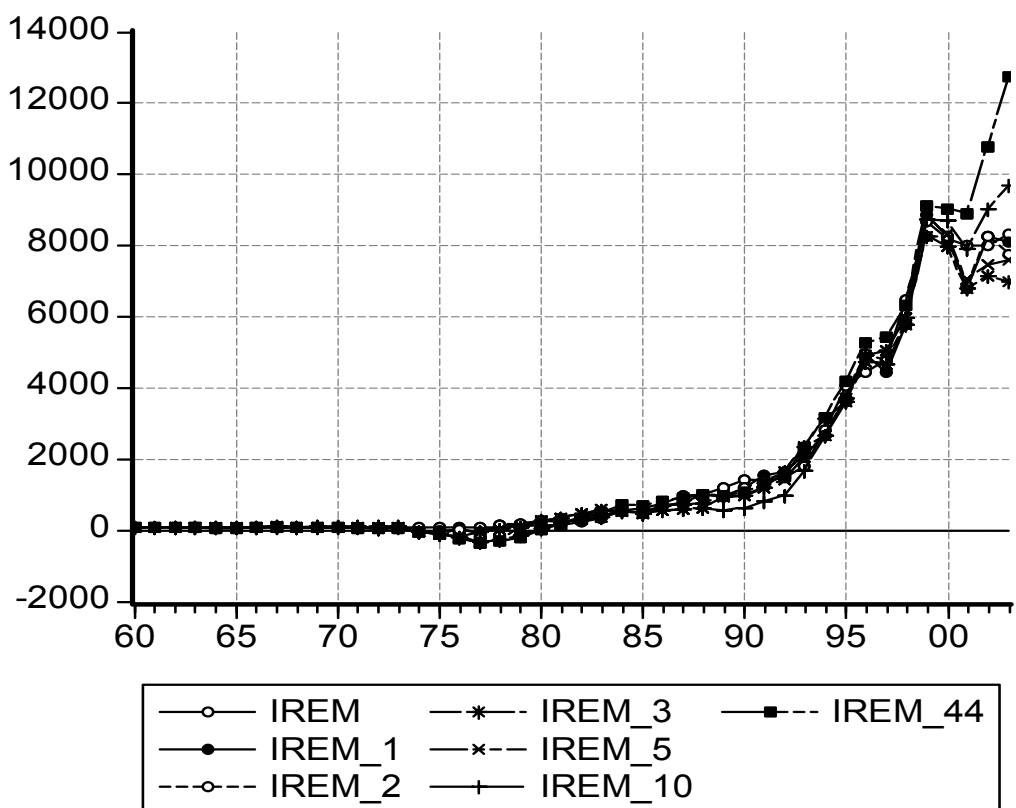
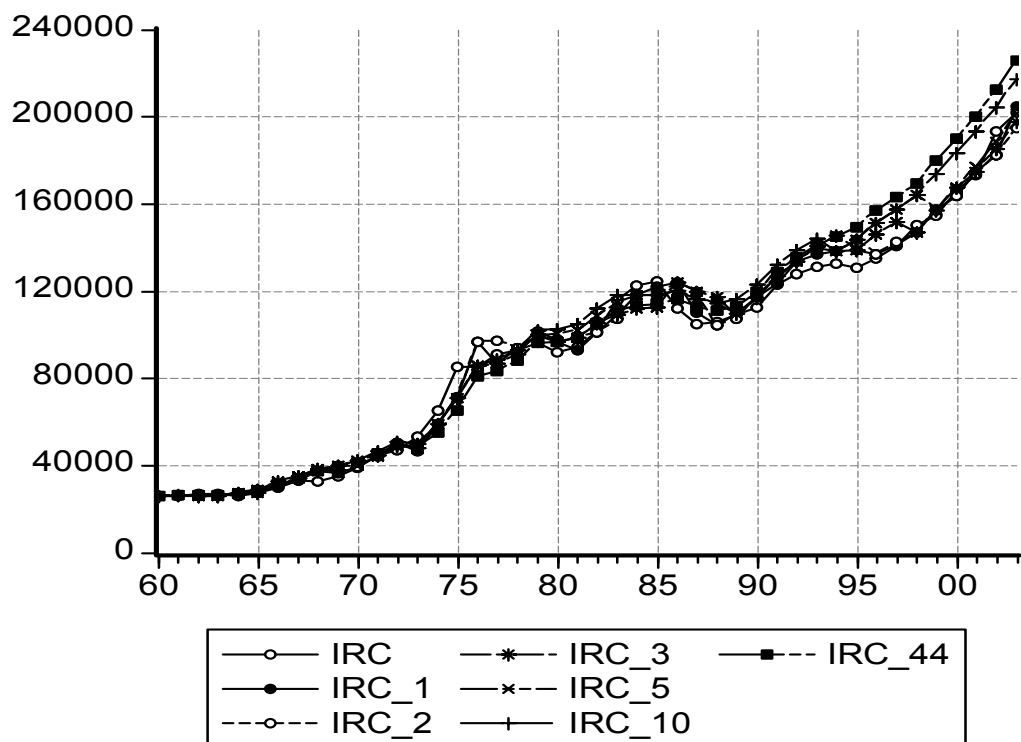
The following graphs show the summary of the above tables.

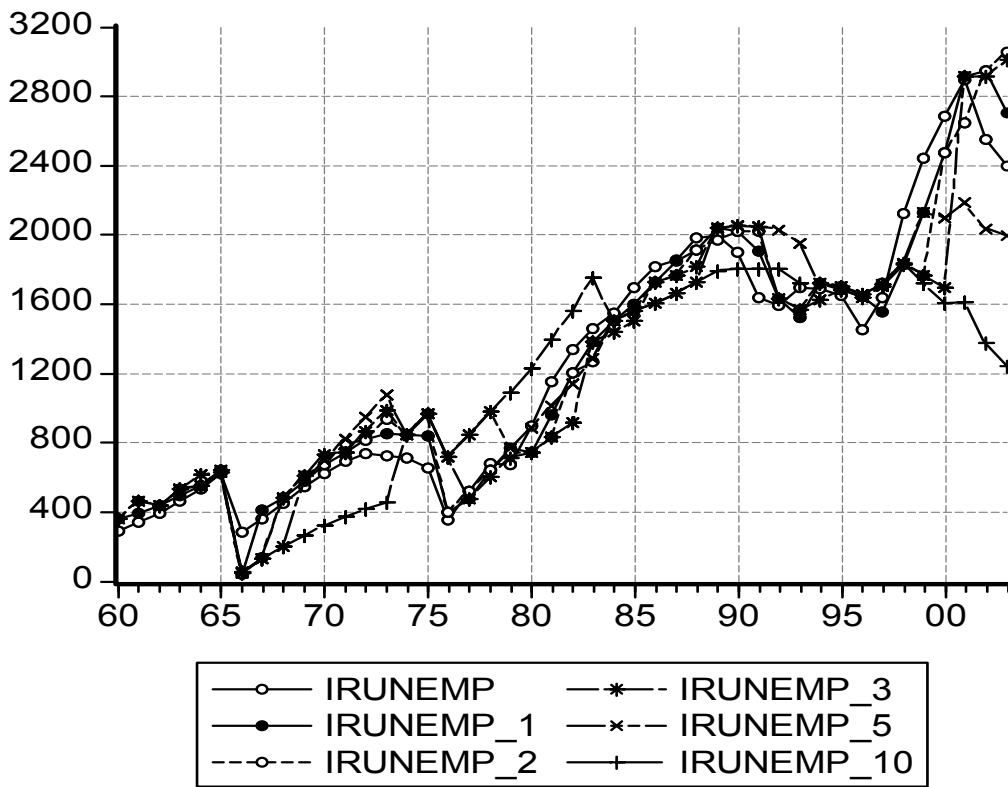
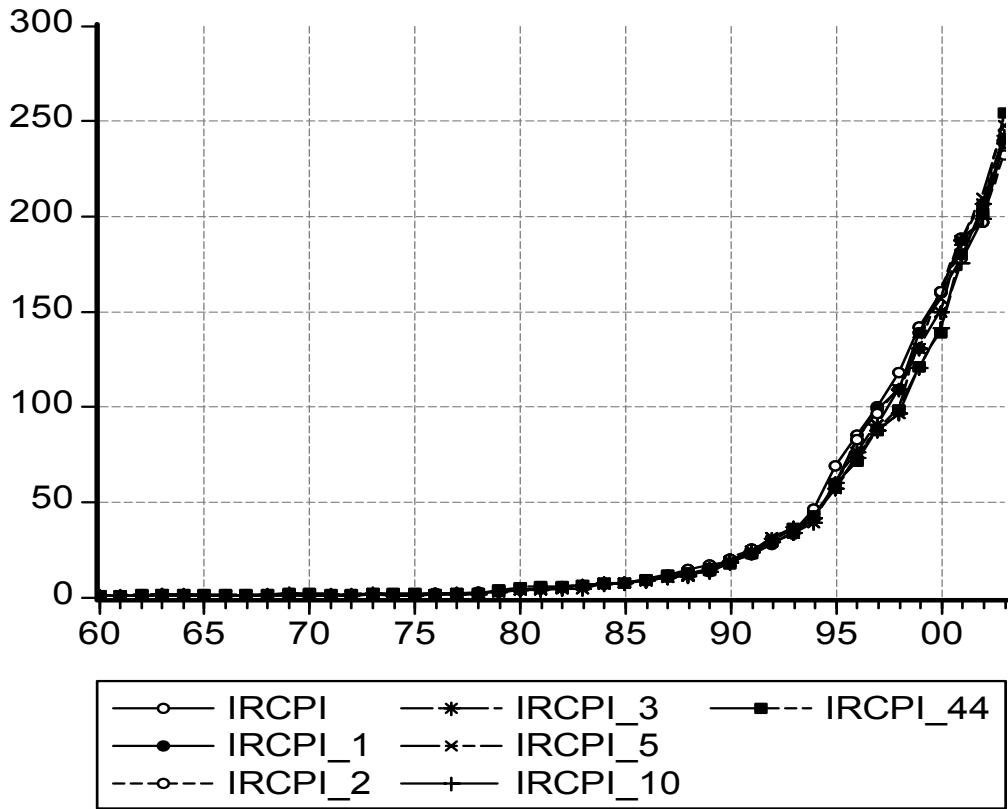






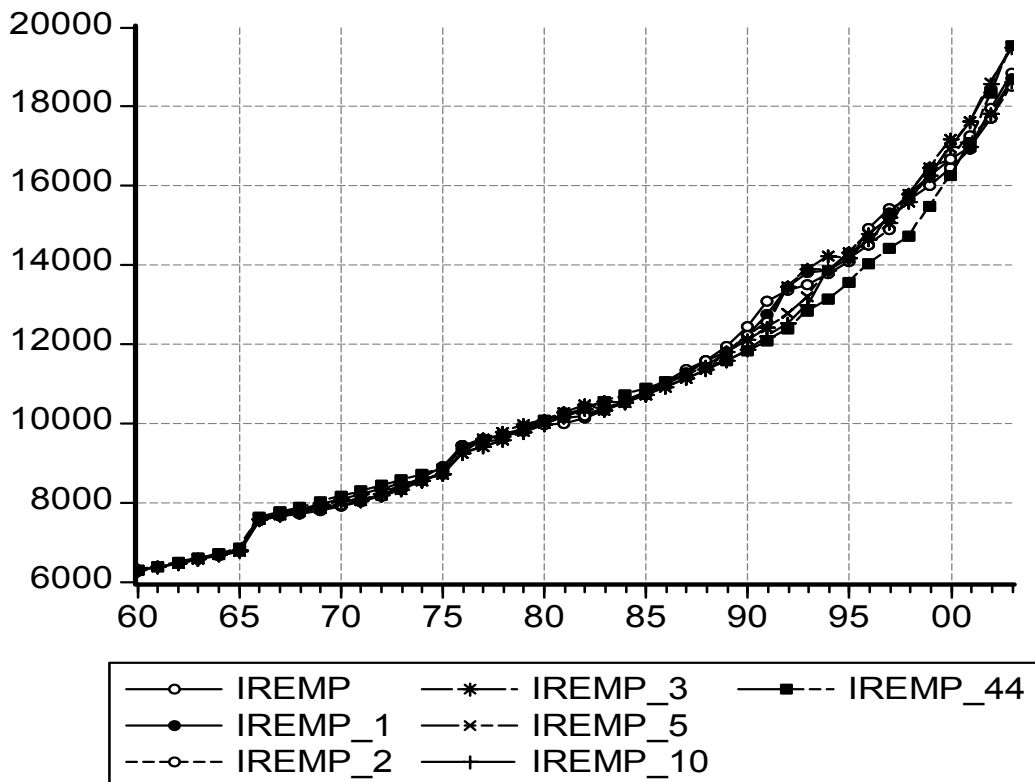
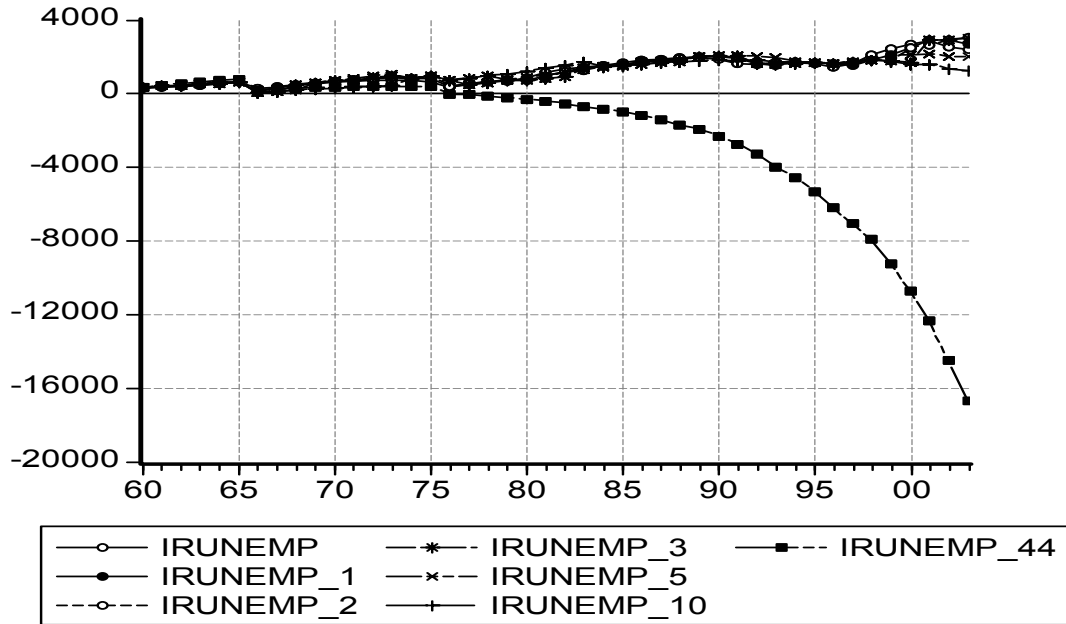


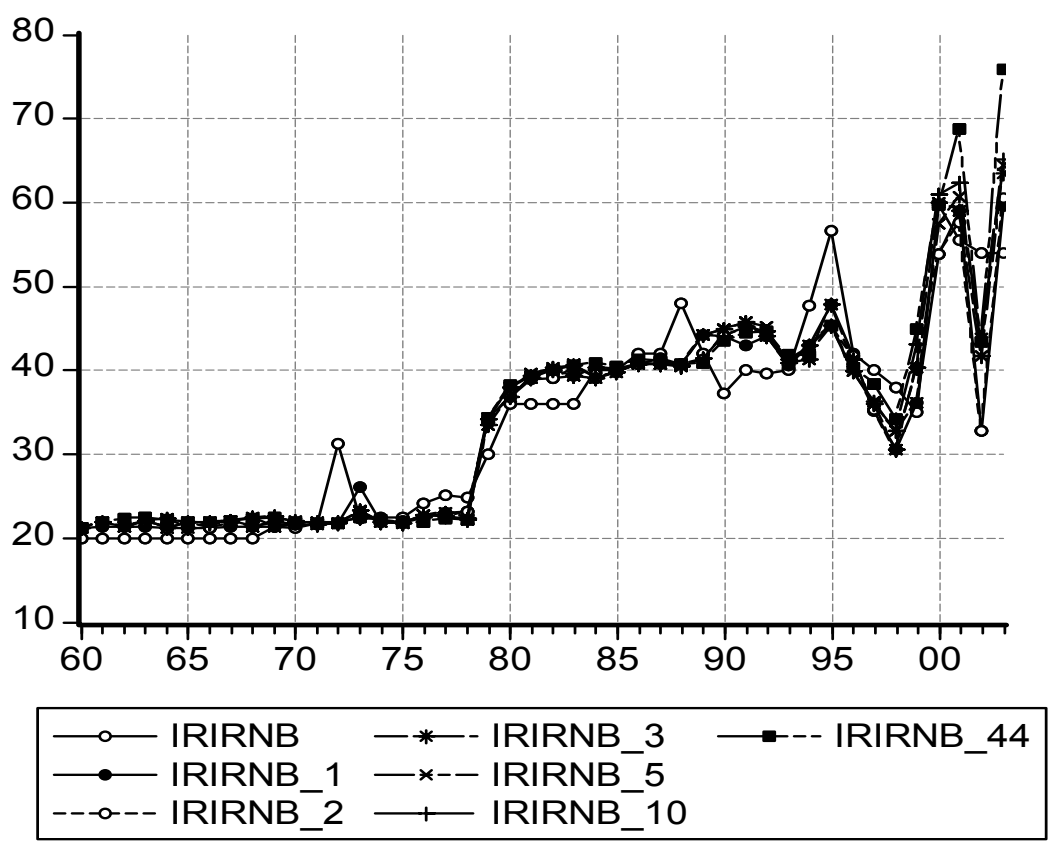






There is an unsolved divergent solution for IRUNEMP at 44 years dynamic solution. The following graph shows this problem.





## Shock analysis

To evaluate the effects of different policies on all endogenous variables, we first solve the model with previous exogenous variables and find the simulated value for endogenous variables. This solution is named “Control Solution”. Then, we change exogenous variable one by one in each scenario with a determined amount and solve the model again to find new simulated values for endogenous variables. The differences between variables of this simulation and control solution will show the shock effect on exogenous policy variable.

In analyzing every shock, a summary table is depicted. In shock analyzing we should precisely consider the interdependent effects of different sectors, variables and equations. By changing an exogenous variable within the sample, we should consider the relationship between the shocked variable and other exogenous variables. This means that exogenous variables have also some behavioral relation which we did not specify in the model. For example, both oil export revenue and government budget are exogenous and with increasing the first one, the second one will also increase, while for analyzing independent shocks we will not consider this interrelationship. So, it would be better to define one group of exogenous variables and then examine their effects on endogenous variables. Independent shocks are chosen without considering the interrelations between exogenous variables, and one exogenous variable is changed independently.

The next important point for examining shock's effects is the non-proportional relationship between the shock in exogenous variable and the corresponding endogenous simulated variables. In other words, if we increase the amount of one exogenous variable by 10% and the corresponding endogenous variable increases by 2%, we can not conclude that 20% increase in the first one, will cause 4% increase in the second one. Because, by solving the whole model simultaneously in different time periods, the amount and also direction of effects can differ in different periods. This would be the case even the model is linear in variables and parameters both. This phenomenon is mainly based on the time changes and fluctuations during time.

## **The simulated shocks**

1. This shock is defined on the basis of 1% increase in import of machinery and equipments over total goods import ratio.
2. This shock is defined on the basis of 1% increase in banking deposit interest rate
3. In this shock, we increase banking facilities interest rates by 1%.
4. This shock is defined by increasing 10% on domestic oil products prices.
5. The government development expenditure shock is defined by 10% increase in this variable.
6. The current government expenditure shock is defined by 10% increase in current government expenditure.
7. Amount of foreign exchange sold in non-official foreign currency market: In this shock we try to evaluate the effect of sales of foreign currency equivalent to 1000 billion Rials in non-official foreign currency market.
8. The obligatory banking credit facility for private sector is defined by increasing this variable by 1000 Rials.
9. The obliged banking credit facility for government sector is defined by increasing this variable by 1000 Rials.
10. The amount of foreign exchange reserve obligation account for 1000 billion Rial increase.
11. The London interbank (LIBOR) interest rate by 1% increase.
12. The consumer price index in industrial countries with 10% increase.
13. One billion dollar increase in the capital account of balance of payments.
14. Export exchange rate shock is defined by 10% devaluation of national currency in relation to dollar for foreign exchange rate for export of goods and services.
15. The official exchange rate. This shock is defined by 10% devaluation of national currency against dollar for official exchange rate.
16. The oil production shock with 10% increase in oil production.
17. The international oil price shock is defined by one dollar increase in this variable.
18. The import (cif) price index shock is defined by 10% increase in this variable.

PCH_IRMACHIMV TABLE						
Percentage change of shocked solution from control solution (%)						
Policy shock: %1 increase in import share of machinery and equipments						
No.	Variabe Name	2000	2001	2002	2003	Period Mean
1	IRXOILD	0.00	0.00	0.00	0.00	0.00
2	IRMGDCIFP	0.07	-0.08	-0.24	-0.37	-0.16
3	IRXGNODOP	0.02	0.02	0.01	0.00	0.01
4	IRM2V	0.12	0.37	0.44	0.58	0.38
5	IRGDPM	0.19	0.26	0.27	0.30	0.26
6	IRGDPNF	0.22	0.28	0.29	0.32	0.28
7	IRIP	1.67	1.75	1.56	1.50	1.62
8	IRC	0.12	0.17	0.20	0.23	0.18
9	IREM	0.20	0.88	1.34	2.19	1.15
10	IRCPI	0.10	0.29	0.32	0.41	0.28
11	IREMP	0.04	0.07	0.08	0.11	0.07
12	IRIRNB	1.13	0.84	0.19	0.40	0.64

PCH_IRIRS TABLE						
Percentage change of shocked solution from control solution (%)						
Policy shock: %1 increase in saving deposits interest rate						
No.	Variabe Name	2000	2001	2002	2003	Period Mean
1	IRXOILD	0.00	0.00	0.00	0.00	0.00
2	IRMGDCIFP	1.67	3.29	4.81	4.49	3.57
3	IRXGNODOP	0.08	0.32	0.52	0.60	0.38
4	IRM2V	-2.45	-4.35	-4.66	-4.30	-3.94
5	IRGDPM	0.17	0.39	0.68	0.89	0.53
6	IRGDPNF	0.19	0.44	0.75	0.97	0.59
7	IRIP	1.30	2.90	4.25	4.42	3.22
8	IRC	0.11	0.25	0.46	0.64	0.36
9	IREM	-3.86	-9.83	-13.27	-14.88	-10.46
10	IRCPI	0.32	-0.06	0.92	1.98	0.79
11	IREMP	0.05	0.06	0.22	0.39	0.18
12	IRIRNB	1.55	0.48	7.14	5.71	3.72

PCH_IRIRL TABLE						
Percentage change of shocked solution from control solution (%)						
Policy shock: %1 increase in banking loans interest rate						
No.	Variabe Name	2000	2001	2002	2003	Period Mean
1	IRXOILD	0.00	0.00	0.00	0.00	0.00
2	IRMGDCIFP	0.05	1.22	1.84	2.06	1.29
3	IRXGNODOP	-0.10	0.03	0.07	0.11	0.03
4	IRM2V	-0.96	-2.59	-2.48	-2.63	-2.16
5	IRGDPM	-0.72	-0.85	-0.78	-0.69	-0.76
6	IRGDPNF	-0.82	-0.93	-0.85	-0.75	-0.84
7	IRIP	-3.87	-3.40	-2.77	-1.92	-2.99
8	IRC	-0.45	-0.59	-0.62	-0.61	-0.57
9	IREM	-1.57	-6.05	-7.34	-9.63	-6.14
10	IRCPI	-0.11	-1.39	-0.73	-0.58	-0.70
11	IREMP	-0.12	-0.28	-0.22	-0.21	-0.21
12	IRIRNB	-2.82	-3.68	2.64	1.51	-0.59

PCH_IRPDOIL TABLE						
Percentage change of shocked solution from control solution (%)						
Policy shock: %10 increase in domestic prices of oil products						
No.	Variabe Name	2000	2001	2002	2003	Period Mean
1	IRXOILD	0.00	0.00	0.00	0.00	0.00
2	IRMGDCIFP	-0.35	-0.30	-0.31	-0.21	-0.29
3	IRXGNODOP	0.03	0.06	0.09	0.12	0.08
4	IRM2V	0.56	0.40	0.35	0.25	0.39
5	IRGDPM	0.00	-0.01	-0.02	-0.01	-0.01
6	IRGDPNF	0.00	-0.01	-0.01	-0.01	-0.01
7	IRIP	-0.26	-0.24	-0.26	-0.19	-0.24
8	IRC	0.01	0.00	0.00	0.00	0.00
9	IREM	0.89	0.89	0.96	0.83	0.89
10	IRCPI	-0.40	-0.51	-0.55	-0.64	-0.52
11	IREMP	0.05	0.04	0.04	0.03	0.04
12	IRIRNB	-1.20	-0.51	-0.39	-0.37	-0.62

PCH_IRGEDV TABLE						
Percentage change of shocked solution from control solution (%)						
Policy shock: %10 increase in government development expenditures						
No.	Variabe Name	2000	2001	2002	2003	Period Mean
1	IRXOILD	0.00	0.00	0.00	0.00	0.00
2	IRMGDCIFP	0.09	-0.06	-0.20	-0.32	-0.12
3	IRXGNODOP	0.04	0.05	0.07	0.10	0.07
4	IRM2V	0.20	0.40	0.53	0.71	0.46
5	IRGDPM	0.29	0.33	0.42	0.57	0.40
6	IRGDPNF	0.32	0.37	0.47	0.63	0.45
7	IRIP	0.16	0.33	0.28	0.26	0.26
8	IRC	0.18	0.23	0.31	0.43	0.29
9	IREM	0.34	0.96	1.62	2.70	1.41
10	IRCPI	0.12	0.20	0.30	0.35	0.24
11	IREMP	0.05	0.08	0.11	0.16	0.10
12	IRIRNB	0.78	0.57	0.76	0.77	0.72

PCH_IRGECV TABLE						
Percentage change of shocked solution from control solution (%)						
Policy shock: %10 increase in government current expenditures						
No.	Variabe Name	2000	2001	2002	2003	Period Mean
1	IRXOILD	0.00	0.00	0.00	0.00	0.00
2	IRMGDCIFP	-0.20	-0.26	-0.35	-0.50	-0.33
3	IRXGNODOP	-0.06	-0.12	-0.17	-0.25	-0.15
4	IRM2V	0.21	0.27	0.27	0.41	0.29
5	IRGDPM	-0.09	-0.10	-0.12	-0.20	-0.13
6	IRGDPNF	-0.02	-0.03	-0.05	-0.09	-0.04
7	IRIP	-0.17	-0.25	-0.32	-0.48	-0.30
8	IRC	-0.01	-0.01	-0.03	-0.05	-0.02
9	IREM	0.32	0.59	0.76	1.43	0.78
10	IRCPI	0.37	0.48	0.56	0.86	0.57
11	IREMP	0.02	0.03	0.03	0.04	0.03
12	IRIRNB	0.65	0.39	0.24	0.83	0.53

PCH_IRGRDSV TABLE						
Percentage change of shocked solution from control solution (%)						
Policy shock: 1000 billion rials increase in dollar sale revenue						
No.	Variabe Name	2000	2001	2002	2003	Period Mean
1	IRXOILD	0.00	0.00	0.00	0.00	0.00
2	IRMGDCIFP	0.38	0.69	1.05	0.98	0.78
3	IRXGNODOP	0.02	0.06	0.12	0.15	0.09
4	IRM2V	0.06	0.12	0.10	0.27	0.14
5	IRGDPM	0.04	0.09	0.14	0.19	0.11
6	IRGDPNF	0.04	0.10	0.16	0.20	0.13
7	IRIP	0.30	0.61	0.93	0.96	0.70
8	IRC	0.02	0.06	0.10	0.14	0.08
9	IREM	-0.88	-2.04	-2.93	-3.26	-2.28
10	IRCPI	0.07	0.11	0.06	0.24	0.12
11	IREMP	0.01	0.03	0.03	0.07	0.03
12	IRIRNB	0.35	0.38	0.61	0.91	0.56

PCH_IROLPV TABLE						
Percentage change of shocked solution from control solution (%)						
Policy shock: 1000 billion rials increase in government budget private obligation loans						
No.	Variabe Name	2000	2001	2002	2003	Period Mean
1	IRXOILD	0.00	0.00	0.00	0.00	0.00
2	IRMGDCIFP	0.01	0.05	0.10	0.14	0.07
3	IRXGNODOP	0.01	0.02	0.04	0.06	0.03
4	IRM2V	-0.01	-0.07	-0.10	-0.14	-0.08
5	IRGDPM	0.00	0.00	0.00	0.01	0.00
6	IRGDPNF	0.00	0.00	0.01	0.01	0.01
7	IRIP	0.01	0.03	0.07	0.11	0.06
8	IRC	0.00	0.00	0.00	0.01	0.00
9	IREM	-0.02	-0.16	-0.29	-0.49	-0.24
10	IRCPI	-0.04	-0.13	-0.18	-0.21	-0.14
11	IREMP	0.00	-0.01	-0.02	-0.02	-0.01
12	IRIRNB	-0.39	-0.47	-0.40	-0.16	-0.35



PCH_IROLGV TABLE						
Percentage change of shocked solution from control solution (%)						
Policy shock: 1000 billion rials increase in government budget government obligation loans						
No.	Variabe Name	2000	2001	2002	2003	Period Mean
1	IRXOILD	0.00	0.00	0.00	0.00	0.00
2	IRMGDCIFP	0.01	0.02	0.04	0.07	0.04
3	IRXGNODOP	0.00	0.01	0.02	0.03	0.02
4	IRM2V	-0.01	-0.03	-0.05	-0.07	-0.04
5	IRGDPM	0.00	0.00	0.00	0.00	0.00
6	IRGDPNF	0.00	0.00	0.00	0.01	0.00
7	IRIP	0.00	0.02	0.03	0.06	0.03
8	IRC	0.00	0.00	0.00	0.00	0.00
9	IREM	-0.01	-0.08	-0.13	-0.26	-0.12
10	IRCPI	-0.03	-0.07	-0.08	-0.11	-0.07
11	IREMP	0.00	-0.01	-0.01	-0.01	-0.01
12	IRIRNB	-0.26	-0.27	-0.21	-0.11	-0.22

PCH_IRFEOAV TABLE						
Percentage change of shocked solution from control solution (%)						
Policy shock: 1000 billion rials increase in foreign exchange obligation account						
No.	Variabe Name	2000	2001	2002	2003	Period Mean
1	IRXOILD	0.00	0.00	0.00	0.00	0.00
2	IRMGDCIFP	0.00	0.01	0.02	0.02	0.02
3	IRXGNODOP	0.00	0.01	0.01	0.01	0.01
4	IRM2V	-0.01	-0.02	-0.02	-0.02	-0.02
5	IRGDPM	0.00	0.00	0.00	0.00	0.00
6	IRGDPNF	0.00	0.00	0.00	0.00	0.00
7	IRIP	0.00	0.01	0.02	0.02	0.01
8	IRC	0.00	0.00	0.00	0.00	0.00
9	IREM	-0.01	-0.04	-0.06	-0.08	-0.05
10	IRCPI	-0.02	-0.03	-0.03	-0.03	-0.03
11	IREMP	0.00	0.00	0.00	0.00	0.00
12	IRIRNB	-0.17	-0.03	0.06	0.04	-0.03

PCH_LIBOR TABLE						
Percentage change of shocked solution from control solution (%)						
Policy shock: %1 increase in London inter bank offer rate						
No.	Variabe Name	2000	2001	2002	2003	Period Mean
1	IRXOILD	0.00	0.00	0.00	0.00	0.00
2	IRMGDCIFP	0.10	0.33	0.14	0.05	0.16
3	IRXGNODOP	0.03	0.11	0.10	0.08	0.08
4	IRM2V	-0.13	-0.41	-0.04	0.01	-0.14
5	IRGDPM	0.00	0.01	0.02	0.02	0.01
6	IRGDPNF	0.01	0.02	0.03	0.02	0.02
7	IRIP	0.07	0.26	0.13	0.07	0.13
8	IRC	0.03	0.04	0.05	0.05	0.04
9	IREM	-0.24	-1.04	-0.23	-0.11	-0.41
10	IRCPI	-0.16	-0.57	0.00	0.05	-0.17
11	IREMP	-0.01	-0.05	0.00	0.01	-0.01
12	IRIRNB	0.05	-0.95	1.96	0.32	0.35

PCH_IRCIFP TABLE						
Percentage change of shocked solution from control solution (%)						
Policy shock: %10 increase in CIF import prices						
No.	Variabe Name	2000	2001	2002	2003	Period Mean
1	IRXOILD	0.00	0.00	0.00	0.00	0.00
2	IRMGDCIFP	-4.25	-3.65	-3.51	-3.11	-3.63
3	IRXGNODOP	-0.29	-0.48	-0.65	-0.84	-0.57
4	IRM2V	-0.32	-0.49	-0.84	-0.74	-0.60
5	IRGDPM	-0.41	-0.52	-0.61	-0.67	-0.55
6	IRGDPNF	-0.47	-0.58	-0.67	-0.75	-0.61
7	IRIP	-3.31	-3.43	-3.39	-3.21	-3.34
8	IRC	-0.26	-0.35	-0.45	-0.53	-0.40
9	IREM	-0.18	-0.19	-0.99	-0.35	-0.43
10	IRCPI	-0.32	-0.20	-0.59	-0.09	-0.30
11	IREMP	-0.09	-0.11	-0.17	-0.15	-0.13
12	IRIRNB	-2.65	-0.53	-1.93	0.86	-1.06

PCH_OECDP TABLE						
Percentage change of shocked solution from control solution (%)						
Policy shock: %10 increase in domestic prices of industrial countries						
No.	Variabe Name	2000	2001	2002	2003	Period Mean
1	IRXOILD	0.00	0.00	0.00	0.00	0.00
2	IRMGDCIFP	2.81	2.84	3.36	3.01	3.01
3	IRXGNODOP	2.23	3.59	4.51	5.09	3.86
4	IRM2V	0.22	0.52	0.40	0.56	0.42
5	IRGDPM	0.24	0.36	0.44	0.50	0.39
6	IRGDPNF	0.26	0.39	0.48	0.55	0.42
7	IRIP	2.02	2.43	2.87	2.77	2.52
8	IRC	0.16	0.22	0.34	0.42	0.28
9	IREM	0.29	1.02	0.89	1.65	0.96
10	IRCPI	0.23	0.42	0.09	0.13	0.22
11	IREMP	0.06	0.10	0.09	0.12	0.09
12	IRIRNB	1.58	1.20	-0.39	0.22	0.65

PCH_IRKAD TABLE						
Percentage change of shocked solution from control solution (%)						
Policy shock: 1000 million dollars increase in capital account						
No.	Variabe Name	2000	2001	2002	2003	Period Mean
1	IRXOILD	0.00	0.00	0.00	0.00	0.00
2	IRMGDCIFP	3.52	2.96	2.79	2.11	2.85
3	IRXGNODOP	0.08	0.13	0.18	0.20	0.15
4	IRM2V	0.05	0.33	0.44	0.59	0.35
5	IRGDPM	0.29	0.38	0.42	0.42	0.38
6	IRGDPNF	0.32	0.41	0.45	0.46	0.41
7	IRIP	2.52	2.59	2.47	2.04	2.40
8	IRC	0.17	0.24	0.29	0.32	0.26
9	IREM	-0.06	0.43	0.81	1.51	0.67
10	IRCPI	-0.04	0.12	0.15	0.21	0.11
11	IREMP	0.04	0.08	0.09	0.11	0.08
12	IRIRNB	1.23	0.82	0.40	0.10	0.64

PCH_IRES TABLE						
Percentage change of shocked solution from control solution (%)						
Policy shock: %10 devaluation of export exchange rate against dollar						
No.	Variabe Name	2000	2001	2002	2003	Period Mean
1	IRXOILD	0.00	0.00	0.00	0.00	0.00
2	IRMGDCIFP	0.40	0.58	0.75	0.63	0.59
3	IRXGNODOP	2.24	3.63	4.50	5.04	3.85
4	IRM2V	0.04	0.10	0.09	0.18	0.10
5	IRGDPM	0.03	0.07	0.09	0.11	0.08
6	IRGDPNF	0.04	0.07	0.10	0.12	0.08
7	IRIP	0.29	0.48	0.63	0.58	0.49
8	IRC	0.02	0.04	0.06	0.08	0.05
9	IREM	0.05	0.20	0.21	0.61	0.27
10	IRCPI	0.04	0.09	0.04	0.14	0.08
11	IREMP	0.01	0.02	0.02	0.04	0.02
12	IRIRNB	0.25	0.30	0.09	0.34	0.25

PCH_IRESO TABLE						
Percentage change of shocked solution from control solution (%)						
Policy shock: %10 devaluation of official exchange rate against dollar						
No.	Variabe Name	2000	2001	2002	2003	Period Mean
1	IRXOILD	0.00	0.00	0.00	0.00	0.00
2	IRMGDCIFP	-0.79	-0.66	-2.96	-2.04	-1.61
3	IRXGNODOP	-0.02	-0.04	-0.15	-0.09	-0.08
4	IRM2V	0.33	0.09	0.76	-0.11	0.27
5	IRGDPM	-0.05	-0.08	-0.29	-0.35	-0.20
6	IRGDPNF	-0.06	-0.09	-0.32	-0.37	-0.21
7	IRIP	-0.61	-0.60	-2.43	-1.99	-1.41
8	IRC	-0.03	-0.05	-0.18	-0.23	-0.12
9	IREM	0.48	0.07	1.89	-1.14	0.33
10	IRCPI	-0.31	-0.31	-1.02	-2.20	-0.96
11	IREMP	0.02	0.00	0.03	-0.11	-0.02
12	IRIRNB	-1.18	-0.22	-6.22	-4.72	-3.08

PCH_IRWPOIL TABLE						
Percentage change of shocked solution from control solution (%)						
Policy shock: 1 dollar increase in foreign price of oil						
No.	Variabe Name	2000	2001	2002	2003	Period Mean
1	IRXOILD	3.80	4.58	3.60	3.56	3.88
2	IRMGDCIFP	3.79	3.06	2.26	2.16	2.82
3	IRXGNODOP	0.10	0.16	0.20	0.26	0.18
4	IRM2V	0.20	0.45	0.82	0.80	0.57
5	IRGDPM	0.32	0.40	0.40	0.43	0.39
6	IRGDPNF	0.36	0.44	0.43	0.47	0.43
7	IRIP	2.72	2.69	2.08	2.05	2.38
8	IRC	0.20	0.27	0.30	0.35	0.28
9	IREM	0.26	0.88	2.20	2.58	1.48
10	IRCPI	-0.13	0.04	-0.10	-0.29	-0.12
11	IREMP	0.06	0.09	0.13	0.13	0.10
12	IRIRNB	1.18	0.79	-1.03	-0.67	0.07

PCH_IRYOILB TABLE						
Percentage change of shocked solution from control solution (%)						
Policy shock: %10 increase in production of oil						
No.	Variabe Name	2000	2001	2002	2003	Period Mean
1	IRXOILD	14.26	14.40	14.93	14.13	14.43
2	IRMGDCIFP	15.76	10.59	10.05	8.65	11.26
3	IRXGNODOP	0.44	0.70	0.99	1.21	0.83
4	IRM2V	0.42	1.72	3.55	3.90	2.40
5	IRGDPM	3.14	3.21	3.16	3.37	3.22
6	IRGDPNF	1.64	1.78	1.95	2.12	1.87
7	IRIP	11.97	10.24	9.53	8.81	10.14
8	IRC	0.86	1.07	1.30	1.51	1.18
9	IREM	0.58	3.79	10.19	13.79	7.09
10	IRCPI	-0.23	0.02	-0.98	-1.15	-0.59
11	IREMP	0.38	0.45	0.63	0.73	0.55
12	IRIRNB	5.90	1.55	-4.91	-1.26	0.32

## Forecasting

In a different way from the previous plans, Iran's 3<sup>rd</sup> development plan (2000-2004) is aimed for structural reforms in Iran's economy. Partial privatization of financial markets, balanced government budget, establishment of foreign exchange reserve fund/account (to stabilize the economy from oil price fluctuations), unification of exchange rate, and movement from fixed to managed float exchange rate system, revision of direct tax law to lower tax rates and indirect levies integration scheme, revising foreign investment protection and inducement law, abolition of export surrender requirement (deposit), removal of some non-tariff foreign trade barriers and changing the government budget book keeping to GFS<sup>1</sup> standards, strengthening the capital market (stock exchange), expansion of financial sector, and taking some steps in privatization of government's companies are the main reforms of the 3<sup>rd</sup> development plan. However, high oil price put the economy in a stable and surplus position of income receipts.

Accordingly, the average rate of GDP growth for the period of 2000-2003 was equal to 5.5%. The average inflation rate was 13.8% which is nearly half of the second plan average. The following tables show the main macroeconomic variables after the revolution period.

Main economic variables during after the revolution period

%		1 <sup>st</sup> plan		2 <sup>nd</sup> plan	3 <sup>rd</sup> plan
Gregorian Calendar	1979-1988	1989-1993	1994	1995-1999	2000-2003
Hijri Shamsi Calendar	1358-1367	1368-1372	1373	1374-1378	1379-1382
Inflation rate	18.9	18.4	35.2	25.1	15.9
Economic growth rate	-1.9	7.4	0.5	3.2	5.5
Investment growth rate	-6.5	9.2	-14.2	8	11
Liquidity (M2) growth rate	23.1	23.6	35.8	44.6	28.6
Dollar/Rial % changes	29	12.1	58.6	24.6	-0.8

Source: A quart of century ups and downs, review of Iran's economic changes, Ministry of Finance and Economic Affairs. 2004, Tehran, Iran.

Hijri Shamsi calendar starts at 21<sup>st</sup> March. 21 March 2004 Gregorian is 1<sup>st</sup> day of 1383 Hijri Shamsi.

Main economic variables during the after revolution period

Billion Dollars		1 <sup>st</sup> plan		2 <sup>nd</sup> plan	3 <sup>rd</sup> plan
Gregorian Calendar	1979-1988	1989-1993	1994	1995-1999	2000-2003
Hijri Shamsi Calendar	1358-1367	1368-1372	1373	1374-1378	1379-1382
Oil export	14.6	15.5	14.6	15.4	22.6
Non-oil export	0.6	2.3	4.8	3.1	4.5
Import	11.7	22.2	11.8	13.7	20.1

Source: previous table reference.

<sup>1</sup> Government Financial Statistics developed by International Monetary Fund.

## **National policy assumptions**

### Foreign exchange system

The currency of Iran is Iranian Rial. Prior to March 21, 2002, the exchange rate system consisted of two official rates, the “oil-notional rate” used for government budget and some external transactions. The “non-oil export” or “certificate of exchange deposit” rate was effectively equivalent to market exchange rate at Tehran Stock Exchange (TSE rate) and applied to non-oil export receipts and regular import transactions.

From the beginning of Iranian fiscal year March 21, 2002, a unified managed float foreign exchange system was adopted. Exchange rates unification was launched along with elimination of all exchange restrictions on current account transactions prior to March 2002. Therefore, all foreign exchange transactions that formerly took place in TSE were shifted to a newly established inter-bank market. The basic official rate (oil-notional rate) was eliminated, and the exchange rate was unified to the rate prevailing at TSE market before unification.

In the subsequent years, exchange rate is determined under a managed floating system. Thus, all foreign exchange regulations in the areas of transaction of goods, services, and banking operations were revised with the aim of complying with the new exchange regime. In this market, in addition to the central bank, other banks can buy and sell foreign currencies. Thus, exporters are availed with full option in managing their foreign exchange resources. But there are some restrictions on foreign exchange capital account.

It is assumed that this system will go on during the forecast period.

### Trade reforms

According to imports and exports regulations, imports are classified as "authorized", "conditional" and "prohibited" goods. Import of "authorized" goods requires no special license and permission, while import of "conditional" goods requires licensing by respective authorities. "Prohibited" goods are those which are forbidden by laws. As a whole, elimination of certification issuance procedures for almost all import items in conditional category was made more liberalization in foreign trade system.

To remove barriers to trade and restricting the smuggling, Ministry of Commerce announced a list of permitted intermediate goods and capital goods which are importable without foreign exchange transfer. To maintain coordination between foreign exchange and trade policies, the Ministry of Commerce revised the regulations pertaining on duties and tariffs. In this regard, downward adjustments were put into effect by a ratio of 5/22 as of March 21, 2002 and all import duties, taxes, and other charges (except commercial profit tax) were unified for the March 21, 2003 and a 4 percent duty rate was levied as a base for custom duties. New conditions were also set for using short-term credit lines (refinance) for importers. Thus, the import of spare

parts and manufacturing machinery by private sector are authorized through this channel.

To promote non-oil exports, the Export Promotion Fund was established. To further liberalize the non-oil exports, export of all goods and services were exempted from surrender requirement (deposit) from March 21, 2002. This was a very important improvement in Iran's non-oil export. To compensate incurred losses of exporters due to exchange rate fluctuations, such as drastic fall of world prices of exported goods, some protections were defined through Export Guarantee Fund. Accompanying with these arrangements, Ministry of Commerce announced a new export rewards payments since 2002. Accordingly, goods with 10 to 100 percent of their domestic value-added, receive a reward of 1 to 3 percent of export values. In addition, 1 to 3 percent of export value shall be rewarded for marketing and export of new commodities. In another development, the comprehensive export promotion program was approved. The main targets of this program revolves around market competitiveness, reduction in public sector ownership, granting of explicit subsidies, reduction of tariffs and extension of banking facilities to export sector.

It is expected that this will be going on during the forecast period.

#### Foreign investment

The "Law for Attraction and Protection of Foreign Investment" was revised in 2002. In the revised version, the maximum share of foreign investment in all economic sectors is set to 25 percent and in all activities to 35 percent. The oil sector is exempted from these limits.

It is expected that there will not be any upheaval in Iran's foreign investment. That is, there is no expectation for capital account liberalization more than free zone areas.

#### Monetary policies

The Money and Credit Council (MCC) approved the following policies to be implemented in 2004:

1. Public banks are authorized to extend up to 45% increase in outstanding of non-public sector facilities (loans) in 2004 without limitation of sectoral credit allocations. The share of various sectors out of total increase in the outstanding facilities of non-public sectors for commercial banks are as follows:



<b>Sectoral allocation of credit to non-public sector (percent)</b>	
Agriculture and water	25
Manufacturing and mining	32
Housing and construction	28
Exports	11
Domestic trade, services and miscellaneous	4
<b>Total</b>	<b>100</b>

2. The provisional (expected) profit (interest) rate for short-term deposits was determined at 7 percent, and for term investment deposits was set at 13-17 percent per annum for deposits for different maturities. Banks are allowed to set their rates on two, three, and four-year deposits within the above range.
3. Expected (minimum) banking loans interest rates for manufacturing, mining and export sectors were reduced by one percent compared to 2003 rates. The rates for other sectors in public banks are the same as before. Thus, it is also assumed that the loans' interest rates of banking system will be reduced by 1% in 2004 and remain unchanged in 2005.
4. To reach the targets of the 3<sup>rd</sup> Plan regarding inflation rate controls, Central Bank of Iran targeted liquidity growth within the range of 20-24 percent.
5. Central Bank of Iran was authorized to issue 5 trillion Rials participation papers<sup>2</sup> with 17% minimum expected profit (interest) rate.
6. Reserve requirement ratios for public commercial banks, private banks and non-bank credit institutions unified equal to weighted average of reserve requirement ratios at the end of 2003 for different financial institutions. Central Bank of Iran is authorized to change this rate in the range of  $\pm 3\%$ .

The above conditions are also adopted as policy assumptions for the forecast period.

### Fiscal policy

According to the 2004 government budget law, the following guidelines are drawn:

1. Increase in outstanding of directed banking facilities in 2004, is to be up to 3 trillion Rials. Public sector share of this increase is 25% and of cooperative and private sectors 75%. At least 65% percent of the share of cooperative and private sectors shall be distributed among deprived provinces.

<sup>2</sup> Participation paper is some kind of bond with guaranteed and determined minimum expected interest rate. This invention is used to finance investment projects and the final interest rate will be determined at maturity in some excess of minimum rate.

2. Government is allowed to sell up to the ceiling of 16.1 billion us dollars in 2004. Moreover, the Central Bank is responsible for regulating foreign exchange market and management of balance of payments.
3. The accounting rate of government foreign exchange sale is based on inter-bank market rate. Government is allowed to provide and guarantee financial resources up to 9.3 billion dollars from foreign capital markets in form of project finance contracts or partnership.
4. Government is allowed to issue 10 trillion Rials participation papers to accelerate the implementation of acquisition of non-financial assets. Of this amount, 2 trillion Rials is allocated to road and transportation sector, 2.5 trillion Rials to water resources and 5.5 trillion Rials to other projects. Public corporations are also allowed to rise up participation papers issuance to 3.2 trillion Rials through issuing participation papers for completing projects of acquisition of non-financial assets.
5. Government current and development expenditures are assumed to be according to approved amounts for 2004 and will grow by previous year growth rate in 2005.

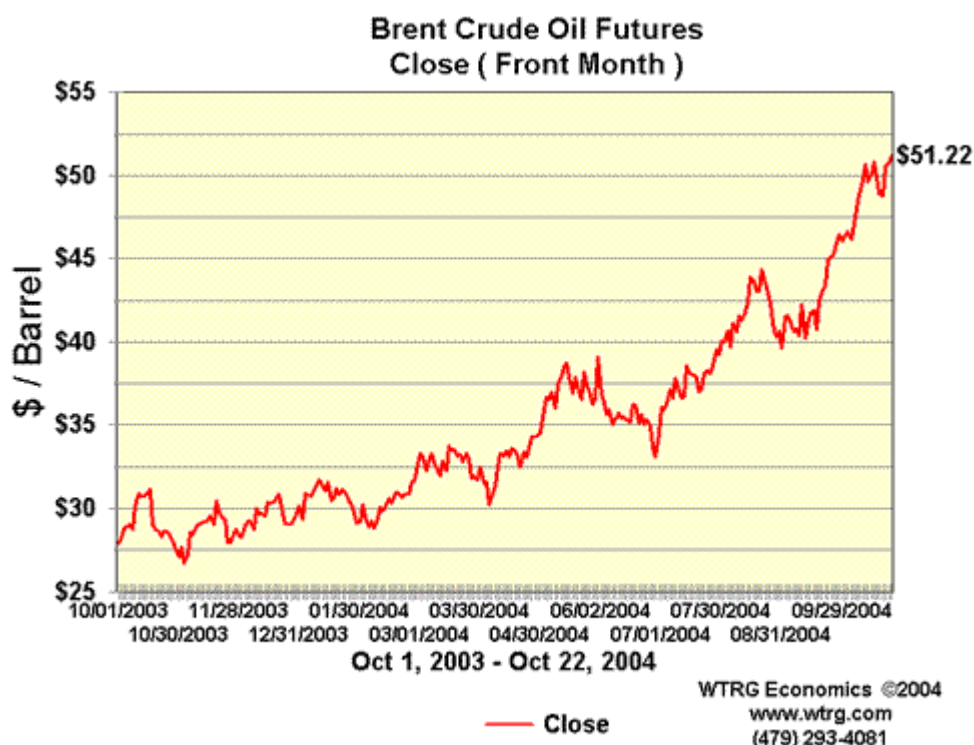
It is also assumed that there will not be any important changes from the above picture of government budget structure in our forecast period.

### **International environment**

Oil prices have been rising and are over \$20.00 per barrel higher than last year prices. What are the chances for prices to return to \$30 per barrel and what are the risks for even higher prices? This lost answer will be the most important variable in the Iran's economy. As the following graph shows, the oil price has an increasing pattern. But as a national model builder, we can not forecast the future of this variable in our national framework and any assumption regarding crude oil price may highly affect the forecasts of Iran's economy. However, we assumed that 30% increase in 2004, and 0.7% increase in 2005 crude oil prices may be reasonable (non-optimistic and non-pessimistic). These estimates are according to April-August price increase for 2004 in comparison with 2003, and on an annual price forecast of 2005 given by International Energy Outlook<sup>3</sup>.

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<sup>3</sup> <http://www.eia.doe.gov/oiaf/ieo/oil.html>



It is also assumed that the foreign economic variables of our model follow the assumptions of IMF World Economic Outlooks<sup>4</sup> in advanced economies prices and productions. In this regard we assume that advanced economies output will grow by 3.5 and 3.1 percent in 2004 and 2005 respectively and the annual percentage changes of consumer price will be 1.7 for both 2004 and 2005. An annual increase of 0.5 percent of Libor is also adopted for 2004 and 2005 according to IMF World Economic Outlook forecasts. However, these variables affect Iran's economy less than the crude oil price.

### Forecast summary

According to above explanations, the amounts of assumed exogenous values are according to following table:

<sup>4</sup> IMF world economic outlook, April 2004, International Monetary Fund.

**Assumed values for all exogenous variables**

Variables	Actual		Assumed	
	2002	2003	2004	2005
IRKAD	2534.000	4015.000	6000.000	8000.000
OECDP	109.8595	112.0566	113.9616	115.8990
IRCIFP	91.54955	93.38054	94.96800	96.58200
IRWPOIL	27.76865	28.10503	38.00000	40.66000
IRYOILB	1245.161	1407.032	1407.000	1407.000
IREO	7958.050	8281.530	8600.000	8600.000
IREX	7958.050	8281.530	8600.000	8600.000
LIBOR	1.790000	1.220000	1.720000	2.220000
IRFEOAV	31102.70	34755.40	34755.40	34755.40
IRGRDSV	0.000000	0.000000	0.000000	0.000000
IRGECV	148297.3	282137.5	315710.7	353300.0
IRGEDV	37212.50	60986.60	99841.30	163450.4
IRGESPV	0.000000	0.000000	0.000000	0.000000
IRGEFIV	0.000000	0.000000	0.000000	0.000000
IRPDOIL	339.2430	407.3479	450.5000	498.3000
IRWARCD	0.000000	0.000000	0.000000	0.000000
IRWARDED	0.000000	0.000000	0.000000	0.000000
IRWARMD	0.000000	0.000000	0.000000	0.000000
IRYEAR	1381.000	1382.000	1383.000	1384.000
IRIRL	15.53770	15.45970	14.45970	14.45970
IRIRS	10.20000	10.20000	10.20000	10.20000
IRMACHIMV	0.355702	0.350490	0.350000	0.350000
IROLGV	1260.000	900.0000	750.0000	600.0000
IROLPV	2940.000	2700.000	2250.000	1800.000

The following table shows the forecast of the Macroeconometric Model of Iran Version 6. for some selected variables<sup>5</sup>.

<sup>5</sup> As it mentioned earlier the oil price forecast is a major and determinant factor in Iran's economy prediction. We did the forecast at the oil peak price and after November the oil price felt down by more than 20 dollars per barrel. This is the main sources of over-forecasting of the model.

### Forecast of the main Iran's macroeconomic variables

%change	2003	2004	2005
	Actual	Forecast	Forecast
Private consumption at constant prices	4.4%	10.1%	10.2%
Consumer price index	15.6%	10.7%	10.9%
Market exchange rate, Rials/Dollar	3.8%	8.0%	17.1%
Employment, thousands	4.9%	5.6%	5.2%
Gross domestic product at market prices at constant prices	6.7%	11.3%	10.5%
Non-oil GDP at market prices at constant prices	5.9%	12.7%	11.6%
Investment at constant prices	10.1%	33.1%	20.8%
Non-organized market interest rate (change)	0.0%	11.9%	2.7%
Liquidity	26.1%	22.0%	20.3%
Import of goods	30.7%	39.7%	13.9%
Import of services	24.0%	13.6%	12.0%
Unemployment	-6.0%	-0.7%	3.0%
Wage index	23.4%	20.7%	16.4%
Wholesale price index	10.1%	5.8%	8.2%
Export of non-oil goods	25.6%	7.0%	7.0%
Real export of goods	19.4%	8.3%	8.0%
Export of oil	17.7%	35.2%	7.0%
Export of services	27.7%	19.7%	17.1%

### Policy issues and uncertainty

Iran's economy has experienced many qualitative changes during the last 3 decades and in this regard, model building in an econometric framework based on historical data may have some weaknesses in comparison with other economies. This problem comes from unstable and indisciplinary volatile changes in economic variables caused by structural changes of the economy.

Price of crude oil has a very important role in Iran's economy. Using accurate forecast of this exogenous variable in the national model will create more accurate forecast for other variables engaged. The applied forecast values for this variable are not desirable figures, because the international predicted figures themselves suffer from qualitative changes in the oil market.

Future structural changes of Iran's economy are not predictable. These changes belong to the category of qualitative data and the amount of their effects on the economy which are not simply measurable. Political environment effects are not negligible in the economy. However, it is predictable that some political changes as scheduled presidential election in 2005 with un-measurable effects will be occurred in Iran. In this regard, the positions of United States and Europe about Iran are important, especially in the case of US sanctions and regional turmoil in Iraq and Afghanistan.

However, the above reasons will be the main sources of discrepancies between actual and predicted values of the model for Iran's economy.

## Computer programs

All calculations have been done by EViews (Econometric Views) 4.1. The following programs show the necessary technical information about the ways that auxiliary variables and calculations have been computed. The following programs have been coded for Eviews 4.1:

### Program CALC14.PRG

'This program generates all necessary variables

SMPL 1959 2003

'Conversion of ton to barrel for records; not for calculations

'IRXOILB=IRXOIL\*7.3\*0.001

'IRYOILB=IRYOIL\*7.3\*0.001

GENR IRWPOIL=IRXOILD/IRXOILB

GENR IRDISV=IRIIV+IRGDPEOV

GENR IRDIS=IRII+IRGDPEO

GENR IRSBD=IRXSD-IRMSD

GENR IRFYSBD=IRXFYSD-IRMFYSD

GENR IRNFSBD=IRXNFSD-IRMNFS

GENR IRPGDIM=IRGDIMV/IRGDIM

GENR IRPC=IRCV/IRC

GENR IRPG=IRGV/IRG

GENR IRPGDPM=IRGDPMV/IRGDPM

GENR IRPGDPF=IRGDPFV/IRGDPF

GENR IRPGDIM=IRGDIMV/IRGDIM

GENR IRPGNIM=IRGNIMV/IRGNIM

GENR IRPGDPNF=IRGDPNFV/IRGDPNF

GENR IRPGNPM=IRGNPMV/IRGNPM

GENR IRPI=IRIV/IRI

GENR IRPA=IRADV/IRAS

GENR IRPM=IRMV/IRM

GENR IRPVAOIL=IRVAOILV/IRVAOIL

GENR IRPX=IRXV/IRX

GENR IRPDIS=IRDISV/IRDIS

GENR IRPGDPEO=IRGDPEOV/IRGDPEO

GENR IRPII=IRIIV/IRII

GENR IRPNIT=IRNITV/IRNIT

GENR IRPIT=IRITV/IRIT

GENR IRPSUB=IRSUBV/IRSUB

GENR IRPNNIF=IRNNIFV/IRNNIF

GENR IRPIP=IRIPV/IRIP

GENR IRPIG=IRIGV/IRIG

GENR IRPCCA=IRCCA/IRCCA

GENR IRPNFY=IRNFYV/IRNFY

GENR IRPBOT=IRBOTV/IRBOT

GENR IRPXFY=IRXFYV/IRXFY

GENR IRPMFY=IRMFYV/IRMFY

GENR IRPGNS=IRGNSV/IRGNS

GENR IRPNNS=IRNNSV/IRNNS

GENR IRPINPUT=IRINPUTV/IRINPUT

GENR IROUTPUT=IRINPUT+IRGDPF

GENR IRPOUTPUT=IROUTPUTV/IROUTPUT

GENR IRPMG = IRMGV / IRMG

GENR IRPMNFS = IRMNFSV / IRMNFS

GENR IRPXOIL = IRXOILV / IRXOIL  
 GENR IRPXNOILG = IRXNOILGV / IRXNOILG  
 GENR IRPXNFS = IRXNFSV / IRXNFS  
 GENR IRWINDCPI=IRWIND/IRCPI  
 GENR IRWINDPGDPM=IRWIND/IRPGDPM  
 GENR IRWINDPGDPNF=IRWIND/IRPGDPNF  
 GENR IRWINDWPID=IRWIND/IRWPID  
 GENR IRUNEMPR=IRUNEMP/IRPOPA\*100  
 GENR IRINFCPI=D(IRCPI)/IRCPI(-1)  
 GENR IRINFWPI=D(IRWPI)/IRWPI(-1)  
 GENR IRXGNODFCPI=IRXGNOD/FCPI  
 GENR IRXGNODOP=IRXGNOD/OECDP  
 GENR IRXNFSODOP=IRXNFSOD/OECDP  
 GENR IRMSDFPX=IRMSD/FPX  
 GENR IRXSDFCPI=IRXSD/FCPI  
 GENR IRMGDFPX=IRMGD/FPX  
 GENR IRMNFSDCIFP=IRMNFSD/IRCIFP  
 GENR IRMGDCIFP=IRMGD/IRCIFP  
 GENR IRMGDCIFP=IRMGD/IRCIFP  
 GENR IRGMTR=(IRGMTV\*1000)/(IRMGD\*(1-(CIFFOBF-1)\*IRD8187)\*CIFFOBF)  
 GENR CIFFOBA8187=(CIFFOBF-1)\*IRD8187\*IRMGD  
 GENR CIFFOBAC8187=(CIFFOBF-1)\*IRD8187\*IRMGCD  
 GENR IRYD = IRGDPNF+IRNFY-IRCCA-IRGRTDV/IRPIT  
 GENR IRYDV = IRGDPNFV+IRNFYV -IRCCAV-IRGRTDV  
 GENR IRPYD = IRYDV/IRYD  
 GENR IRSPV=IRYDV-IRCV  
 GENR IRSP=IRYD-IRC  
 GENR IRPSP=IRSPV/IRSP  
 GENR IRPGDEM=IRGDEM/IRGDEM  
 GENR IRM2NFAD=1000\*IRM2NFV\*( (1-IRD93-IRD90-IRD91-IRD92)/IREO +IRD93/1748  
 +IRD90/221.89 +IRD91/351.9+IRD92/641.2 )  
 GENR IRM2PGDPM=IRM2V/IRPGDPM  
 GENR IRM2CPI=IRM2V/IRCPI  
 GENR IRDDVPGDPM=IRDDV/IRPGDPM  
 GENR IRSDVPGDPM=IRSDV/IRPGDPM  
 GENR IRCUVPGDPM=IRCUV/IRPGDPM  
 GENR IRM2NPVPGDPM=IRM2NPV/IRPGDPM  
 GENR IRM2NGGV= IRGBDVC +IRFEOAV +IROLVC  
 GENR IRM2NGSV= IRM2NGV - IRM2NGGV  
 GENR IRM2NGSVPGDPM= IRM2NGSV/IRPGDPM  
 GENR IRWARCD=IRWARCDV/IRPCCA  
 GENR IRWARED=IRWAREDV/IRPCCA  
 GENR IRWARMD=IRWARMDV/IRWPI  
 GENR IRWARD=IRWARCD+IRWARED+IRWARMD

SMPL 1959 1959

GENR IRK=IRI-IRCCA  
 GENR IRKV=IRIV-IRCCAV  
 GENR IRIIVC=IRIIV  
 GENR IRIIC=IRII

SMPL 1960 2005

GENR IRK=IRK(-1)+IRI-IRCCA  
 GENR IRKV=IRKV(-1)\*(1+(IRPI-IRPI(-1))/IRPI(-1))+IRIV-IRCCAV

SMPL 1959 2005

GENR IRPK=IRKV/IRK

SMPL 1959 1959



GENR IRBOPDC=IRBOPD  
GENR IRBOPEODC=IRBOPEOD  
GENR IRKADC=IRKAD  
GENR IRCADC=IRCAD  
GENR IRTBDC=IRTBD  
GENR IRSBDC=IRSD  
GENR IRNTRDC=IRNTRD  
GENR IRFYSBDC=IRFYSBD  
GENR IRNFSBDC=IRNFSBD  
GENR CIFFOBA8187C=CIFFOBA8187  
GENR IRGBDVC= - IRGBDV  
GENR IROLVC= IROLV  
GENR IROLPVC= IROLPV  
GENR IROLGVC= IROLGV  
GENR IRGEFIVC=IRGEFIV  
GENR IRGEFIDC=IRGEFIV/IREO\*1000

SMPL 1960 2005

GENR IRBOPDC=IRBOPDC(-1) + IRBOPD  
GENR IRBOPEODC=IRBOPEODC(-1)+IRBOPEOD  
GENR IRKADC=IRKADC(-1)+IRKAD  
GENR IRCADC=IRCADC(-1)+IRCAD  
GENR IRTBDC=IRTBDC(-1)+IRTBD  
GENR IRSBDC=IRSBDC(-1)+IRSD  
GENR IRNTRDC=IRNTRDC(-1)+IRNTRD  
GENR IRFYSBDC=IRFYSBDC(-1)+IRFYSBD  
GENR IRNFSBDC=IRNFSBDC(-1)+IRNFSBD  
GENR CIFFOBA8187C=CIFFOBA8187C(-1)+CIFFOBA8187  
GENR IRGBDVC=IRGBDVC(-1) - IRGBDV  
GENR IROLVC=IROLVC(-1)+IROLV  
GENR IROLPVC=IROLPVC(-1)+IROLPV  
GENR IROLGVC=IROLGVC(-1)+IROLGV  
GENR IRGEFIVC=IRGEFIVC(-1)+IRGEFIV  
GENR IRGEFIDC=IRGEFIDC(-1)+IRGEFIV/IREO\*1000

SMPL 1959 2005

GENR IRPOPAPOP=IRPOPA/IRPOP

SMPL 1959 1959

GENR IRINFCPI=(4.37-3.87)/3.87

GENR IRINFWPI=(4.8-4.6)/4.6

SMPL 1959 2005

## Program EVAL200.PRG

'This program evaluates the ex-post simulation of the MODEL\_200 by generating various simulation statistics. The evaluations may be applied to dynamic, static and fitted (static simulation with no-interaction) simulations.

'Note: In model-solve tab tick baseline scenario as active scenario

```
'Initialization:
!START=1959
!END=2003
!LAGSTRUCTURE=1
%MODNAME="Ver6_MODEL_200"
%SYSNAME="SYS_200"
!NVAR=200
!NROWS=!NVAR+2
%SIMULATIONID="_0"
!NSTAT=23
!NCOLS=!NSTAT+3
!MAXIT=50000
!PRECISION=1E-07
!MED=0
!VARIANCE=0
!NOBS= !END-!START+1
SUBROUTINE LOCAL MEDIAN(SERIES DUMMY ,SCALAR !MED, SCALAR !NOBS)
!NOBS1= !NOBS-1
FOR !I=1 TO !NOBS1
    !M=!I+1
    FOR !J=!M TO !NOBS
        IF DUMMY(!I) > DUMMY(!J) THEN !D=DUMMY(!I)
        DUMMY(!I)=DUMMY(!J)
        DUMMY(!J)=!D
    ELSE
    ENDIF
    NEXT !I
NEXT !J
!M=0
FOR !N=0 TO !NOBS
    !M=!M+2
    IF !M>=!NOBS THEN EXITLOOP
    ENDF
NEXT !N
IF !M=!NOBS THEN !K= !NOBS/2
!MED=(DUMMY(!K)+DUMMY(!K+1))/2
ELSE
!K= !NOBS/2
!MED=DUMMY(!K+1)
ENDIF
ENDSUB

SMPL !START !END
TABLE(!NROWS,!NCOLS) SIMSTAT
SETCOLWIDTH(SIMSTAT,1,5)
SETCOLWIDTH(SIMSTAT,2,16)
SETCOLWIDTH(SIMSTAT,3,16)
SETCOLWIDTH(SIMSTAT,4,14)
SETCOLWIDTH(SIMSTAT,5,14)
FOR !J=6 TO !NCOLS
```

```

        SETCOLWIDTH(SIMSTAT,!J,16)
NEXT !J
FOR !J=1 TO !NCOLS
    SETCELL(SIMSTAT,1,!J,0,"C")
NEXT !J
SETLINE(SIMSTAT,2)
FOR !I=3 TO !NROWS
    %NUMBER=@STR(!I-2)+" "
    SETCELL(SIMSTAT,!I,1,%NUMBER,"R",4.0)
    SETCELL(SIMSTAT,!I,2,0,"L")
    SETCELL(SIMSTAT,!I,3,0,"L")
    SETCELL(SIMSTAT,!I,4,0,"R",14.0)
    SETCELL(SIMSTAT,!I,5,0,"R",14.0)
    FOR !J= 6 TO !NCOLS
        SETCELL(SIMSTAT,!I,!J,0,"R",16.5)
    NEXT !J
NEXT !I
SHOW SIMSTAT
GROUP TEMPGROUP
DELETE TEMPGROUP
SOLVE(M=!MAXIT,C=!PRECISION) %MODNAME
{%MODNAME}.MAKEGROUP(A,N) TEMPGROUP @ENDOG
TABLE TEMPTAB
DELETE TEMPTAB
FREEZE(TEMPTAB) TEMPGROUP

FOR !I=1 TO !NVAR
    SIMSTAT(!I+2,3)=TEMPTAB(1,!I+1)+"_0"
    SIMSTAT(!I+2,2)=TEMPTAB(1,!I+1)
    "" SIMSTAT(!I+2,2)=@MID(TEMPTAB(1,!I+1),3,14)
NEXT !I
SIMSTAT(1,1)="No."
SIMSTAT(1,2)="Actual"
SIMSTAT(1,3)="Simulated"
SIMSTAT(1,4)="Observations"
SIMSTAT(1,5)="Non_zero obs"
SIMSTAT(1,6)="Mean actual"
SIMSTAT(1,7)="Mean simulated"
SIMSTAT(1,8)="Mean error"
SIMSTAT(1,9)="VAR(error)"
SIMSTAT(1,10)="SDV(error)"
SIMSTAT(1,11)="Median(error)"
SIMSTAT(1,12)="Max(error)"
SIMSTAT(1,13)="Min(error)"
SIMSTAT(1,14)="Skewness(error)"
SIMSTAT(1,15)="Kurtosis(error)"
SIMSTAT(1,16)="RMS Error"
SIMSTAT(1,17)="M percent error"
SIMSTAT(1,18)="RMS percent error"
SIMSTAT(1,19)="M absolute error"
SIMSTAT(1,20)="MA percent error"
SIMSTAT(1,21)="Corr(act,sim)"
SIMSTAT(1,22)="Cov(act,sim)"
SIMSTAT(1,23)="Theil U-Stat."
SIMSTAT(1,24)="Theil U-Bias"
SIMSTAT(1,25)="Theil U-Var"
SIMSTAT(1,26)="Theil U-Cov"
FOR !I=3 TO !NROWS

```

```

SMPL !START !END
%ACTUAL=SIMSTAT(!I,2)
%SIMULATED=SIMSTAT(!I,3)
%ERROR="E_"+"%ACTUAL
%PERROR="P_"+"%ACTUAL
%APERROR="A_"+"%ACTUAL
SERIES %ACTUAL
SERIES %SIMULATED
SERIES %ERROR
GENR {%ERROR}={%SIMULATED}-{%ACTUAL}
SIMSTAT(!I,4)=@OBS({%ACTUAL})
!AUX0=@OBS({%ACTUAL})
SMPL !START !END IF ({%ACTUAL})<>0
SIMSTAT(!I,5)=@OBS({%ACTUAL})
SMPL !START !END IF ({%ACTUAL})>0
!AUX1=@OBS({%ACTUAL})
IF !AUX1=!AUX0 THEN
GENR {%PERROR}={%ERROR} / {%ACTUAL}
GENR {%APERROR}=ABS({%ERROR} / {%ACTUAL})
ELSE
GENR {%PERROR}=NA
GENR {%APERROR}=NA
ENDIF
SMPL !START !END
GENR TEMP1=({%ERROR}-@MEAN({%ERROR}))^3
GENR TEMP2=({%ERROR}-@MEAN({%ERROR}))^4
SIMSTAT(!I,6)=@MEAN({%ACTUAL})
SIMSTAT(!I,7)=@MEAN({%SIMULATED})
SIMSTAT(!I,8)=@MEAN({%ERROR})
!VARIANCE=@VAR({%ERROR})*@OBS({%ERROR})/(@OBS({%ERROR})-1)
SIMSTAT(!I,9)=!VARIANCE
SIMSTAT(!I,10)=SQR(!VARIANCE)
CALL MEDIAN({%ERROR}, !MED, !NOBS)
SIMSTAT(!I,11)=!MED
GENR {%ERROR}={%SIMULATED}-{%ACTUAL}
SIMSTAT(!I,12)=@MAX({%ERROR})
SIMSTAT(!I,13)=@MIN({%ERROR})
IF !VARIANCE<>0 THEN
SIMSTAT(!I,14)=
@MEAN(TEMP1)/(!VARIANCE^1.5)*@OBS({%ERROR})/(@OBS({%ERROR})-1)
SIMSTAT(!I,15)=@MEAN(TEMP2)/(!VARIANCE^2)*@OBS({%ERROR})/(@OBS({%ERROR})-1)
ELSE
ENDIF
SIMSTAT(!I,16)=SQR( @SUMSQ({%ERROR})/@OBS({%ERROR}))
SMPL !START !END IF ({%ACTUAL})<>0
IF !AUX1=!AUX0 THEN
SIMSTAT(!I,17)=@MEAN({%PERROR})
SIMSTAT(!I,18)=SQR(@SUMSQ({%PERROR})/@OBS({%PERROR}))
ELSE
SIMSTAT(!I,17)="NA"
SIMSTAT(!I,18)="NA"
ENDIF
SMPL !START !END
SIMSTAT(!I,19)=@SUM(ABS({%ERROR})/@OBS({%ERROR}))
SMPL !START !END IF ({%ACTUAL})<>0
IF !AUX1=!AUX0 THEN
SIMSTAT(!I,20)=@SUM(ABS({%APERROR})/@OBS({%ERROR}))

```

```

ELSE
SIMSTAT(!I,20)="NA"
ENDIF
SMPL !START !END
SIMSTAT(!I,21)=@COR({%ACTUAL},{%SIMULATED})
SIMSTAT(!I,22)=@COV({%ACTUAL},{%SIMULATED})
SIMSTAT(!I,23)=SQR( @SUMSQ({%ERROR})/@OBS({%ERROR})) /
(SQR(@SUMSQ({%SIMULATED})/@OBS({%ERROR})) +
SQR(@SUMSQ({%ACTUAL})/@OBS({%ERROR})))
IF !VARIANCE>0.00001 THEN
SIMSTAT(!I,24)= ( (@MEAN({%SIMULATED})-@MEAN({%ACTUAL}))^2 ) / (
@SUMSQ({%ERROR})/@OBS({%ERROR}))
SIMSTAT(!I,25)= ( (SQR(@VAR({%SIMULATED}))-SQR(@VAR({%ACTUAL})))^2 ) / (
@SUMSQ({%ERROR})/@OBS({%ERROR}))
SIMSTAT(!I,26)= ( 2*(1-@COR({%SIMULATED},{%ACTUAL}))*(
SQR(@VAR({%SIMULATED}))*SQR(@VAR({%ACTUAL}))) ) / (
@SUMSQ({%ERROR})/@OBS({%ERROR}))
ELSE
SIMSTAT(!I,24)=0
SIMSTAT(!I,25)=0
SIMSTAT(!I,26)=1
ENDIF
'  DELETE {%SIMULATED}
DELETE {%ERROR}
DELETE {%PERROR}
DELETE {%APEROR}
NEXT !I
SETLINE (SIMSTAT,!NROWS+1)
SHOW SIMSTAT
DELETE TEMP1 TEMP2
DELETE TEMPTAB

```

## Program EVAL200FORCASTABILITY.PRG

This program evaluates the ex-post simulation of the MODEL\_200 by generating various simulation statistics. The evaluation is applied to dynamic short term simulations with different time periods.

```
'Initialization:
!START=1959
!END=2003
!LAGSTRUCTURE=1
%MODNAME="Ver6_MODEL_200"
%SYSNAME="SYS_200"
!NVAR=200
!NROWS=!NVAR+2
%SIMULATIONID="_0"
!NSTAT=23
!NCOLS=!NSTAT+3
!MAXIT=50000
!PRECISION=1E-07
!MED=0
!VARIANCE=0
!NOBS= !END-!START+1

!PERIOD=1
SUBROUTINE LOCAL MEDIAN(SERIES DUMMY ,SCALAR !MED, SCALAR !NOBS)
!NOBS1= !NOBS-1
FOR !I=1 TO !NOBS1
    !M=!I+1
    FOR !J=!M TO !NOBS
        IF DUMMY(!I) > DUMMY(!J) THEN !D=DUMMY(!I)
        DUMMY(!I)=DUMMY(!J)
        DUMMY(!J)=!D
    ELSE
    ENDIF
    NEXT !J
NEXT !I
!M=0
FOR !N=0 TO !NOBS
    !M=!M+2
    IF !M>=!NOBS THEN EXITLOOP
ENDIF
NEXT !N
IF !M=!NOBS THEN !K= !NOBS/2
!MED=(DUMMY(!K)+DUMMY(!K+1))/2
ELSE
!K= !NOBS/2
!MED=DUMMY(!K+1)
ENDIF
ENDSUB

SMPL !START !END
TABLE(!NROWS,!NCOLS) SIMSTAT
SETCOLWIDTH(SIMSTAT,1,5)
SETCOLWIDTH(SIMSTAT,2,16)
SETCOLWIDTH(SIMSTAT,3,16)
SETCOLWIDTH(SIMSTAT,4,14)
SETCOLWIDTH(SIMSTAT,5,14)
FOR !J=6 TO !NCOLS
    SETCOLWIDTH(SIMSTAT,!J,16)
```

```

NEXT !J
FOR !J=1 TO !NCOLS
    SETCELL(SIMSTAT,1,!J,0,"C")
NEXT !J
SETLINE(SIMSTAT,2)
FOR !I=3 TO !NROWS
    %NUMBER=@STR(!I-2)+" "
    SETCELL(SIMSTAT,!I,1,%NUMBER,"R",4.0)
    SETCELL(SIMSTAT,!I,2,0,"L")
    SETCELL(SIMSTAT,!I,3,0,"L")
    SETCELL(SIMSTAT,!I,4,0,"R",14.0)
    SETCELL(SIMSTAT,!I,5,0,"R",14.0)
    FOR !J= 6 TO !NCOLS
        SETCELL(SIMSTAT,!I,!J,0,"R",16.5)
    NEXT !J
NEXT !I
SHOW SIMSTAT
GROUP TEMPGROUP
DELETE TEMPGROUP
SOLVE(M=!MAXIT,C=!PRECISION) %MODNAME
{%MODNAME}.MAKEGROUP(A,N) TEMPGROUP @ENDOG
TABLE TEMPTAB
DELETE TEMPTAB
FREEZE(TEMPTAB) TEMPGROUP
FOR !I=1 TO !NVAR
    SIMSTAT(!I+2,3)=TEMPTAB(1,!I+1)+"_0"
    SIMSTAT(!I+2,2)=TEMPTAB(1,!I+1)
NEXT !I

%SIMTAG="_"+@STR(!PERIOD)
!IDLEPERIOD=0

FOR !N=!END TO !START+!LAGSTRUCTURE STEP -!PERIOD
    IF !N-!PERIOD<!START+!LAGSTRUCTURE-1 THEN EXITLOOP
ELSE
    !IDLEPERIOD=!N-!PERIOD+1
    ENDIF
    SMPL !N-!PERIOD+1 !N
    SOLVE(M=!MAXIT,C=!PRECISION) %MODNAME

FOR !I=3 TO !NROWS
    %PERIODSIMULATED=SIMSTAT(!I,2)+%SIMTAG
    %SIMULATED=SIMSTAT(!I,3)
    SERIES %PERIODSIMULATED
    SERIES %SIMULATED
    GENR {%PERIODSIMULATED}={%SIMULATED}
NEXT !I
NEXT !N

!START=!IDLEPERIOD
!END=!END
SMPL !START !END

SIMSTAT(1,1)="No."
SIMSTAT(1,2)="Actual"
SIMSTAT(1,3)="Simulated"
SIMSTAT(1,4)="Observations"
SIMSTAT(1,5)="Non_zero obs"

```

```

SIMSTAT(1,6)="Mean actual"
SIMSTAT(1,7)="Mean simulated"
SIMSTAT(1,8)="Mean error"
SIMSTAT(1,9)="VAR(error)"
SIMSTAT(1,10)="SDV(error)"
SIMSTAT(1,11)="Median(error)"
SIMSTAT(1,12)="Max(error)"
SIMSTAT(1,13)="Min(error)"
SIMSTAT(1,14)="Skewness(error)"
SIMSTAT(1,15)="Kurtosis(error)"
SIMSTAT(1,16)="RMS Error"
SIMSTAT(1,17)="M percent error"
SIMSTAT(1,18)="RMS percent error"
SIMSTAT(1,19)="M absolute error"
SIMSTAT(1,20)="MA percent error"
SIMSTAT(1,21)="Corr(act,sim)"
SIMSTAT(1,22)="Cov(act,sim)"
SIMSTAT(1,23)="Theil U-Stat."
SIMSTAT(1,24)="Theil U-Bias"
SIMSTAT(1,25)="Theil U-Var"
SIMSTAT(1,26)="Theil U-Cov"
FOR !I=3 TO !NROWS
  SMPL !START !END
  %ACTUAL=SIMSTAT(!I,2)
  %SIMULATED=SIMSTAT(!I,2)+%SIMTAG
  SIMSTAT(!I,3)=%SIMULATED
  %ERROR="E_"+"%ACTUAL
  %PERROR="P_"+"%ACTUAL
  %APEROR="A_"+"%ACTUAL
  SERIES %ACTUAL
  SERIES %SIMULATED
  SERIES %ERROR
  GENR {%ERROR}={%SIMULATED}-{%ACTUAL}
  SIMSTAT(!I,4)=@OBS({%ACTUAL})
  !AUX0=@OBS({%ACTUAL})
  SMPL !START !END IF ({%ACTUAL})<>0
  SIMSTAT(!I,5)=@OBS({%ACTUAL})
  SMPL !START !END IF ({%ACTUAL})>0
  !AUX1=@OBS({%ACTUAL})
  IF !AUX1=!AUX0 THEN
    GENR {%PERROR}={%ERROR} / {%ACTUAL}
    GENR {%APEROR}=ABS({%ERROR} / {%ACTUAL})
  ELSE
    GENR {%PERROR}=NA
    GENR {%APEROR}=NA
  ENDIF
  SMPL !START !END
  GENR TEMP1=({%ERROR}-@MEAN({%ERROR}))^3
  GENR TEMP2=({%ERROR}-@MEAN({%ERROR}))^4
  SIMSTAT(!I,6)=@MEAN({%ACTUAL})
  SIMSTAT(!I,7)=@MEAN({%SIMULATED})
  SIMSTAT(!I,8)=@MEAN({%ERROR})
  !VARIANCE=@VAR({%ERROR})*@OBS({%ERROR})/(@OBS({%ERROR})-1)
  SIMSTAT(!I,9)!=VARIANCE
  SIMSTAT(!I,10)=SQR(!VARIANCE)
  CALL MEDIAN({%ERROR}, !MED, !NOBS)
  SIMSTAT(!I,11)!=MED
  GENR {%ERROR}={%SIMULATED}-{%ACTUAL}

```



```

SIMSTAT(!I,12)=@MAX({%ERROR})
SIMSTAT(!I,13)=@MIN({%ERROR})
IF !VARIANCE<>0 THEN
SIMSTAT(!I,14)=
@MEAN(TEMP1)/(!VARIANCE^1.5)*@OBS({%ERROR})/(@OBS({%ERROR})-1)

SIMSTAT(!I,15)=@MEAN(TEMP2)/(!VARIANCE^2)*@OBS({%ERROR})/(@OBS({%ERROR})-1)
ELSE
ENDIF
SIMSTAT(!I,16)=SQR( @SUMSQ({%ERROR})/@OBS({%ERROR}))
SMPL !START !END IF ({%ACTUAL})<>0
IF !AUX1=!AUX0 THEN
SIMSTAT(!I,17)=@MEAN({%PERROR})
SIMSTAT(!I,18)=SQR(@SUMSQ({%PERROR})/@OBS({%PERROR}))
ELSE
SIMSTAT(!I,17)="NA"
SIMSTAT(!I,18)="NA"
ENDIF
SMPL !START !END
SIMSTAT(!I,19)=@SUM(ABS({%ERROR}))/@OBS({%ERROR})
SMPL !START !END IF ({%ACTUAL})<>0
IF !AUX1=!AUX0 THEN
SIMSTAT(!I,20)=@SUM(ABS({%APERROR}))/@OBS({%ERROR})
ELSE
SIMSTAT(!I,20)="NA"
ENDIF
SMPL !START !END
SIMSTAT(!I,21)=@COR({%ACTUAL},{%SIMULATED})
SIMSTAT(!I,22)=@COV({%ACTUAL},{%SIMULATED})
SIMSTAT(!I,23)=SQR( @SUMSQ({%ERROR})/@OBS({%ERROR})) /
(SQR(@SUMSQ({%SIMULATED})/@OBS({%ERROR})) +
SQR(@SUMSQ({%ACTUAL})/@OBS({%ERROR})))
IF !VARIANCE<>0 THEN
SIMSTAT(!I,24)= ( (@MEAN({%SIMULATED})-@MEAN({%ACTUAL}))^2) / (
@SUMSQ({%ERROR})/@OBS({%ERROR}))
SIMSTAT(!I,25)= ( (SQR(@VAR({%SIMULATED}))-SQR(@VAR({%ACTUAL})))^2) / (
@SUMSQ({%ERROR})/@OBS({%ERROR}))
SIMSTAT(!I,26)= ( 2*(1-@COR({%SIMULATED},{%ACTUAL}))*(
SQR(@VAR({%SIMULATED}))*SQR(@VAR({%ACTUAL}))) ) / (
@SUMSQ({%ERROR})/@OBS({%ERROR}))
ELSE
SIMSTAT(!I,24)=0
SIMSTAT(!I,25)=0
SIMSTAT(!I,26)=1
ENDIF
'
DELETE {%SIMULATED}
DELETE {%ERROR}
DELETE {%PERROR}
DELETE {%APERROR}
NEXT !I
SETLINE (SIMSTAT,!NROWS+1)
SHOW SIMSTAT
DELETE TEMP1 TEMP2
DELETE TEMPTAB

```

## Program SHOCK200.PRG

This program evaluates the ex-post policy shock analysis of the MODEL\_200. By defining different individual shock policies this program creates new simulated values and compares them with control solution created by solution of the MODEL\_200 with no policy shock.

'Initialization:

```
!START=1959
!END=2003
!SIMSTART=2000
!SIMEND=2003
%MODNAME="ver6_model_200"
%SYSNAME="SYS_200"
%SOLUTIONID="_1"
!NVAR=200
!NROWS=!NVAR+6
!MAXIT=50000
!PRECISION=1E-07
!NOBS= !SIMEND-!SIMSTART+1
!NCOLS=!NOBS+2
```

```
SUBROUTINE SHOCKTABLE(STRING %SOLUTION)
DELETE {%SOLUTION}
COPY TABFORM {%SOLUTION}
{%SOLUTION}(1,1)=%SOLUTION+" SOLUTION TABLE"
{%SOLUTION}(2,1)="Dynamic solution of the model "+ %MODNAME+ " for the period of
"+@STR(!SIMSTART)+ " to "+@STR(!SIMEND)
{%SOLUTION}(3,1)=%DESCRIPTION
SMPL !SIMSTART !SIMEND
SOLVE(M=!MAXIT,C=!PRECISION) %MODNAME
```

```
{%MODNAME}.MAKEGROUP TEMPGROUP @ENDOG
TABLE TEMPTAB
DELETE TEMPTAB
FREEZE(TEMPTAB) TEMPGROUP
DELETE TEMPGROUP
FOR !I=1 TO !NVAR
  !SUMSOLUTION=0
  FOR !J=1 TO !NOBS
    {%SOLUTION}(!I+6,!J+2)=@VAL(TEMPTAB(!J+2,!I+1))
    !SUMSOLUTION=!SUMSOLUTION+{%SOLUTION}(!I+6,!J+2)
  NEXT !J
  {%SOLUTION}(!I+6,!NCOLS+1)=!SUMSOLUTION/!NOBS
NEXT !I
DELETE TEMPTAB
'SHOW %SOLUTION
ENDSUB
```

```
SUBROUTINE SHOCKSTAT(STRING %SHOCK, STRING %DIFFERENCE, STRING
%PERCENTCHANGE)
DELETE {%DIFFERENCE}
DELETE {%PERCENTCHANGE}
COPY TABFORM {%DIFFERENCE}
COPY TABFORM {%PERCENTCHANGE}
{%DIFFERENCE}(1,1)=%DIFFERENCE+" TABLE"
{%DIFFERENCE}(2,1)="Difference of shocked solution from control solution"
{%DIFFERENCE}(3,1)=%DESCRIPTION
{%PERCENTCHANGE}(1,1)=%PERCENTCHANGE+" TABLE"
```

```

{%PERCENTCHANGE}(2,1)="Percentage change of shocked solution from control solution (%)"
{%PERCENTCHANGE}(3,1)=%DESCRIPTION
FOR !I=7 TO !NROWS
  !SUMDIF=0
  !SUMPCH=0
  %FLAG="NO"
  FOR !J=3 TO !NCOLS
    {%DIFFERENCE}(!I,!J)=@VAL({%SHOCK}(!I,!J)) -@VAL(CONTROL(!I,!J))
    !SUMDIF=!SUMDIF+{%DIFFERENCE}(!I,!J)
    IF @VAL(CONTROL(!I,!J)) > 0 THEN
      {%PERCENTCHANGE}(!I,!J)=100*{%DIFFERENCE}(!I,!J)/(@VAL(CONTROL(!I,!J)))
      !SUMPCH=!SUMPCH+{%PERCENTCHANGE}(!I,!J)
    ELSE
      %FLAG="YES"
      {%PERCENTCHANGE}(!I,!J)=NA
    ENDIF
  NEXT !J
  {%DIFFERENCE}(!I,!NCOLS+1)=!SUMDIF!/NOBS
  IF %FLAG="NO" THEN
    {%PERCENTCHANGE}(!I,!NCOLS+1)=!SUMPCH!/NOBS
  ELSE
    {%PERCENTCHANGE}(!I,!NCOLS+1)=NA
  ENDIF
NEXT !I
'SHOW {%DIFFERENCE}
SHOW {%PERCENTCHANGE}
SMPL !START !END
ENDSUB

TABLE TABFORM
DELETE TABFORM
TABLE(!NROWS,!NCOLS+1) TABFORM
SETCOLWIDTH(TABFORM,1,5)
SETCOLWIDTH(TABFORM,2,16)
FOR !J=3 TO !NCOLS+1
  SETCOLWIDTH(TABFORM,!J,12)
NEXT !J
SETLINE(TABFORM,4)
SETLINE(TABFORM,6)
FOR !J=3 TO !NCOLS+1
  SETCELL(TABFORM,5,!J,!J+!SIMSTART-3,"C",4.0)
NEXT !J
FOR !I=7 TO !NROWS
  %NUMBER=@STR(!I-6)+" "
  SETCELL(TABFORM,!I,1,%NUMBER,"R",4.0)
  SETCELL(TABFORM,!I,2,0,"L")
  FOR !J= 3 TO !NCOLS+1
    SETCELL(TABFORM,!I,!J,0,"R",12.3)
  NEXT !J
NEXT !I
TABFORM(5,1)="No."
TABFORM(5,2)="Variabe Name"
TABFORM(5,!NCOLS+1)="Period Mean"
SETLINE (TABFORM,!NROWS+1)
{%MODNAME}.MAKEGROUP TEMPGROUP2 @ENDOG

TABLE TEMPTAB
DELETE TEMPTAB

```

```

FREEZE(TEMPTAB) TEMPGROUP2
DELETE TEMPGROUP2
FOR !I=1 TO !NVAR
  TABFORM(!I+6,2)=TEMPTAB(1,!I+1)
NEXT !I
DELETE TEMPTAB

```

```

TABLE CONTROL
%DESCRIPTION="Pre-shock solution"
CALL SHOCKTABLE("CONTROL")

```

```

TABLE SHK_IRWPOIL
SMPL !SIMSTART !SIMEND
GENR TEMP=IRWPOIL
GENR IRWPOIL=IRWPOIL+1
%DESCRIPTION="Policy shock: 1 dollar increase in foreign price of oil"
CALL SHOCKTABLE("SHK_IRWPOIL")
SMPL !SIMSTART !SIMEND
GENR IRWPOIL=TEMP
TABLE DIF_IRWPOIL
TABLE PCH_IRWPOIL
CALL SHOCKSTAT("SHK_IRWPOIL", "DIF_IRWPOIL", "PCH_IRWPOIL")

```

```

TABLE SHK_IRYOILB
SMPL !SIMSTART !SIMEND
GENR TEMP=IRYOILB
GENR IRYOILB=IRYOILB*(1+0.10)
%DESCRIPTION="Policy shock: %10 increase in production of oil"
CALL SHOCKTABLE("SHK_IRYOILB")
SMPL !SIMSTART !SIMEND
GENR IRYOILB=TEMP
TABLE DIF_IRYOILB
TABLE PCH_IRYOILB
CALL SHOCKSTAT("SHK_IRYOILB", "DIF_IRYOILB", "PCH_IRYOILB")

```

```

TABLE SHK_IRESO
SMPL !SIMSTART !SIMEND
GENR TEMP=IRESO
GENR IRESO=IRESO*(1+0.10)
%DESCRIPTION="Policy shock: %10 devaluation of official exchange rate against dollar"
CALL SHOCKTABLE("SHK_IRESO")
SMPL !SIMSTART !SIMEND
GENR IRESO=TEMP
TABLE DIF_IRESO
TABLE PCH_IRESO
CALL SHOCKSTAT("SHK_IRESO", "DIF_IRESO", "PCH_IRESO")

```

```

TABLE SHK_IRESX
SMPL !SIMSTART !SIMEND
GENR TEMP=IRESX
GENR IRESX=IRESX*(1+0.10)
%DESCRIPTION="Policy shock: %10 devaluation of export exchange rate against dollar"
CALL SHOCKTABLE("SHK_IRESX")
SMPL !SIMSTART !SIMEND
GENR IRESX=TEMP
TABLE DIF_IRESX
TABLE PCH_IRESX
CALL SHOCKSTAT("SHK_IRESX", "DIF_IRESX", "PCH_IRESX")

```

```

TABLE SHK_IRKAD
SMPL !SIMSTART !SIMEND
GENR TEMP=IRKAD
GENR IRKAD=IRKAD+1000
%DESCRIPTION="Policy shock: 1000 million dollars increase in capital account"
CALL SHOCKTABLE("SHK_IRKAD")
SMPL !SIMSTART !SIMEND
GENR IRKAD=TEMP
TABLE DIF_IRKAD
TABLE PCH_IRKAD
CALL SHOCKSTAT("SHK_IRKAD", "DIF_IRKAD", "PCH_IRKAD")

```

```

TABLE SHK_OECDP
SMPL !SIMSTART !SIMEND
GENR TEMP=OECDP
GENR OECDP=OECDP*(1+0.10)
%DESCRIPTION="Policy shock: %10 increase in domestic prices of industrial countries"
CALL SHOCKTABLE("SHK_OECDP")
SMPL !SIMSTART !SIMEND
GENR OECDP=TEMP
TABLE DIF_OECDP
TABLE PCH_OECDP
CALL SHOCKSTAT("SHK_OECDP", "DIF_OECDP", "PCH_OECDP")

```

```

TABLE SHK_IRCIFP
SMPL !SIMSTART !SIMEND
GENR TEMP=IRCIFP
GENR IRCIFP=IRCIFP*(1+0.10)
%DESCRIPTION="Policy shock: %10 increase in CIF import prices"
CALL SHOCKTABLE("SHK_IRCIFP")
SMPL !SIMSTART !SIMEND
GENR IRCIFP=TEMP
TABLE DIF_IRCIFP
TABLE PCH_IRCIFP
CALL SHOCKSTAT("SHK_IRCIFP", "DIF_IRCIFP", "PCH_IRCIFP")

```

```

TABLE SHK_LIBOR
SMPL !SIMSTART !SIMEND
GENR TEMP=LIBOR
GENR LIBOR=LIBOR+1.00
%DESCRIPTION="Policy shock: %1 increase in London inter bank offer rate"
CALL SHOCKTABLE("SHK_LIBOR")
SMPL !SIMSTART !SIMEND
GENR LIBOR=TEMP
TABLE DIF_LIBOR
TABLE PCH_LIBOR
CALL SHOCKSTAT("SHK_LIBOR", "DIF_LIBOR", "PCH_LIBOR")

```

```

TABLE SHK_IRFEOAV
SMPL !SIMSTART !SIMEND
GENR TEMP=IRFEOAV
GENR IRFEOAV=IRFEOAV+1000
%DESCRIPTION="Policy shock: 1000 billion rials increase in foreign exchange obligation account"
CALL SHOCKTABLE("SHK_IRFEOAV")
SMPL !SIMSTART !SIMEND
GENR IRFEOAV=TEMP
TABLE DIF_IRFEOAV

```

```
TABLE PCH_IRFEOAV
CALL SHOCKSTAT("SHK_IRFEOAV", "DIF_IRFEOAV", "PCH_IRFEOAV")
```

```
TABLE SHK_IROLGV
SMPL !SIMSTART !SIMEND
GENR TEMP=IROLGV
GENR IROLGV=IROLGV+1000
%DESCRIPTION="Policy shock: 1000 billion rials increase in government budget government
obligation loans"
CALL SHOCKTABLE("SHK_IROLGV")
SMPL !SIMSTART !SIMEND
GENR IROLGV=TEMP
TABLE DIF_IROLGV
TABLE PCH_IROLGV
CALL SHOCKSTAT("SHK_IROLGV", "DIF_IROLGV", "PCH_IROLGV")
```

```
TABLE SHK_IROLPV
SMPL !SIMSTART !SIMEND
GENR TEMP=IROLPV
GENR IROLPV=IROLPV+1000
%DESCRIPTION="Policy shock: 1000 billion rials increase in government budget private obligation
loans"
CALL SHOCKTABLE("SHK_IROLPV")
SMPL !SIMSTART !SIMEND
GENR IROLPV=TEMP
TABLE DIF_IROLPV
TABLE PCH_IROLPV
CALL SHOCKSTAT("SHK_IROLPV", "DIF_IROLPV", "PCH_IROLPV")
```

```
TABLE SHK_IRGRDSV
SMPL !SIMSTART !SIMEND
GENR TEMP=IRGRDSV
GENR IRGRDSV=IRGRDSV+1000
%DESCRIPTION="Policy shock: 1000 billion rials increase in dollar sale revenue"
CALL SHOCKTABLE("SHK_IRGRDSV")
SMPL !SIMSTART !SIMEND
GENR IRGRDSV=TEMP
TABLE DIF_IRGRDSV
TABLE PCH_IRGRDSV
CALL SHOCKSTAT("SHK_IRGRDSV", "DIF_IRGRDSV", "PCH_IRGRDSV")
```

```
TABLE SHK_IRGECV
SMPL !SIMSTART !SIMEND
GENR TEMP=IRGECV
GENR IRGECV=IRGECV*(1+0.10)
%DESCRIPTION="Policy shock: %10 increase in government current expenditures"
CALL SHOCKTABLE("SHK_IRGECV")
SMPL !SIMSTART !SIMEND
GENR IRGECV=TEMP
TABLE DIF_IRGECV
TABLE PCH_IRGECV
CALL SHOCKSTAT("SHK_IRGECV", "DIF_IRGECV", "PCH_IRGECV")
```

```
TABLE SHK_IRGEDV
SMPL !SIMSTART !SIMEND
GENR TEMP=IRGEDV
GENR IRGEDV=IRGEDV*(1+0.10)
%DESCRIPTION="Policy shock: %10 increase in government development expenditures"
```

```

CALL SHOCKTABLE("SHK_IRGEDV")
SMPL !SIMSTART !SIMEND
GENR IRGEDV=TEMP
TABLE DIF_IRGEDV
TABLE PCH_IRGEDV
CALL SHOCKSTAT("SHK_IRGEDV", "DIF_IRGEDV", "PCH_IRGEDV")

```

```

'TABLE SHK_IRGESPV
'SMPL !SIMSTART !SIMEND
'GENR TEMP=IRGESPV
'GENR IRGESPV=IRGESPV+1000
'%DESCRIPTION="Policy shock: 1000 billion rials increase in government special payments"
'CALL SHOCKTABLE("SHK_IRGESPV")
'SMPL !SIMSTART !SIMEND
'GENR IRGESPV=TEMP
'TABLE DIF_IRGESPV
'TABLE PCH_IRGESPV
'CALL SHOCKSTAT("SHK_IRGESPV", "DIF_IRGESPV", "PCH_IRGESPV")

```

```

TABLE SHK_IRPDOIL
SMPL !SIMSTART !SIMEND
GENR TEMP=IRPDOIL
GENR IRPDOIL=IRPDOIL*(1+0.10)
%DESCRIPTION="Policy shock: %10 increase in domestic prices of oil products"
CALL SHOCKTABLE("SHK_IRPDOIL")
SMPL !SIMSTART !SIMEND
GENR IRPDOIL=TEMP
TABLE DIF_IRPDOIL
TABLE PCH_IRPDOIL
CALL SHOCKSTAT("SHK_IRPDOIL", "DIF_IRPDOIL", "PCH_IRPDOIL")

```

```

'TABLE SHK_IRGEFIV
'SMPL !SIMSTART !SIMEND
'GENR TEMP=IRGEFIV
'GENR IRGEFIV=IRGEFIV+100*IRES
'%DESCRIPTION="Policy shock: 100 million dollars increase in government foreign investment"
'CALL SHOCKTABLE("SHK_IRGEFIV")
'SMPL !SIMSTART !SIMEND
'GENR IRGEFIV=TEMP
'TABLE DIF_IRGEFIV
'TABLE PCH_IRGEFIV
'CALL SHOCKSTAT("SHK_IRGEFIV", "DIF_IRGEFIV", "PCH_IRGEFIV")

```

```

TABLE SHK_IRIRL
SMPL !SIMSTART !SIMEND
GENR TEMP=IRIRL
GENR IRIRL=IRIRL +1
%DESCRIPTION="Policy shock: %1 increase in banking loans interest rate"
CALL SHOCKTABLE("SHK_IRIRL")
SMPL !SIMSTART !SIMEND
GENR IRIRL=TEMP
TABLE DIF_IRIRL
TABLE PCH_IRIRL
CALL SHOCKSTAT("SHK_IRIRL", "DIF_IRIRL", "PCH_IRIRL")

```

```

TABLE SHK_IRIRS
SMPL !SIMSTART !SIMEND
GENR TEMP=IRIRS

```

```

GENR IRIRS=IRIRS +1
%DESCRIPTION="Policy shock: %1 increase in saving deposits interest rate"
CALL SHOCKTABLE("SHK_IRIRS")
SMPL !SIMSTART !SIMEND
GENR IRIRS=TEMP
TABLE DIF_IRIRS
TABLE PCH_IRIRS
CALL SHOCKSTAT("SHK_IRIRS", "DIF_IRIRS", "PCH_IRIRS")

TABLE SHK_IRMACHIMV
SMPL !SIMSTART !SIMEND
GENR TEMP=IRMACHIMV
GENR IRMACHIMV=IRMACHIMV+0.01
%DESCRIPTION="Policy shock: %1 increase in import share of machinery and equipments"
CALL SHOCKTABLE("SHK_IRMACHIMV")
SMPL !SIMSTART !SIMEND
GENR IRMACHIMV=TEMP
TABLE DIF_IRMACHIMV
TABLE PCH_IRMACHIMV
CALL SHOCKSTAT("SHK_IRMACHIMV", "DIF_IRMACHIMV", "PCH_IRMACHIMV")

FOR !I=1 TO !NVAR
  %CLEAN=@MID(TABFORM(!I+6,2),1,16)
  DELETE %CLEAN
NEXT !I
DELETE TEMP TABFORM

```



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