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GRADUATE PROGRAM IN FINANCIAL ECONOMICS

THESIS: ESTIMATING A SMALL SCALE MACROECONOMETRIC MODEL OF GREECE

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1. INTRODUCTION

1.1. Macroeconometric models in general.

1.1.a. Categories of Macroeconometric models.

A model is a simplified description of reality. A macroeconometric model is a description of the economy as a whole, one that has emerged from the data we have concerning the operation of the economy, through the process of estimating the equations that describe that operation.

Describing the economy can be done in several ways, i.e. by using several modeling techniques, the latter ranging from the strict theoretical models to the data based ones.

The first end of the modeling spectrum is the theoretical models, which are basically models founded on the notion of equilibrium and optimizing behavior of individuals. Such models, although useful in analyzing the behavior of the economy and its participants rarely fit the data, even after calibration or the finest of assumptions. They are more useful to channel one's way of thinking in a particular way or to give us qualitative models.

In the middle of the spectrum of modelling approaches are the structural macroeconometric models. Such models have a theoretical foundation, meaning that their basic equations have properties that satisfy some crucial theoretical results, yet their equations have been estimated from the data using appropriate econometric techniques. Such models vary enormously in the number of equations, from large scale models with hundreds of equations, like the ones that were built in the sixties, to medium sized models with fifteen to thirty or even forty estimated equations, to small-sized ones with less than ten equations, the latter being a very aggregated – undetailed description of the economy.

At the other end of the modelling strategies are the data based models, like, for example, the vector autoregression models (VAR). These models do not require many theoretical assumptions for the structure of the economy, apart from the ones necessary for the selection of the variables to include in the system. They are essentially a statistical description of the past interrelations among the variables of the economy. However, there are limitations on the number of variables that can be included in a VAR, as well as in the number of lags, due to the number of parameters that must be estimated. VARs are mainly used for short term forecasting, under the assumption of the continuation of the existing interactions among the variables, and for examining the effects of economic shocks on the system. A modification of the VAR models are the structural VAR (SVAR) models, where in some of the entries of the coefficient matrices are imposed restrictions derived from economic theory; in this case the shocks (the residuals in MA representation) can have some economic meaning.

1.1.b. Main uses of macroeconometric models.

The macroeconometric models tell us how the economy generally works, or at least how it has on average worked in the past. This knowledge, especially if the economy is not going to (or not expected to) change the way of operating in the future, is very useful, because we can project the past behaviour into the future. The previous characteristic is essential if we are to use the macroeconometric model we have estimated.

The main uses of macroeconometric models are the following. The first use is for forecasting purposes; the model forecasts the future values of the endogenous variables. These forecasts will provide to us some expectation of the future, and if the forecasts are reasonably accurate, they will help us prepare for the future economic conditions and anticipate the likely actions of the other agents of the economy, or they, in the case of the government, will help them to channel the economy to the desired path.

The other main use of a macroeconometric model is its utilization in order to run simulations with it. This way we can perform “experiments”, which indicate the likely reaction of the economy to a shock – to particular values or paths in a set of the exogenous variables of the model. A particularly common subsection of simulation is policy analysis, which is running a simulation under a particular policy assumption, and indicates the most probable reaction of the economy to the specific policy; this way we can even experiment with different policies, comparing them in the “laboratory” of the model.

1.2. OVERVIEW OF THE MODEL.

My thesis concerns estimating a macroeconometric model of Greece. The model that is going to be estimated is based on the existing GRMOD of Professor Dimitrios Malliaropulos. It consists of 25 estimated equations, plus 7 estimated equations belonging in the model of the Eurozone, and 31 identities (and a minimized equation). There are 15 exogenous and 74 endogenous variables for both models, 59 of which belong to GRMOD (time trend and dummies are not included). Most of the model has remained unchanged, and it will simply be reestimated in order to be updated. There are, however, extensive modifications in the equations that model the monetary sector and the exchange rate sector of the economy, because of the monetary union, of which Greece is a full member from January 2001 onward. This structural change rendered the respecification of these two sectors imperative, and led to the estimation of a small model for the Economic and Monetary Union (EMU), so that the inclusion of a monetary policy reaction function in a form of a Taylor rule becomes feasible.

The general structure of the model is a fairly standard one. It is neoclassical in the long run and keynesian in the short. Potential output is given by a Cobb-Douglas production function, where output is determined by capital stock, equilibrium labour force and technology (total factor productivity – this is given as a time trend).

Yet, in the short run, it is demand that drives GDP. Total demand comprises of consumer expenditure, investment expenditure, both private and public, government expenditure and export minus imports. All these variables are estimated, except from the ones that are directly set by the government, in particular government investment and consumption. Wages gradually adjust to the potential productivity, ensuring that the share of wages in GDP remains stable.

Money demand is a function of the price level and real GDP. The GDP deflator, which is considered the most important price measure of the economy, is a function of nominal variables for the most part, ensuring long run money neutrality, as the quantity theory of money predicts. The only real input, the ratio of real wages to real GDP, is stable in the long run. The other price measures are modelled as functions of the GDP deflator, except from the import deflator, which is derived from the prices of the main components of imports.

Expectations are both forward and backward looking and from 2001 onward they fall into an autoregressive process (this happens because we consider the target-equilibrium inflation 2% - we accept this policy target as credible). Only the real 12-month T-Bill rate is modelled due to lack of data on other interest rates. The exchange rate is modelled in two parts: one describes the pre monetary union nominal effective and real effective exchange rates, and the other the (hypothetical) post EMU real effective exchange rate of the greek economy, as an attempt to measure a part of the competitiveness of the greek economy inside EMU. The government sector comprises mostly of accounting identities, and only the tax reaction function is estimated.

The structure of the small EMU model is the following. Potential output is derived from a Hoddrick-Prescott filter that discloses the long run trend of output. We model the change of the natural logarithm of the total EMU output and the change of the natural logarithm of the EMU GDP deflator, as well as the change of the real effective exchange rate of the euro. This way we have the necessary input to estimate the aggregate ECB monetary policy reaction function in the form of a Taylor rule in the deviation of inflation from the target and the deviation of output from potential. The EMU model is estimated from quarterly data from the ECB.

The rest of the model is estimated with annual data from the AMECO database of EUROSTAT for the period 1965 -2001. Each equation is estimated using nonlinear least squares, which are the standard OLS in the absence of any nonlinearities. Cointegration methods were used to ensure long run convergence to a steady state. Only one lag is used in the dynamic equations, because with annual data for thirty years there is no justification of using more lags.

The primary function of GRMOD is to make simulations of the effects of shocks in the model's variables, and to study the effects of the shock or compare the effects of different shocks (scenarios). It can also be used to generate conditional forecasts of the endogenous variables, given a forecast of the exogenous economic variables derived from different models or information. However, GRMOD is a complete macroeconomic model, covering all the national accounts statistics, as they appear after the entrance in the EMU.

The scenario of the baseline simulation is taken from the revised convergence program of 2001. We are performing the following simulations. The first simulation is the effect of a recession in the Eurozone on the greek economy. In the second simulation we will experiment with the effect of a depreciation of Euro. The third simulation will concern the effect of a different tax policy than the announced one, specifically the effect of a reduction of the indirect tax rate. On the forth simulation we will experiment with the effect of a permanent inflation differential against the Eurozone on the economy.

STYLIZED OVERVIEW OF GRMOD	
$Y^* = Y(K, EMP^*)$	Potential output
$K = ITR + (1 – \delta)K_{t-1}$	Capital accumulation
$CPR = CPR(Y^*(1 – TRATIO), POP, \pi^e)$	Private consumption
$IPR = IPR(Y^*, i – \pi^e)$	Private investment
$IMP = IMP(Y^*, REER, IMP_{t-1})$	Imports
$EXR = EXR(Y^f, REER)$	Exports
$EMP = EMP(Y^*, WRATE)$	Employment
$WRATE = WRATE(\Delta PROD, \pi - \pi^e)$	Wage formation
$M3 = M3(PGDP, Y)$	Money demand
$PGDP = PGDP(WRATE, PIM, PGDP/P^*)$	GDP deflator
$\pi^e = \pi^e(\pi_{t-1} – \pi^*)$	Expected inflation
$r = r(i, \pi^e)$	Real interest rate
$NEER = NEER(PGDP/PGDP^f)$	Nominal effective exchange rate
$REER = REER(NEER, PGDP/PGDP^f)$	Real effective exchange rate
$DEBTRATIO = DEBTRATIO(DEBTRATIO_{t-1}, SGRATIO, IGRATIO)$ Intertemporal budget constraint	
$TRATIO = TRATIO(TRATIO^*)$	Tax reaction function
Y^{*EMU} = HP trend	Potential EMU output
$Y^{EMU} = Y^{EMU}(Y^{*EMU}, i – \pi, REER^{euro}, Y^{US})$	EMU output
$PGDP^{EMU} = PGDP^{EMU}(WRATE^{EMU}, POIL, Y^{EMU}/Y^{*EMU})$	EMU GDP deflator
$REER^{EMU} = REER^{EMU}(NEER^{EMU}, PGDP^{EMU}/PGDPROW)$	Real effective euro exchange rate
$i^{EMU} = i^{EMU}(i^{EMU}, \pi^{EMU} – \pi^{*EMU}, Y^{EMU}/Y^{*EMU})$	Monetary policy reaction function

2. THE MODEL.

2.1. AGGREGATE SUPPLY AND AUXILIARY REGRESSIONS.

2.1.a. Aggregate supply.

Potential output (Y) is given by a Cobb-Douglas production function with inputs capital and equilibrium employment. The latter is calculated by actual employment plus the deviation of unemployment from its equilibrium value times labor force; this deviation controls the deviation of output from potential. The coefficients of capital and labor are restricted to sum to one. These coefficients, which denote the shares of capital and labor in total output, are not estimated, but their sample means have been imposed, 0.36 for capital and 0.64 for labor. Total factor productivity enters in the equation as a deterministic function of time. The regression is estimated by using the actual values of real output, and potential output is the fitted values of the equation[1].

$$Y_t^* = \exp[\alpha_0 + \alpha_1(0.01t) + \beta\ln(EMP_t + \frac{0.01(u_t - u_t^*)EMP_t}{(EMP_t / LF_t)}) + (1 - \beta)\ln(K_{t-1})]$$

β = 0.64, α_0 = 0.67(18.04), α_1 = 0.16(1.34), $\overline{R^2}$ = 0.92, DW = 0.21, ADF(1) = -2.34(-1.95)

In the equilibrium of the economy, actual output is equal to potential, and unemployment is equal to its natural rate (NAIRU). The output gap is a stationary variable, which ensures long run convergence – that the economy reaches a steady state, with output and unemployment gaps at zero. The long run growth rate of potential output is equal to the population growth rate (assuming that the ratio of employment to total population is stable) plus the rate of technological progress (which includes the rate of the increase of capital).

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[1] Parameter estimates are below estimated equations, with the t-statistics in parentheses next to them. $\overline{R^2}$ is the adjusted coefficient of determination, DW the Durbin – Watson statistic. ADF(i) is the augmented Dickey – Fuller test for the equation containing i lags, the number of which is determined by the Akaike (AIC) criterion. Other statistics, like the BJ – $x^2(2)$ or the Goddfrey - Breush Lagrange Multiplier SC(q) – $x^2(q)$ or the ARCH(1) – $x^2(1)$ can be viewed in the output file.

The natural rate of unemployment (u^* - NAIRU) is modeled as a weighted average of its lagged value (u^*_{t-1}) with weight equal to 0.9 and the current actual unemployment rate (u_t) with weight equal to 0.1.

$u_t^* = 0.1u_t + 0.9u_{t-1}^*$ $\quad\quad (u_0^* = u_0)$

Capital (K) is the sum of investment and one lag of its own (K_{t-1}) minus the depreciation rate (δ), which is set at its estimated value of 2% per year.

$K_t = ITR_t + (1 - \delta)K_{t-1}$

$\delta = 0.02(90.03)$, $\overline{R^2} = 0.99$, DW = 0.16

2.1.b. Auxiliary regressions.

Population (POP), and labor participation rate (EMPPOP = EMP/POP) are modeled as fist order autoregressive processes.

$POP_t = \exp(\ln POP_{t-1} + \alpha_0 + \alpha_1 \Delta \ln POP_{t-1})$

$\alpha_0 = 0.002(2.32)$, $\alpha_1 = 0.58(4.24)$, $\overline{R^2} = 0.99$, DW = 2.08

$EMPPOP_t = \alpha_0 + \alpha_1 EMPPOP_{t-1}$

$\alpha_0 = -0.001(-0.061)$, $\alpha_1 = 1.005(19.13)$, $\overline{R^2} = 0.91$, DW = 1.55

Real depreciation (the level of it), DR, is a function of lagged real investment and its own lag with the coefficients of the two variables being restricted to sum to one.

$DR_t = \alpha_0 + \alpha_1 ITR_{t-1} + (1 - \alpha_1)DR_{t-1}$

$\alpha_0 = -0.74(-0.1)$, $\alpha_1 = \delta$ (= 0.02), $\overline{R^2} = 0.99$, DW = 1.78, ADF(0) = -8.06(-1.95)

Real change of stocks, VR, is modeled as a first order autoregressive process. The actual change in stocks, V, is a function of the real change in stocks and GDP deflator, PGDP.

$VR_t = \alpha_0 + \alpha_1 VR_{t-1}$

$\alpha_0 = 42.58(0.59)$, $\alpha_1 = 0.64(4.93)$, $\overline{R^2} = 0.39$, DW = 2.05

$V_t = \alpha_0 + \alpha_1 VR_{t-1} PGDP_{t-1}$

$\alpha_0 = 25.6(2.14)$, $\alpha_1 = 0.81(4.49)$, $\overline{R^2} = 0.35$, DW = 0.95

2.2. AGGREGATE DEMAND.

2.2.a Private consumption.

Equilibrium real private consumption, CPR*, is proportional to equilibrium disposable income, YD* = Y*(1 - TRATIO), where TRATIO is the total, indirect and direct, tax rate. The other determinants of equilibrium private consumption are the labor participation rate, which affects per capita income, and the expected inflation, because consumers react in changes in expected inflation, which changes their real wealth, by adjusting (smoothing) their consumption.

$\ln(CPR_t^*) = \alpha_0 + \ln(Y_t^*(1 - TRATIO_t)) + \alpha_1 EMPPOP_t + \alpha_2 \pi_t^e$

$\alpha_0 = -1.40(-5.07)$, $\alpha_1 = 3.14(4.60)$, $\alpha_2 = -0.52(-1.88)$, $\overline{R^2} = 0.91$, DW = 0.43, ADF(0) = -2.44(-1.95)

The rate of change of the private consumption is given as a function of its own lag, of the lag of the deviation of the (natural log of the) actual real private consumption from (the natural log of) its equilibrium value, from the change in the real disposable income and from the deviation of the actual inflation from the expected inflation. The coefficient of the deviation of expected consumer inflation from the actual consumer inflation is restricted to be equal to the stable term of the equation, so that the rate of change of actual employment is under control in simulation experiments.

$\Delta Ln(CPR_t) = \alpha_0 + \alpha_1[\ln(CPR_{t-1}) - \ln(CPR_{t-1}^*)] + \alpha_2 \Delta\ln(YDR_t) + \alpha_3 \Delta\ln(CPR_{t-1}) + \alpha_0(\pi_t^e - \Delta\ln(PCP_t))$

$\alpha_0 = 0.016(3.15)$, $\alpha_1 = -0.043(-0.94)$, $\alpha_2 = 0.35(4.70)$, $\alpha_3 = 0.24(1.84)$, $\overline{R^2} = 0.99$, DW = 1.49

2.2.b. Private investment.

Private investment is determined by potential output and the cost of capital. Public investment is exogenous. Potential output is a function of the equilibrium employment, total factor productivity and the lagged capital stock. The cost of capital is defined as the sum of the expected real interest rate, r^e (= i - π^e), the rate of depreciation, δ, and a risk premium on corporate capital, which is set at its average value of 2.6%; thus capital costs are: CC = r^e + δ + RP.

The adjustment of capital to its equilibrium level, holding government investment predetermined, occurs through the demand from private investment. Equilibrium real private investment, IPR*, is determined by potential output and real capital costs.

$$\ln(IPR_t^*) = \alpha_0 + \ln(Y_t^*) - CC_t$$

α_0 = -1.58(-41.6), DW = 0.40, ADF(0) = -3.05(-1.95)

The change of the actual real private investment, IPR, is given by the lagged deviation of the natural log of the real private investment from the natural log of its equilibrium level, plus a dummy to account for the change in the regime after 1994, which was the increase in public investment spending as a result of the initiation of CSF I.

$$\Delta\ln(IPR_t) = \alpha_1[\ln(IPR_{t-1}) - \ln(IPR_{t-1}^*) + \alpha_2 DUM1$$

α_1 = -0.13(-1.34), α_2 = 0.076(1.59), $\overline{R^2}$ = 0.55, DW = 1.79

2.2.c. Imports and Exports.

Real imports of goods and services, IMR, are determined by potential output and the relative price levels. Relative prices is the ratio of the GDP deflator, net of the indirect tax rate, PGDP(1 – TINR), and the import deflator, PIM. The coefficients of (the natural logs of) Y* and the lag of imports are restricted to sum to one, ensuring that imports remain a stable portion of GDP. PIM also incorporates the effect of depreciations. If PPP holds in the long run, the ratio of relative prices should be stationary, and relative prices should affect imports only in the short run.

$$\ln(IMR_t) = \alpha_0 + \alpha_1\ln(IMR_{t-1}) + (1 - \alpha_1)\ln(Y_t^*) + \alpha_2\ln\left(\frac{PGDP_t(1-TINR_t)}{PIM_t}\right)$$

α_0 = -0.049(-0.83), α_1 = 0.89(20.39), α_2 = 0.18(2.44), $\overline{R^2}$ = 0.99, DW = 2.17, ADF(0) = -6.48(-1.95)

Real equilibrium exports of goods and services, EXR*, are driven by the real GDP of the main trading partners i.e. the EU15 countries, YEU15, and the real effective exchange rate, REER.

$\ln(EXR_t^*) = \alpha_0 + \alpha_1 \ln(YEU15_t) + \alpha_2 \ln(REER_t)$

α_0 = -8.34(-4.95), α_1 = 2.36(17.62), α_2 = -0.82(-2.20), $\overline{R^2}$ = 0.91, DW = 0.22, ADF(0) = -1.76(-1.95)[2]

The adjustment of the real exports towards their long run equilibrium value is given by the deviation of the (natural logarithm of the) lagged value of them from the (natural log of the) lag of their equilibrium value, and by the percentage change of the equilibrium value of real exports.

$\Delta\ln(EXR_t) = \alpha_3 + \alpha_4[\ln(EXR_{t-1}) - \ln(EXR_{t-1}^*)] + \alpha_5\Delta\ln(EXR_{t-1}^*)$

α_3 = -0.03(-1.77), α_4 = -0.18(-2.19), α_5 = 0.66(3.60), $\overline{R^2}$ = 0.98, DW = 1.61

[2] Unit root rejected in 10% significance level having critical value – 1.61.

2.3. EMPLOYMENT AND WAGES.

With a Cobb – Douglass production function, equilibrium employment should change one to one to adapt to changes in potential output and the real wage rate. However, because of the big public sector in Greece, where the demand for labor is relatively inelastic to such changes, we would expect equilibrium employment to respond less than proportionally to changes in these variables.

In detail, the equations that describe employment and wages are the following. Actual employment is given as a function of its own lag, as an increasing function of potential output and as a decreasing function of the real wage rate, WRATE. The coefficients of the lag of the employment and of the potential output are restricted to sum to one.

$$\ln(EMP_t) = \alpha_0 + \alpha_1 \ln(EMP_{t-1}) + (1 - \alpha_1)\ln(Y_t^*) + \alpha_2 \ln(WRATE_t)$$

α_0 = -0.058(-0.96), α_1 = 0.95(21.15), α_2 = -0.022(-0.66), $\overline{R^2}$ = 0.98, DW = 2.46, ADF(0) = -2.09(-1.95)

The percentage change in the real wage rate is a function of one lag of it, the deviation of consumer inflation from the expected inflation, and of the change in the equilibrium productivity. In the short run, wages are negatively affected by inflation surprises (= unanticipated changes of inflation), but in the long run, the real wage rate increases one to one with potential productivity, keeping the share of wages in GDP stationary. Potential productivity is defined as follows: PRODS = Y*/[EMP/(1 – u*)].

$$\Delta\ln(WRATE_t) = \alpha_1 \ln\left(\frac{WRATE_{t-1}}{WRATE_{t-2}}\right) + \alpha_2\left[\ln\left(\frac{PCP_t}{PCP_{t-1}}\right) - \pi_t^e\right] + (1 - \alpha_1)\ln\left(\frac{PRODS_t}{PRODS_{t-1}}\right)$$

α_1=0.62(4.79), α_2=-0.66(-4.94), $\overline{R^2}$ =0.97, DW=1.88, ADF(0)=-5.18(-1.95)

2.4. MONEY AND PRICES.

We now proceed into describing the specification of the monetary sector. The first equation of the sector is the money demand function, which is the same as the one of the original GRMOD. The theoretical base of the equation is the quantity theory of money, PY = MV, and as a consequence the long run inflation is considered to be strictly a monetary phenomenon, although in the short run inflation can be affected by real variables.

Demand for nominal balances is a function of GDP deflator and real GDP, and the equation includes a dummy (1 before 1990, 0 after) variable to account for the change in velocity after 1990, when the Bank of Greece started a program of shadowing the ECU exchange rate. The inclusion of the dummy allows for changes in velocity, like the one that occurred in Greece in 1990. Income velocity was declining until 1990, when it reached the value of one and stabilized. The inclusion of the dummy in the coefficient of Y accounts for the different values before and after 1990, and the existence of the same dummy as a regressor in the equation accounts for the gradual diminishment of velocity before 1990. We also include a second dummy for the years 1999 – 2000 in this equation, as well as in the equation that calculates the actual inflation, for reasons we present later, in the description of that equation. By substituting real output in the equation with real potential output (Y*), we calculate the equilibrium price level – the price level that is compatible with equilibrium in the real sector.

$$\ln(M3_t) = \ln(PGDP_t) + \alpha_0 + (1+ \alpha_1 DUM0)\ln(Y_t) + \alpha_2 DUM0 + \alpha_3 DUM3$$

$$\Rightarrow \ln(P_t^*) = \ln(M3_t) - \alpha_0 - (1+ \alpha_1 DUM0)\ln(Y_t^*) - \alpha_2 DUM0 - \alpha_3 DUM3$$

α_0 = 6.52(178.01), α_1 = 0.92(11.49), α_2 = -9.41(-11.87), α_3 = 0.088(1.02), $\overline{R^2}$ = 0.99, DW = 0.35, ADF(0) = -1.83(-1.95)[3]

The previous equation cannot be solved for P* after 2001. The reason for this development is the entrance of Greece in the EMU (Economic and Monetary Union). After 2001, the Bank of Greece, like all the other central banks of the EMU member states, abolished the monetary sovereignty, replacing the drachma with the euro. The central bank for the whole EMU is

[3] Unit root rejected at 10% significance level having critical value – 1.61.

now ECB, which conducts a single monetary policy for the Eurozone as a whole. There is only one money supply, and the allocation of this money supply into any single member state is a complex and unidentified function of the total money supply and of the demand of money of each individual member state, and cannot be calculated. This structural change forces us to make the following set of assumptions in order to close the model and render it estimable.

The equilibrium or target inflation rate is the difference of the natural logarithm of the equilibrium price level, and is restricted to 2% annually from 2001 and thereafter, since this is the explicit inflation target of the ECB; as a consequence, the target price level after 2001 is $P_t^* = \exp(\ln P_{t-1}^* + \pi^*) = \exp(\ln P_{t-1}^* + 0.02)$, and is exogenous from the point of view of the greek economy. We obviously assume that the policy of ECB will successfully keep the EMU inflation close to the target of 2% and that the greek inflation will converge to that level – or in another expression that great divergences in inflation cannot persist under the same monetary police since inflation in the long run is a monetary phenomenon.

The basic equation for the various price levels is the one that estimates the GDP deflator. The change of the GDP deflator is a function of the deviation of the (natural log of the) actual price level from (the natural log of) its equilibrium value; it also a function of its own lag, of the change in the import deflator (PIM) and of the change in the ratio of wage to employed persons in the economy (WAGE/EMP).

There is a modification in this equation, in the form of including a dummy variable (0 – 1), for the years 1999 and 2000. The reason was the following. In the last two years when Greece still retained its monetary sovereignty (1999 – 2000), Bank of Greece was responsible to achieve the low inflation that would send Greece inside EMU; however, because the financial system was liberalized, and Bank of Greece had to lower the interest rate, the monetary base was increased significantly, and so was the equilibrium price level, P*. Yet BoG, in conjunction with a (relatively) restrictive government policy, succeeded in keeping the inflation low, breaking, at least partially, the relationship of the price level with its equilibrium value, a development that justified in our eyes the use of the dummy in the equation.

$$\Delta\ln(PGDP_t) = \alpha_1[\ln(PGDP_{t-1} - \ln(P_{t-1}^*)] + \alpha_2\Delta\ln(PGDP_{t-1}) + \alpha_3\Delta\ln(WAGE_t/EMP_t) + \alpha_4\Delta\ln(PIM_t) + \alpha_5 DUM3$$

α_1 = -0.22(-3.25), α_2 = 0.51(5.5), α_3 = 0.216(2.45), α_4 = 0.18(2.48), α_5 = -0.007(-0.38), $\overline{R^2}$ = 0.99, DW = 2.32, ADF(0) = -3.00(-1.95)

The equations of the other price levels, with the exception of the one for the import deflator come unchanged from the original GRMOD. The consumer price level, the government deflator and the investment deflator are functions of their own lags, respectively, and of the GDP deflator. The export deflator is a function of its lag, of the import deflator and of the GDP deflator, something quite natural if one considers the dependence of the greek economy from imported goods and oil.

$\Delta\ln(PCP_t) = \alpha_1 \Delta\ln(PCP_{t-1}) + (1 - \alpha_1)\Delta\ln(PGDP_{t-1})$

α_1 = 0.187(2.93), $\overline{R^2}$ = 0.99, DW = 2.09, ADF(1) = -2.06(-1.95)

$\Delta\ln(PIT_t) = \alpha_1\Delta\ln(PGDP_t)$

α_1 = 1.008(23.78), $\overline{R^2}$ = 0.99, DW = 1.47, ADF(0) = -2.06(-1.95)

$\Delta\ln(PG_t) = \alpha_0 + \alpha_1\Delta\ln(PG_{t-1}) + (1 - \alpha_1)\Delta\ln(PGDP_t)$

α_0 = 0.009(1.9), α_1 = 0.181(1.75), $\overline{R^2}$ = 0.99, DW = 2.60, ADF(1) =-8.07(-1.95)

$\Delta\ln(PEX_t) = \alpha_1\Delta\ln(PIM_t) + \alpha_2\Delta\ln(PGDP_t)$

α_1 = 0.66(7.50), α_2 = 0.29(3.44), $\overline{R^2}$ = 0.99, DW = 2.10, ADF(0) = - 5.97(-1.95)

The other modification that we have done in the price sector is the following: we estimated import deflator on its own lag, on the GDP deflator of the European Union (EU 15), the participants in which are Greece's main trading partners, and on the price of oil.

$\Delta\ln(PIM_t) = \alpha_1\Delta\ln(PGDPEU15_t) + \alpha_2\Delta\ln(POIL_t) + \alpha_3\Delta\ln(PIM_{t-1})$

α_1 = 0.80(2.62), α_2 = 0.09(2.79), α_3 = 0.49(3.72), $\overline{R^2}$ = 0.99, DW = 2.11, ADF(0) = - 6.40(-1.95)

2.5. EXPECTATIONS.

Expectations of consumer price inflation are both forward and backward looking. They are forward looking, in the sense that they take into account the long run equilibrium inflation π^* (= $\Delta \ln P^*$), and backward looking, in order to comply with the statistical properties of the actual inflation process, which is highly persistent. The coefficients of the regressors are restricted to sum to one, ensuring that the process will not diverge. From 2001 onward, since π^* is 2%, the process becomes an AR(1) with a constant.

$$\pi_t^e = \alpha_1 \Delta \ln(PCP_{t-1}) + (1 - \alpha_1)\, \pi_t^*$$

$\alpha_1 = 0.95(5.73)$, $\overline{R^2} = 0.62$, DW = 1.70, ADF(0) = - 4.63(-1.95)

2.6. INTEREST RATES.

The interest rate modeled is the 12-month T-Bill, due to lack of data in other securities; till recently, the greek government issued only short-term securities.

In the original GRMOD, the equation calculated the real rate of the economy ($i - \pi^e$). In the long run, nominal interest rates move one to one with expected inflation, so that the fisher relationship ($r = i - \pi$) holds with a constant real rate. However, in the short run, in addition to being mean reverting, the process of the real rate shows persistence in the deviations from the constant long run real rate, caused by the changes in the expected inflation. Consequently, the real rate was modeled as a first order autoregressive process.

$$R12MTB_t = \alpha_0 + 100\pi_t^e + \alpha_1(R12MTB_{t-1} - 100\pi_{t-1}^e)$$

$\alpha_0 = 0.83(1.09)$, $\alpha_1 = 0.63(4.29)$, $\overline{R^2}$ =0.53, DW=1.90, ADF(0)=2.24(-1.95)

The entrance in the EMU caused the interest rate formation of the economy to change too. The interest rate is no longer endogenous in the economy, but the basic interest rate is set by the ECB. The basic interest rate for the EMU is considered the 3-month euribor, to which 12-month T-Bill rate of the greek government is linked with a term premium of 30 basis points. In simulations, its value can be the output of the model of the Eurozone, or a path for it can be assumed.

R12MTB = R3MEUR + 0.3

2.7. FOREIGN SECTOR.

The current account deficit (surplus) is an identity: exports minus imports plus transfers from the rest of the world. The log of the ratio of transfers to GDP is modeled as a first order autoregressive process. However, the ratio of transfers to GDP is held fixed in the simulation experiments we conducted.

$CA_t = EX_t - IM_t + U_t$

$\ln(UTR_t) = \ln(GDP_t) + \alpha_0 + \alpha_1 \ln(UTR_{t-1}/GDP_{t-1})$

$\alpha_0 = -0.66(-2.11)$, $\alpha_1 = 0.77(7.10)$, $\overline{R^2} = 0.99$, DW = 1.56

2.8. EXCHANGE RATES.

The other major modification of the GR Model concerns the exchange rate sector and became necessary because the monetary union led to the abolition of drachma. The exchange rate is modeled in two discrete ways, the first describing the period when drachma was the currency of Greece (pre 2001), and the second the period when euro is the currency of Greece. The first specification comes unaltered from the original GRMOD. The target is to model the real effective exchange rate of the economy. The equations that describe the exchange rate come from the basic theoretical equation RER = 1 = NER(P/P^f). Taking logarithms, ln(NER) = ln(P^f/P).

The equilibrium nominal effective exchange rate towards the OECD countries is a function of the relative price levels, the foreign one and the local equilibrium price level; the actual real effective exchange rate is a function of its lag and the lagged deviation of the (log of the) nominal effective exchange rate from its equilibrium value.

$$\ln(NEER_t^*) = \alpha_0 + \alpha_1 \ln\left(\frac{PGDP_t^f}{P_t^*}\right)$$

α_0 = 4.56(303.33), α_1 = 0.99(99.52), $\overline{R^2}$ =0.99, DW=1.06, ADF(0)=-3.31(-1.95)

$$\Delta\ln(NEER_t) = \alpha_2[\ln(NEER_{t-1}^*) - \ln(NEER_{t-1})] + \alpha_3\ln(NEER_{t-1}^*)$$

α_2 = 0.48 (2.79), α_3 = 0.90(9.44), $\overline{R^2}$ = 0.99, DW = 1.70

$$Ln(REER_t) = \ln(NEER_t) - \ln\left(\frac{PGDP_t^f}{PGDP_t}\right)$$

From 2001 onward, euro is the greek currency. The natural log of the real effective exchange rate of euro is given by the difference of the (natural log of the) nominal effective exchange rate of the euro plus the (natural log of the) ratio of the price levels (GDP deflator of the Eurozone divided by the GDP deflator of the major Eurozone trading partners).

$$\ln(REEREURO_t) = \ln(NEEREURO_t) - \ln\left(\frac{PGDPEMU_t}{PGDPROW_t}\right)$$

We have also made an effort to calculate the real effective exchange rate of a hypothetical greek currency inside the EMU, in an attempt to give a measure of the competitiveness of the greek economy inside the monetary union. The real effective exchange rate of Greece inside EMU is the product of the nominal effective exchange rate of the euro, NEEREURO, ADV, which is an adjustment factor guaranteeing the comparability of the output with the original Eurostat series, and GDP deflator of Greece, PGDP, divided by the weighted average of the price levels of the main greek trading partners. The two main trading partners are the rest of the EMU countries and the rest of the OECD countries after taking out the ones belonging in Eurozone, with weights the trade volume with each region against the total trade volume of Greece with the OECD countries, which is equal to 0.7 towards EMU countries and 0.3 towards the rest of the world (to be precise, OECD). The weights come from the 1995 – 1997 trade volume.

$$REER_t = NEEREURO_t \, ADV\left(\frac{PGDP_t}{0.7PGDPEMU_t + 0.3PGDPROW_t}\right)$$

$ADV = REER22_{2001}/REER_{2001}$,

$REER22_{2001}$ is the reported by the Ameco database real effective exchange rate of Greece for the year 2001, and $REER_{2001}$ is the result of the previous equation for the year 2001.

2.9. GOVERNMENT SECTOR.

The government sector consists of identities that define government variables and ratios that show the magnitude of these variables compared to GDP. The only estimated equation is the one that concerns the total tax to GDP ratio, TRATIO, defined as the sum of direct and indirect taxes and social security contributions minus transfers to the private sector.

The budget surplus – deficit, SG, is defined as the sum of total taxes, social security contributions and other receipts of government minus the transfers to the private sector, the consumption and investment expenditure and the interest payments of the government. Dividing by GDP, we get the budget surplus – deficit to GDP ratio, SGRATIO. The debt to GDP ratio is equal to its lag minus the current SGRATIO minus current government investment to GDP ratio, IGRATIO: $DEBTRATIO_t = DEBTRATIO_{t-1} – SGRATIO_t – IGRATIO_t$.

Assuming that the government pursues (or has to pursue) a balanced budget in the long run, i.e. SGRATIO* = 0, the target tax to GDP ratio, TRATIO* is defined as the tax ratio that is consistent with this target, i.e. that ensures a balanced budget. But due to political reasons, as well as economic (destabilization of output growth), the government is slow into achieving this target. The actual tax rate, TRATIO, is modeled in the following way: $TRATIO_t = TRATIO_{t-1} + α_1(TRATIO_{t-1} – TRATIO_t^*)$. The coefficient $α_1$ lies between 0 and 1, and can take different values in simulations. In the baseline simulation, the value of $α_1$ is fixed at 0.1, meaning that 10% of the adjustment of the tax ratio towards a tax ratio compliant to the target of balanced budget takes place in the first year.

The interest payments to GDP ratio, INTRATIO, is given by the following formula (in use for simulations): $INTRATIO_t = INTRATIO_{t-1} + [(i + 0.01) – Δ\ln(GDP_t)]*ΔDEBTRATIO_t$. The reason we add one percentage point in the interest rate that the government pays to service the debt is that they issue long-term securities mainly. Since in the long run DEBTRATIO is stable, the interest payment to GDP ratio stabilizes.

In what concerns the other government variables, the value of real government consumption, GR, of real government investment, IGR, the government investment to GDP ratio, IGRATIO, the indirect tax rate TINR and the other receipts (PIN) to GDP ratio, NTRATIO, are determined exogenously.

2.10. EMU MODEL.

A Taylor rule is an equation that relates the interest rate of the whole economy (usually a central bank interest rate or the T-Bill rate or even an interbank rate) to some aggregate macroeconomic variables that affect this interest rate, usually money supply, real output and inflation (or the price level). The rule gives the reaction of the central bank to changes of the aforementioned variables, or to deviations of these variables from their equilibrium (or target) values. The assumption is that the central bank does not have, at least strict, interest rate targets, but either money and/or output and/or inflation (price level) targets. It is very useful to have such an equation, because it gives us the likely development in the interest rate, one of the most important variables in an economy.

The data for the model come from the official ECB data available in the ECB web site and the monthly bulletin, plus the data that were constructed by the authors of the AVM model of the ECB, because the official ECB data start in the first quarter of 1991 while the AVM data cover the period 1970 Q1 to 1997-8. The old data were adjusted in the following way: at the first quarter the official data become available, the AVM data have been adjusted backwards by being multiplied with the ratio of the official data to them. Henceforth, the official ECB data are used. Three month euribor replaced the old short term interest rate as soon as it became available, with no adjustment. The unit labor costs have been adjusted to the future by using the rate of change from the official data set, since only this rate of change is available.

The estimation of the Taylor rule for the monetary policy has become very difficult with the entrance in the EMU, since ECB is responsible for the money and prices of the whole union, and pays attention on aggregate variables and phenomena. This forced us to estimate a small EMU model, consisting of the following equations: a) a Hoddrick – Prescott filter that calculates potential EMU output, with $\lambda = 1600$, which is the value proposed for quarterly data and the one both EViews and RATS have as default for such frequency data.

The model continues with an equation for the change in output, where the latter is given as a function of its own lag, of the deviation of the natural log of the actual output from the natural log of the potential, of the real interest rate, of the change of the real effective exchange rate of the EU 12 and of the change of the US output.

$\Delta ln(YEMU_t) = \alpha_0 + \alpha_1[ln(YEMU_{t-4}) – ln(YSTAREMU_{t-4})] + \alpha_2(I\_SHORT_{t-4} – ln(PGDPEMU_t/PGDPEMU_{t-4}) + \alpha_3 ln(YEMU_{t-1}/YEMU_{t-5}) + \alpha_4 ln(REEREURO_t/NEEREURO_{t-4}) + \alpha_5 ln(YUS_t/YUS_{t-4}) + \alpha_6 ln(YEMU_{t-2}/YEMU_{t-6})$

α_0 = 0.0065(3.39), α_1 = -0.44(-5.94), α_2 = -0.05(-2.11), α_3 = 0.60(8.11), α_4 = -0.013(-1.55), α_5 = 0.045(1.34), α_6 = 0.23(1.91), $\overline{R^2}$ = 0.99, DW = 1.30, ADF(0) = - 7.66(-1.95)

The EMU also model incorporates an equation for the change of the GDP deflator, were the latter is a function of its lag, of the change in the unit labor costs and of the deviation of the (log of the) output from the (log of the) potential.

$ln(PGDPEMU_t/PGDPEMU_{t-4}) = \alpha_0 + \alpha_1 ln(PGDPEMU_{t-1}/PGDPEMU_{t-5}) + \alpha_2[ln(YEMU_{t-1}) – ln(YSTAREMU_{t-1})] + \alpha_3 ln(ULC_{t-4}/ULC_{t-8}) + \alpha_4 ln(POIL_{t-1}/POIL_{t-5}) + \alpha_5 ln(PGDPEMU_{t-2}/PGDPEMU_{t-6})$

α_0 = 0.00146(1.91), α_1 = 1.395(16.69), α_2 = 0.092(2.91), α_3 = 0.059(2.86), α_4 = 0.003(0.72), α_5 = -0.485(-5.63), $\overline{R^2}$ = 0.99, DW = 2.07, ADF(0) = - 7.18(-1.95)

The estimation results indicate that the steady state level of GDP inflation is equal to 0.0014/(1 – 1.395 + 0.485) = 1.6% annually, in line with ECB target of less than 2% inflation.

There is also an equation for the harmonized consumer price index (HICP), which is modeled as a function of the lag of the GDP deflator of the Eurozone and the target inflation rate of the 2%.

$ln(HICP_t/HICP_{t-4}) = \alpha_1 ln(PGDPEMU_{t-1}/PGDPEMU_{t-5}) + (1–\alpha_1)PSTAREMU$

α_1 = 0.80(52.73), $\overline{R^2}$ = 0.99, DW = 0.53, ADF(0) = - 4.91(-1.95)

All the above give inputs to the ECB reaction function, the form of which is the following: the interest rate is a function of its lagged value, of the deviation of the HICP inflation from the target value of 2%, and of the deviation of the (log of the) output from the (log of the) potential output. The results indicate that ECB, and before it, the central banks of the Eurozone countries, placed more weight in the inflation gap (60%) than in the output gap (40%) in their decisions concerning the interest rate determination. They also indicate a steady state interest rate for the Eurozone of 0.0063/(1 – 0.85) = 4.2%.

$I\_SHORT_t = \alpha_0 + \alpha_1 I\_SHORT_{t-1} + \alpha_2(\ln(YEMU_t) - \ln(YSTAREMU_t)) + \alpha_3(LOG(HICP_t/HICP_{t-4}) - PSTAREMU)$

$\alpha_0 = 0.0063(2.23)$, $\alpha_1 = 0.85(15.58)$, $\alpha_2 = 0.19(2.95)$, $\alpha_3 = 0.28(1.89)$, $\overline{R^2} = 0.97$, DW = 1.64, ADF(0) = - 5.66(-1.95)

The model also consists of three AR models with the purpose of giving inputs to the behavioral equations when the model is simulated in the future. The first is for the rest of the world GDP deflator, PGDPROW, the second is for the potential output for the Eurozone, YSTAREMU, and the third is for the unit labor costs of the EMU. With the existence of these equations or an assumption about the paths of the endogenous variables they calculate, plus some assumption for the path of the nominal effective exchange rate of the euro and the change in the US output, the model of the Eurozone is closed and can generate forecasts.

$\ln(PGDPROW_t) = \alpha_0 + \ln(PGDPROW_{t-4}) + \alpha_1 \ln(PGDPROW_{t-1}/PGDPROW_{t-5})$

$\alpha_0 = 0.0028(1.69)$, $\alpha_1 = 0.92(24.76)$, $\overline{R^2} = 0.99$, DW = 1.57, ADF(0) = -8.84(-1.95)

$\ln(YSTAREMU_t) = \alpha_0 + \alpha_1 \ln(YSTAREMU_{t-4}) + \alpha_2 \ln(YSTAREMU_{t-1}/YSTAREMU_{t-5})$

$\alpha_0 = -0.008(-2.60)$, $\alpha_1 = 1.001(2206.68)$, $\alpha_2 = 0.99(96.35)$, $\overline{R^2} = 0.99$, DW = 0.02, ADF(0) = - 4.88(-1.95)

$ULC_t = \alpha_0 + \alpha_1 ULC_{t-4} + \alpha_2 \ln(ULC_{t-1}/ULC_{t-5})$

$\alpha_0 = -0.02(-5.07)$, $\alpha_1 = 1.04(162.93)$, $\alpha_2 = 0.32(12.28)$, $\overline{R^2} = 0.99$, DW = 0.42, ADF(0) = - 2.74(-1.95)

Finally, the log real effective exchange rate is modeled as the difference of the log of the nominal effective exchange rate plus the log of the ratio of the price levels (PGDPEMU / PGDPROW).

$$\ln(REEREURO_t) = \ln(NEEREURO_t) - \ln\left(\frac{PGDPEMU_t}{PGDPROW_t}\right)$$

3. MODEL PROJECTIONS AND SIMULATIONS.

3.1. ASSUMPTIONS FOR THE BASELINE PROJECTION.

The projection period is set at years 2002 to 2010. In order to generate forecasts, we had to assume the future path of several exogenous variables. We had to assume the paths of two sets of exogenous variables: the first set is the fiscal policy environment, and the second is the external environment.

3.1.a. Fiscal policy assumptions.

The path of the government variables for the baseline projection comes from the updated convergence program 2001 – 2004, as it is announced and is available in internet[4]. Real government consumption falls by 0.5% in 2002, rises in 2003-4 by 0.7% and then it is assumed to grow with a rate of 0.5% for the rest of the projection sample. Real government investment rises by 9.5% in 2002, by 9.9% in 2003, 7.4% in 2004 and 4% afterwards. Net transfers to GDP ratio, NTRATIO, is increasing by 10% for the period 2002-3, is kept stable then until 2006, and then drops to zero, to account for the effect of the cease of CSF III transfers from the EU; we suppose that Greece will not participate in the program that is said to start after 2005 and aims at developing the economies of the future members of EU. Government investment to GDP ratio, IGRATIO, is set at 4.3% in 2002, 4.4% in 2003 and 4.6% at 2004, and 4.2% afterwards.

Indirect tax rate rises by 1% from its 2001 value throughout the simulation period, to a stable 12.4% of GDP, and direct tax rate falls by 20%, to a permanent 9% of GDP; we have done this to account for the effect of the announced tax reform; the reform is planed to increase indirect taxes, through the increase and the extension of coverage of VAT, while the direct taxes, like income tax and corporate tax rates are expected to decline. The overall tax rate is not expected to change. Receipts from privatization are at 0.15% of GDP in 2002, at 0.1% of GDP in 2003 and 0.05% of GDP after. URATIO, net transfers from rest of the world to GDP ratio, is fixed at 4% of GDP throughout the sample.

[4] http//:www.mnec.gr/ministry/converg/spg2001_en.htm.

3.1.b. External environment.

The variables that we need from the external to the greek economy environment in the model are the real GDP of the European union countries, the inflation rate of the Eurozone, the 3-month euribor, the nominal effective exchange rate of Euro, NEEREURO, the GDP deflator of the other main trading partners, excluding EU 12 countries, and the price of oil, POIL.

The real GDP of the EU 15 rises by 1.5% in 2002, 2.5% in 2003, and this rate is kept unchanged until the end of the forecasting period, 2010. EU 12 inflation falls from 2.8% in 2002 to reach levels around 2% after 2006. Euribor is set at 3.5% in 2002, 3.7% in 2003, 3.9% in 2004 and 4% afterwards, as the european economy reaches a steady state. R12MTB is Euribor plus 0.3%, and the rate government pays is R12MTB plus 1%, because government issues mainly long-term securities. NEER of Euro is set at the average 2001 value throughout the projection. The price of oil is fixed at the 2001 value. Rest of the world GDP deflator, PGPDROW, rises by 2.5% annually.

3.1.c. Projections of the baseline simulation.

The outlook of the baseline simulation is optimistic for the greek economy. Real GDP rises by more than 4% annually throughout the simulation period. This growth is fuelled by strong demand growth, as a result of disposable income growth, with rates ranging between 3.3 and 3.6% annually, by investment spending, which rises with (decelerating) rates starting from 8.5% in 2002 to reach 3.6% in 2010; despite government spending and the low interest rates, the growth rate of private investment is weaker, reflecting the result of a decade of continuously increased investment spending, that has lifted the investment spending to levels higher than 25% of GDP for the whole forecasting period, and the effect of the increase of the real interest rate to levels over 2% at the end of the forecasting period. Merely the investment spending comes in line with actual output growth, and the question (and relative policy issue) is if the high investment to GDP ratio is sustainable further in the future.

The last reason for the growing GDP is the exports, that rise with an average rate for the whole simulation period of around 5.3%, while imports rise moderately with an average rate of 3.3%, as a result of the success in keeping inflation low, i.e. keeping the competitiveness with the Eurozone stable and at the same time increased towards the rest of the world. This results in a continuously improving current account balance, which, despite the deterioration in 2002 – 2004, moves fast towards the target of zero deficit, which it almost reaches in 2010.

Inflation converges steadily towards the target of 2%, which it reaches at the end of the projection period, a development that is accommodated by the moderate real wage growth of 1.2% on average because of a rising employment with rates around 1% annually; the latter development is evident in the unemployment rate, which continuously falls to reach 7.7% in 2010, and is 8.5% on average in the whole forecasting period. Real interest rate is below 1% in the years 2003-5, caused by the higher than the average of the Eurozone greek inflation, aiding investment, but then rises steadily towards 2%, as a result of the lower inflation. This explains (at least a part of) the decline in investment spending and the change in the composition of output in favor of exports. The effect of lower inflation is evident in the REER of the economy, which has a small upward tendency until 2005, and starts declining afterwards. If this change in REER looks marginal, there is an explanation for the increase in exports: though competitiveness against EU 12 does not change much, the inflation assumptions favor overall the external sector of the Eurozone, of which part is the greek external sector, against its competitors.

Government, which conducts an austere fiscal policy, has a budget surplus of a little more than 1% of GDP in the years 2002 – 2006, in line with the convergence program. The discontinuation of the convergence packages after 2006 immediately produces a budget deficit of –1.1% of GDP in 2007, but then increased activity as well as the same tight policy help to reduce the deficit, which is almost eliminated by 2010. Needless to say that such small surplus is prone to become a deficit in the occurrence of an unanticipated development, or simply because of elections. Also the projection does not take into account any developments in the social security system funding, since they are not decided up to the moment. Undoubtedly, they will exercise a major effect on the budget in the years to come. Debt to GDP ratio, DEBTRATIO, falls steadily to reach 56% of GDP in 2010, as a result of both fiscal policy and, mainly, strong expansion.

These results come from our baseline assumptions where the direct tax rate was exogenous, taken from the convergence program and the so far announced reforms in the tax system. If we include the direct tax rate in the system, rendering it endogenous, we observe that the results of the model do not change much. We see the direct tax rate slightly falling to less than 9% starting from 2003, a development that affects the variables that connect to private consumption. The further fall in the tax rate raises disposable income, by 1% in 2003 and 0.3% in 2004 - 2006, by the situation reverses after 2007, with an average fall of 0.2%. This affects private consumption by a positive 0.36% change in 2003 and +0.1% in 2004 – 2006, while after 2007 the reduced disposable income affects consumption by –0.1% on average. The ¾ of previous changes pass in the growth rate of output, which is mainly affected in 2003 by +0.25% and in 2004 by +0.1%; afterwards, the change from the baseline with exogenous direct tax rate is less than 0.1% each year. All the other variables are marginally affected.

3.1.d. EMU baseline scenario.

The assumptions of the baseline EMU scenario are the following: US output growth is 3 in 2002 and 3.5% afterwards, rest of world inflation is at 2.5% annually, unit labor costs rise of the Eurozone by 3% annually.

The model projects a fall in EMU GDP inflation which reaches 2.8% in 2002, and then a further fall to 2.6% on average in 2003; in 2004 inflation starts to increase again, to reach 2.8% that year, 3.3% in 2005 and 3.2% in 2006; starting from 2007 the inflation starts declining again to reach 2.6%, and the last three years of the forecast stabilizes further to rates around 2.2%, close to the ECB target. Output growth is at the low level of 2.1% in 2002, yet it picks up later to reach the levels of 3.7% in 2003 and 4% in 2004 aided by interest rates of around 4%. The resulting output gap and the increased inflation forces ECB to take action and increase interest rates to 4.8 – 5% in the next three years, reducing the output growth rate to 3.2 and 2.8% in 2005 and 2006 respectively. However, success in fighting inflation, which drops further as we described earlier allows ECB to cut the interest rates to 4.1% in 2008, 3.6% in 2009 and less than 3.4% in 2010, because of the diminishing inflation, keeping a constant real rate of around 1.3-1.4%. Because of the interest rate developments, output growth picks up again, to rates between 3.5% in 2007 and more than 4.2% after 2008. Throughout the forecasting period, the competitiveness of the European economy stays unaltered to the current levels, because inflation is in general under control.

3.2. SIMULATIONS

3.2.a. Scenario 1: EU 15 recession.

In this scenario, EU 15 GDP growth is –2.5% in 2002, - 1.5% in 2003, and 0% after. Inflation in the Eurozone is set at 2.3% in 2002, 2% in 2003, 1.7% in 2004, 1.4% in 2005 and at 1% thereafter. Euribor declines fast starting from 2.5% in 2002 to reach 0.5% from 2006 to the end – ECB exhausts its power to help the economy through cutting the interest rates.

The results on the geek economy are significant. Output growth immediately drops to 2% in 2002, a growth rate that is maintained for the whole forecasting period, except from the year 2004, when it reaches 2.5%. Investment growth is slightly positively affected, as a result of the negative real interest rate throughout the sample and government investment spending. Consumption growth drops suddenly in 2002-3, then peaks up in 2004, but cannot be sustained and declines again as a result of the weak disposable income growth; on average the growth rate of consumption lies around 2.6%. The main determinant of output is the trade balance: exports decline by 2.5% in 2002 and 1.5% in 2003 and remain at that level throughout the rest of the forecasting period, but imports are increasing steadily, at an average rate of 3.3%, as a consequence of the loss of competitiveness and the weak foreign economies. This results in a continuously deteriorating current account balance, which reaches -15% of GDP in 2010. Inflation drops faster, to rates below 2% after 2008. Output growth is positive due to private consumption and investment, the effect of which is stronger than the negative effect from trade balance.

In the fiscal sector, budget is barely balanced until 2006, but the discontinuation of EU money results in a deficit again, of an average level of – 2.5% for the period 2006 - 2010. However, DEBTRATIO still falls, naturally at a lower pace; the weak output growth and the lower interest rate government pays appear more significant influences than the deficits.

3.2.b. Scenario 2: Euro depreciation by 10% in 2002.

The main effect is in output growth, and mainly in 2002, with 2 extra percentage points in output growth, and 2003, with an extra 0.35% increased output. Afterwards, growth rates are almost identical. The main driving force are exports, as is expected, and the effect of their increased level is spread throughout the economy. The first surplus in CA for the last decades is reached in 2009, caused only by exports, since imports are unaffected. Consumption growth is affected by a cumulative 1.2% for the whole period, with the 2/3 of the effect occurring in 2002. The higher level of output affects the government variables marginally, leading a bit faster decline in the DEBTRATIO.

3.2.c. Scenario 3. Tax reform is reducing the overall tax rate.

In this scenario we explore the effect of a reduction in the overall tax rate, by imposing a drop to the indirect tax rate by 10% in the year 2003, and keeping it stable for the rest of the simulation period.

The effect of the tax relief on output is positive in 2003: output growth is 0.96% higher than the baseline projection, at 5.3%, fed by the increase in consumption by 1.75 percentage points, which is caused by the extra 4.9% increase in disposable income. Consumption increases by 0.37% in 2004 too, and then its growth rate starts to deteriorate: in average, a reduction of 0.2% in the annual growth rate of consumption occurs, with a direct counterpart in the real GDP growth rate: it is lower by an average of 0.20% in the years following 2004. The effect on the growth rate of exports is negative in 2003 by -0.31% and by –0.14% in 2004, due to the increased demand, and marginally positive for the rest of the period; the effect on import growth rate is positive throughout the period, with augmented growth rates of about 0.5% in 2003 – 2005, but the increase diminishes as we move towards the end of the forecast period. This results to a deteriorated trade balance, which remains at lower levels throughout the sample: the growth rate of the current account surplus – deficit to GDP ratio is deteriorated with increasing rates, starting with -0.08% in 2003 to reach –0.9% in the 2008-2010 period.

The effect on employment and unemployment is marginal throughout the period. The real wage rate declines only in 2003 by only 0.31%; afterwards, it increases again with 0.1% on average higher than in the baseline projection, as a result of lower prices after 2006. The effect of the increasing demand on prices is +0.45% in inflation in 2004 and +0.24% in 2005; afterwards, the effect is reversed, and lower demand reduces consumer inflation by about 0.1% on average.

The higher demand has a small positive effect in the budget in years 2003 – 2005: surplus is higher and DEBTRATIO falls faster caused by the increased output growth rates. Later, the reduced output effect prevails and the situation is reversed: tax revenues growth rate falls and DEBTRATIO falls slower, but finishes to the same level as in the baseline.

3.2.d. Scenario 4: permanent 2% inflation differential over Eurozone.

In this scenario, we fix greek inflation to be permanently 2% more than the inflation of the EU 12. What is mostly affected is GDP growth. The inflation differential leads to a continuous loss of competitiveness (REER reaches 119 at the end of the sample). The inflation is mostly affected at the end of the period, when it should converge to 2% according to the baseline simulation. Therefore, exports, consumption and output growth rates are progressively lower as we move into the future. The effect is high. Output grows by an average 3.3% rate throughout the sample, as a result of the lower consumption growth, the lower export growth rate and the higher (stable, instead of diminishing) growth rate of imports of around 4.1% annually. This results in a deteriorated current account balance, the deficit of which falls by about 20% in 2002 to 5.5% of GDP and progressively returns to 4.5% of GDP, a higher deficit than that of 2001; this effect is caused by the fact that although Greece looses competitiveness, the URATIO is stable throughout the sample. The higher inflation keeps real interest rate close to zero, exercising a (small) positive effect on investment. Government budget is marginally deteriorated in 2002 - 2006, when the inflation differential from the baseline forecast is not great, but deficit is bigger in the rest of the sample, when the significantly lower output growth reduces tax revenues more. Lower output growth results in a higher DEBTRATIO than in the baseline in all the simulation period, yet this variable falls as a percentage of GDP, to reach 59% of GDP.

3.2.e. Scenario 5: Combined forecast of the two models.

In this scenario, we use the baseline forecast of the EMU model as input for the GRMOD. We perform the experiment for the period 2002 – 2010. The results are far from being unexpected. In general, both the low interest rates and most importantly the strong output growth of the Eurozone, with the beneficial effect for exports, combined with the slight gain in competitiveness due to the higher forecasted inflation for the Eurozone than that assumed in the baseline scenario, exercise a strongly beneficial effect on output growth rates of an average magnitude of 1.3% annually. The positive effect on output results mainly by the export growth, which is accelerated by 2.2 percentage points on average throughout the sample, and secondarily in the resulting consumption growth, which is increased by an average of 0.4% in the estimation period; the result on investment, despite the lower interest rates, is marginal. The increase in competitiveness results in lower import growth rates by 0.3% on average; the overall result in trade balance is positive, with current account running faster towards a surplus, which it achieves in 2008.

The effect on prices is marginally positive in the simulation, and must be attributed to the higher import deflator and the stronger domestic demand.

The outcome for the government sector is positive. Tax collection is slightly higher due to the output growth, resulting in higher surpluses in the 2002 – 2006 period and lower deficits thereafter; the output growth and higher tax collection exercise their beneficial effect in the DEBTRATIO too, which declines faster to end up 2.2 percentage points lower than in the baseline.

3.3. CONCLUDING REMARKS ON SIMULATIONS – AREAS FOR FURTHER RESEARCH.

The simulation results have proven two fundamental characteristics of the greek economy. The first is the dependence of our economy on the overall EU developments, especially the EU output and EU inflation. These countries are our main trading partners: their economic condition is reflected in our automatically.

Second, the most crucial variable for the economy is the inflation rate, the development of which determines the competitiveness of our economy, and therefore its ability to compete in the international markets. Keeping inflation low is imperative now that the exchange rate is exogenous to the economy, since even in the worst situation we will not gain advantage over the other EU countries, but we can gain against the rest of the world.

We have seen the economy not to respond much on interest rate reduction. However, since the total investment spending as a percentage of GDP is quite high, over 25%, we may see this as a natural consequence of this already high level. It is the allocation of the investment spending, the R&D spending in Greece and the sustainability of the high investment to GDP ratio one has to consider in further analysis or in conducting policy.

The other area for further analysis is the effect of the major societal problem of the social security system. No doubt the way this problem will be solved (?) will determine the fiscal policy for the years to come.

A very useful equation for the model of the EMU, while refraining from building a new, structural model for the Eurozone like GRMOD, would be an equation that would describe the nominal effective exchange rate of the Euro. This could be coupled with the modelling of the rest of the EU 15 countries, namely England, Denmark and Sweden, in order to have complete overview of the EU economy. Further research could be contacted on the effect of the growing liberalization of the other Balkan and eastern European countries, and their growing importance for the greek economy. Or, following the political developments, the incorporation of the coming EU and maybe EMU enlargement in the model could be considered in the future, leading to a model for the whole Europe.

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APPENDIX A: IDENTITIES

PFD = FD/FDR

ITR = IPR + IGR

CP = CPR*CPI

IT = ITR*PIT

G = GR*PG

IM = IMR*PIM

EX = EXR*PEX

FD = CP + IT + G + V + EX

FDR = CPR + ITR + GR + VR + EXR

GDPR = CPR + ITR + GR + VR + EXR – IMR

GDP = GDPR*PGDP = FDR*PFD – IMR*PIM

NI = GDP – TINR*FD – DR*PIT

YD = NI – TDNR*NI

YDR = YD/CPI

GNP = GDP +UTR

GRATIO = G/GDP

TDNR = TAX*GDP/NI – TINR*FD/NI = (TD + SS – TRA)/NI

SP = SP + ΔYD – ΔCP

SPRATIO = (YD – CP)/GDP

WAGE = WRATE*(PGDP*(1 – TINR)*EMP)

UNEMP = EMPPOP*POP – EMP

u = UNEMP/(EMPPOP*POP)

TINR = TIND/FD

R12MTB = R3MEUR + RP

$INTRATIO = INTRATIO_{t-1} + (0.01(R12MTB+1) - LOG(GDP/GDP_{t-1}))*(DEBTRATIO-DEBTRATIO_{t-1})$

PRODS = Y*/[EMP/(1 – u*)]

$\ln(P_t^*) = \ln(M3_t) - \alpha_0 - (1+ \alpha_1 DUM0)\ln(Y_t^*) - \alpha_2 DUM0 – \alpha_3 DUM3$ or $= \exp(\ln P^* + 0.02)$

REER = ADV*NEEREURO*100*PGDP/(0.7*PGDPEMU + 0.3*PGDPROW)

DEBTRATIO = DEBTRATIO{1} - SGRATIO - IGRATIO – ADJ

TRATIO = TRATIO{1} - 0.1*(TRATIO{1}-TRATIOSTAR)

TRATIOSTAR = GRATIO - NTRATIO + INTRATIO + SGRATIOSTAR + IGRATIO

$CC = r^e + \delta + 0.026$

APPENDIX B: METHODOLOGY.

A. Non Linear Least squares.

The general form of the regression model is that the dependent variable is a function of a general form, including linear form as a special case, of the independent one:

$Y_i = f(\boldsymbol{X_i}, \boldsymbol{\beta}) + \varepsilon_i$

The nonlinear least squares estimators will be the parameters that minimize the half of the squared residuals, i.e. minimize the following equation:

$$S(\boldsymbol{\beta}) = \frac{1}{2}\sum_{i=1}^{n}\varepsilon_i^2 = \frac{1}{2}\sum_{i=1}^{n} [y_i - f(\boldsymbol{X_i}, \boldsymbol{\beta})]^2$$

Since the solution to the previous equation is not in general explicit, an iterative procedure is required for the solution. The most usually used algorithm for the solution of such problems, and the one RATS utilizes, is the Gauss – Newton algorithm.

The most common results for the least squares apply in this case. If $\boldsymbol{X^0}$ is the matrix of derivatives with respect to $\boldsymbol{\beta}$, and $\boldsymbol{Q^0} = plim\frac{1}{n}\boldsymbol{X^{0\prime}X^0}$ ($\boldsymbol{Q^0}$ is a positive definite matrix), consistency of the estimator is obtained as long as = $plim\frac{1}{n}\sum_{i=1}^{n} \boldsymbol{x_i^0}\varepsilon_i = 0$, and asymptotic normality is established if $\frac{1}{\sqrt{n}}\sum_{i=1}^{n} \boldsymbol{x_i^0}\varepsilon_i \xrightarrow{d} N(\boldsymbol{0}, \sigma^2\boldsymbol{Q^0})$. This means that the estimator is consistent if the derivatives of the $\boldsymbol{\beta}$ are uncorrelated with the residuals, meaning that the regressors must be uncorrelated with the residuals, as is the case with the OLS.

B. Gauss – Newton algorithm.

To find the solution to the nonlinear least squares estimation problem, the Gauss – Newton algorithm is used (default algorithm in RATS). As we said in the previous paragraph, finding a solution to $\boldsymbol{\beta}$ is equivalent to solving the minimization problem stated there. To find the solution, the algorithm begins from an initial value (given, or zero by default), and estimates the model with linear least squares, finding a new solution – value for $\boldsymbol{\beta}$ beginning from the past iteration value.

$$\mathbf{b}_{t+1} = [\sum_{i=1}^{n} \mathbf{x}_i^0 \mathbf{x}_i^{0\prime}]^{-1} [\sum_{i=1}^{n} \mathbf{x}_i^0 (y_i - f_i^0 + \mathbf{x}_i^0 \mathbf{b}_t)]$$

where $\mathbf{x}_i^0$ is the derivatives of $\boldsymbol{\beta}$ (regressors), f_i^0 is the value of the equation at the point of the Taylor expansion, and $\mathbf{b}_t$ is the value of the coefficient vector from the previous iteration. The procedure continues until further iterations do not change the value of $\mathbf{b}$ more than a specified amount.

However, the process is sensitive to the choice of starting values since the algorithm will stop after finding a maximum, but there is no guarantee that this will be the global or just a local one. Also, sometimes the algorithm "jumps" and cannot calculates residuals for the next iteration.

C. Gauss-Seidel Algorithm.

RATS uses the Gauss-Seidel method when solving systems of nonlinear equations. Suppose the system of equations is given by:

$$x_1 = f_1(x_1, x_2, \ldots x_n, \mathbf{z})$$
$$x_2 = f_2(x_1, x_2, \ldots x_n, \mathbf{z})$$
$$\ldots$$
$$x_n = f_n(x_1, x_2, \ldots x_n, \mathbf{z})$$

where x_i are the endogenous variables and $\mathbf{z}$ is a vector with the exogenous variables.

The problem is to find a fixed point such that $\mathbf{x} = f(\mathbf{x}, \mathbf{z})$, which means that the algorithm searches for a solution to each equation such that all the equations are satisfied, with a numerical tolerance. Gauss-Seidel uses an iterative updating rule of the form: $x^{(i+1)} = f(x^{(i)}, \mathbf{z})$, to find the solution, which means that the past solution is the starting value for the next iteration.

The computer solves the equations in the order that they appear in the model at each iteration. The performance of the Gauss-Seidel method can be affected be reordering of the equations, which means that the order of the equations may result in failure to find a solution, even if one exists.

D. Hodrick-Prescott Filter.

This is a smoothing method that is widely used among macroeconomists to obtain a smooth estimate of the long-term trend component of a series. The method was first used in a working paper (circulated in the early 1980's and published in 1997) by Hodrick and Prescott to analyze postwar U.S. business cycles.

Technically, the Hodrick-Prescott (HP) filter is a two-sided linear filter that computes the smoothed series *s* of *y* by minimizing the variance of *y* around *s*, subject to a penalty that constrains the second difference of *s*. That is, the HP filter chooses s_t to minimize:

$$\sum_{t=1}^{T}(y_t - s_t)^2 + \lambda\sum_{t=2}^{T-1}((s_{t+1} - s_t) - (s_t - s_{t-1}))^2$$

The penalty parameter λ controls the smoothness of the series s_t. The larger the λ, the smoother the s_t. As $\lambda \longrightarrow \infty$, s_t approaches a linear trend. The proposed values for the most widely used frequencies are: 100 for annually data (they need little smoothing), 1600 for quarterly data, and 14400 for monthly data (which have much greater variation).

APPENDIX C: LIST OF VARIABLES

ENDOGENOUS VARIABLES

CA: current account balance
CC: real capital cost
CP: nominal private consumption
CPR: real private consumption
DEBT: total government debt
DEBTRATIO: government debt to GDP ratio
DR: real depreciation
δ: depreciation
EMP: employment
EMPPOP: employment to population ratio
EX: nominal exports
EXR: real exports
EXR*: long run real exports
FD: final domestic demand
FD: real final domestic demand
G: nominal government consumption
GDP: gross domestic product
GNP: gross national product
GRATIO: government consumption to GDP ratio
i^{EMU}: short term ECB interest rate
i_short: short run interest rate of eurozone
IM: nominal imports
IMR: real imports
INTRATIO: interest payment of government to GDP ratio
IPR: real private investment
IPR*: equilibrium real private investment
IT: nominal total investment
ITR: total real investment
K: real capital stock
NEER: nominal effective exchange rate
NEER*: equilibrium nominal effective exchange rate
NI: gross national income
M3: M3 money supply – demand

π^*: equilibrium inflation

π^e: expected inflation

P*: equilibrium price level

PCP: consumption deflator (CPI)

PEX: export deflator

PFD: deflator of final demand

PGDP: GDP deflator

$PGDP^{EMU}$: EMU GDP deflator

PGP: government consumption deflator

PIM: import deflator

PIT: investment deflator

POP: population

PRODS: potential productivity

R12MTB: 12 month T-Bill rate

R3MEUR: 3 month euribor

r^e: expected real interest rate

r^{*EMU}: average potential EMU output growth per year

REER: real effective exchange rate

$REER^{euro}$: real effective euro exchange rate

SGRATIO: government budget surplus-deficit to GDP

SP: private saving

SPRATIO: private saving to GDP ratio

TRATIO: total tax to GDP ratio

TRATIO*: target total tax to GDP ratio

u: unemployment rate

u*: natural rate of unemployment

UNEMP: unemployed persons

UTR: transfers from the rest of the world

V: change in stocks

VR: real change in stocks

w^{EMU} =total (exports + imports) trade with other EMU members as a percentage of total trade with foreign countries.

w^{ROW} =total (exports + imports) trade with the rest of world as a percentage of total trade with foreign countries.

WAGE: wages of employees

WRATE: real wage rate per worker

WRATEEMU: real wage rate per worker in EMU

Y: real GDP

Y^{EMU}: real GDP of the euro zone

Y*: real potential GDP

Y^{*EMU}: real potential GDP of the euro zone

YD: disposable income

YDR: real disposable income

EXOGENOUS VARIABLES

DYUS: real US GDP percentage change

GR: real government consumption

IGR: real government investment

IGRATIO: government investment to GDP ratio

NEEREURO: euro nominal effective exchange rate

NTRATIO: other receipts of government to GDP ratio

π^{*EMU}: equilibrium - target inflation for the EMU

PGDPEU15: GDP deflator of the 15 EU countries

POIL: price of oil

PGPDROW: GDP deflator main trading partners, excluding Eurozone countries

RP: average risk premium for real investment

SGRATIOSTAR: target budget deficit - surplus to GDP ratio

TDNR: net direct taxes to GDP ratio

TINR: indirect tax rate

URATIO: net transfers from rest of the world to GDP ratio

YEU15: real GDP of the 15 EU countries

APPENDIX D: SIMULATIONS OUTPUT

A. BASELINE SIMULATION OF GRMOD

```
Statistics on Series WSHARE
Annual Data From 1970:01 To 2001:01
Observations   32
Sample Mean    63.6203468750          Variance          14.905212
Standard Error  3.8607268987          SE of Sample Mean      0.682487
t-Statistic       93.21846            Signif Level (Mean=0) 0.00000000
Skewness           0.14355            Signif Level (Sk=0)   0.75205302
Kurtosis          -1.41340            Signif Level (Ku=0)   0.14483048


    0.63620

Dependent Variable GDPR - Estimation by Nonlinear Least Squares
Iterations Taken     6
Annual Data From 1960:01 To 2001:01
Usable Observations     37      Degrees of Freedom    35
 Total Observations     42      Skipped/Missing        5
Centered R**2     0.918996      R Bar **2   0.916682
Uncentered R**2   0.995043      T x R**2      36.817
Mean of Dependent Variable      22611.251351
Std Error of Dependent Variable  5852.757604
Standard Error of Estimate       1689.393241
Sum of Squared Residuals         99891733.321
Durbin-Watson Statistic          0.216044

   Variable               Coeff        Std Error      T-Stat    Signif
*******************************************************************************
1.  GDPRP_A0            0.6737639861 0.0373317298     18.04802  0.00000000
2.  GDPRP_A1            0.1657249801 0.1228791799      1.34868  0.18610149

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)=     27.561531 with Significance Level 0.00000015
Chi-Squared(2)=     27.561531 with Significance Level 0.00000104
Bera-Jarque Normality tests
Chi-Squared(2)=     16.180229 with Significance Level 0.00030655
ARCH(1) test
Chi-Squared(1)=     27.214876 with Significance Level 0.00000018
ADF(1) test: a and ta are:       0.75943      -2.11001


*****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES              *
*         Using data from 1965:01 to 2001:01                    *
*   Choosing the optimal lag length for the ADF regression     *
*    between 0 and  4  lags.                                    *
*****************************************************************

Model Selection Criteria
   Minimum AIC at lag:    1
   Minimum BIC at lag:    1

*****************************************************************
* Augmented Dickey-Fuller t-test with 1 lags:       -2.3451    *
*              1%        5%        10%                          *
*            -2.62     -1.95      -1.61                         *
*                                                               *
* Augmented Dickey-Fuller Z-test with 1 lags:       -9.6062    *
*              1%        5%        10%                          *
*            -12.9      -7.7       -5.5                         *
*****************************************************************

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES          SAMPLE 1965:01 TO 2001:01
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT  5.0 %  SIGNIFICANCE LEVEL
```

```
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

  t(rho-1)/tao =       -2.32194 with critical value      -3.41000
  Cannot reject a unit root with t(rho-1)/tao
    Next is joint test of trend=0 and root=1
    psi3 =        2.75314 with critical value       6.25000
    PSI3 cannot reject unit root and no linear trend

REGRESSIONS WITH CONSTANT,NO TREND
  t(rho-1)/mu =       -2.32888 with critical value      -2.86000
  Cannot reject a unit root with t(rho-1)/mu
    Next is joint test of constant=0 and root=1
    psi1 =        3.10906 with critical value       4.59000
      PSI1 cannot reject constant=0 and root=1

REGRESSIONS WITH NO CONSTANT, NO TREND
  t(rho-1) =       -2.34515 with critical value      -1.95000
  Unit root rejected

CONCLUSION: Series stationary around a zero mean

Statistics on Series DGDPRP
Annual Data From 1960:01 To 2001:01
Observations   36     (42 Total - 6 Skipped/Missing)
Sample Mean    0.02282661707            Variance              0.000122
Standard Error 0.01105892932            SE of Sample Mean      0.001843
t-Statistic       12.38454             Signif Level (Mean=0) 0.00000000
Skewness           0.90759              Signif Level (Sk=0)   0.03314888
Kurtosis           2.32561             Signif Level (Ku=0)   0.00994996

 ENTRY        DGDPRP
 1997:01  0.0065764866228
 1998:01  0.0345853374951
 1999:01  0.0107426577531
 2000:01  0.0137235803866
 2001:01  0.0181337402026


Dependent Variable M3L - Estimation by Nonlinear Least Squares
Iterations Taken     2
Annual Data From 1965:01 To 2001:01
Usable Observations     36      Degrees of Freedom    32
 Total Observations     37      Skipped/Missing        1
Centered R**2     0.997370      R Bar **2   0.997124
Uncentered R**2   0.999949      T x R**2      35.998
Mean of Dependent Variable      14.369545170
Std Error of Dependent Variable  2.049080281
Standard Error of Estimate       0.109894230
Sum of Squared Residuals         0.3864557340
Durbin-Watson Statistic          0.353509

   Variable                  Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  M3_A0                 6.520959775  0.036631410    178.01553  0.00000000
2.  M3_A1                 0.922376235  0.080234602     11.49599  0.00000000
3.  M3_A2                -9.411024174  0.792260725    -11.87870  0.00000000
4.  M3_A3                 0.088213731  0.085908271      1.02684  0.31219729

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)=     23.054632 with Significance Level 0.00000157
Chi-Squared(2)=     23.054632 with Significance Level 0.00000986
Bera-Jarque Normality tests
Chi-Squared(2)=     12.170577 with Significance Level 0.00227611
ARCH(1) test
Chi-Squared(1)=     17.369659 with Significance Level 0.00003077
ADF(1) test: a and ta are:       0.73177      -2.05997


******************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES             *
*          Using data from 1965:01 to 2000:01                   *
```

```
*   Choosing the optimal lag length for the ADF regression    *
*    between 0 and  4  lags.                                  *
****************************************************************

Model Selection Criteria
   Minimum AIC at lag:    0
   Minimum BIC at lag:    0

****************************************************************
* Augmented Dickey-Fuller t-test with 0 lags:      -1.8387    *
*              1%       5%       10%                  *
*            -2.62    -1.95     -1.61                 *
*                                             *
* Augmented Dickey-Fuller Z-test with 0 lags:      -6.2593    *
*              1%       5%       10%                  *
*           -12.9     -7.7      -5.5                  *
****************************************************************

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES          SAMPLE 1965:01 TO 2000:01
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT  5.0 %  SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

  t(rho-1)/tao =       -1.91523 with critical value      -3.41000
  Cannot reject a unit root with t(rho-1)/tao
    Next is joint test of trend=0 and root=1
    psi3 =        1.87046 with critical value       6.25000
    PSI3 cannot reject unit root and no linear trend

REGRESSIONS WITH CONSTANT,NO TREND
  t(rho-1)/mu =       -1.82662 with critical value      -2.86000
  Cannot reject a unit root with t(rho-1)/mu
    Next is joint test of constant=0 and root=1
    psi1 =        1.67199 with critical value       4.59000
      PSI1 cannot reject constant=0 and root=1

REGRESSIONS WITH NO CONSTANT, NO TREND
  t(rho-1) =       -1.85482 with critical value      -1.95000
  Cannot reject a unit root with t(rho-1)

CONCLUSION: Series contains a unit root with zero drift

Dependent Variable PGDPL - Estimation by Nonlinear Least Squares
Iterations Taken     2
Annual Data From 1965:01 To 2001:01
Usable Observations     32      Degrees of Freedom     30
 Total Observations     37      Skipped/Missing        5
Centered R**2     0.997255      R Bar **2   0.997163
Uncentered R**2   0.998763      T x R**2      31.960
Mean of Dependent Variable      -1.534883547
Std Error of Dependent Variable  1.412457897
Standard Error of Estimate       0.075226139
Sum of Squared Residuals         0.1697691587
Durbin-Watson Statistic          0.674831

   Variable                   Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  PGDP_A0               -0.016770396  0.019705386     -0.85106  0.40148022
2.  PGDP_A1                1.012533178  0.009698813    104.39764  0.00000000

Dependent Variable PGDPL - Estimation by Nonlinear Least Squares
Iterations Taken     2
Annual Data From 1965:01 To 2001:01
Usable Observations     31      Degrees of Freedom     26
 Total Observations     37      Skipped/Missing        6
Centered R**2     0.999717      R Bar **2   0.999673
Uncentered R**2   0.999870      T x R**2      30.996
Mean of Dependent Variable      -1.461902459
Std Error of Dependent Variable  1.373105087
Standard Error of Estimate       0.024819947
```

```
Sum of Squared Residuals       0.0160167735
Durbin-Watson Statistic        2.322139

   Variable                  Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  PGDP_A2              -0.218466538  0.067063677     -3.25760  0.00312221
2.  PGDP_A3               0.515754087  0.093722535      5.50299  0.00000896
3.  PGDP_A4               0.183724291  0.074025858      2.48189  0.01985333
4.  PGDP_A5               0.216377166  0.088067324      2.45695  0.02099993
5.  PGDP_A6              -0.007036882  0.018323941     -0.38403  0.70408144

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)=      1.662683 with Significance Level 0.19724152
Chi-Squared(2)=      1.662683 with Significance Level 0.43546482
Bera-Jarque Normality tests
Chi-Squared(2)=      8.579077 with Significance Level 0.01371125
ARCH(1) test
Chi-Squared(1)=     10.285516 with Significance Level 0.00134079
ADF(1) test: a and ta are:      -0.11733      -2.44597


*****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES             *
*         Using data from 1970:01 to 2001:01                    *
*   Choosing the optimal lag length for the ADF regression     *
*    between 0 and  4  lags.                                    *
*****************************************************************

Model Selection Criteria
   Minimum AIC at lag:    1
   Minimum BIC at lag:    0

*****************************************************************
* Augmented Dickey-Fuller t-test with 0 lags:       -3.0033    *
*              1%        5%        10%                     *
*            -2.62     -1.95      -1.61                    *
*                                                      *
* Augmented Dickey-Fuller Z-test with 0 lags:      -12.2608    *
*              1%        5%        10%                     *
*           -12.9      -7.7       -5.5                   *
*****************************************************************

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES           SAMPLE 1970:01 TO 2001:01
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT  5.0 %  SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

  t(rho-1)/tao =       -3.12077 with critical value      -3.41000
  Cannot reject a unit root with t(rho-1)/tao
    Next is joint test of trend=0 and root=1
    psi3 =        4.87337 with critical value        6.25000
    PSI3 cannot reject unit root and no linear trend

REGRESSIONS WITH CONSTANT,NO TREND
  t(rho-1)/mu =        -3.12988 with critical value      -2.86000
  Unit root rejected by t(rho-1)/mu

CONCLUSION: Series stationary around a non-zero mean

Dependent Variable DPCP - Estimation by Nonlinear Least Squares
Iterations Taken     2
Annual Data From 1965:01 To 2001:01
Usable Observations     31      Degrees of Freedom    30
 Total Observations     37      Skipped/Missing        6
Centered R**2     0.624104       R Bar **2   0.624104
Uncentered R**2   0.927394       T x R**2     28.749
Mean of Dependent Variable      0.1377567432
Std Error of Dependent Variable 0.0685159331
Standard Error of Estimate      0.0420073645
Sum of Squared Residuals        0.0529385601
```

Durbin-Watson Statistic 1.698174

Variable	Coeff	Std Error	T-Stat	Signif
1. PCPE_A1	0.9504452105	0.1447794058	6.56478	0.00000029

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)= 3.308591 with Significance Level 0.06891856
Chi-Squared(2)= 3.308591 with Significance Level 0.19122673
Bera-Jarque Normality tests
Chi-Squared(2)= 3.942285 with Significance Level 0.13929764
ARCH(1) test
Chi-Squared(1)= 11.354384 with Significance Level 0.00075270
ADF(1) test: a and ta are: 0.22554 -1.89473

```
*****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES            *
*         Using data from 1971:01 to 2001:01                   *
*   Choosing the optimal lag length for the ADF regression     *
*    between 0 and  4  lags.                                   *
*****************************************************************
```

Model Selection Criteria
Minimum AIC at lag: 0
Minimum BIC at lag: 0

```
*****************************************************************
* Augmented Dickey-Fuller t-test with 0 lags:     -4.6354     *
*             1%      5%      10%                              *
*           -2.62   -1.95   -1.61                              *
*                                                              *
* Augmented Dickey-Fuller Z-test with 0 lags:    -25.5049     *
*             1%      5%      10%                              *
*           -12.9    -7.7    -5.5                              *
*****************************************************************
```

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES SAMPLE 1971:01 TO 2001:01
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT 5.0 % SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

t(rho-1)/tao = -5.54932 with critical value -3.41000
Unit root rejected with t(rho-1)/tao

CONCLUSION: Series has no unit root

Statistics on Series N1
Annual Data From 1965:01 To 2001:01
Observations 37

Sample Mean	1.16647567379	Variance	0.007113
Standard Error	0.08433751125	SE of Sample Mean	0.013865
t-Statistic	84.13095	Signif Level (Mean=0)	0.00000000
Skewness	0.60600	Signif Level (Sk=0)	0.14881599
Kurtosis	-0.86200	Signif Level (Ku=0)	0.33141884

Statistics on Series N2
Annual Data From 1965:01 To 2001:01
Observations 37

Sample Mean	0.79272565454	Variance	0.000623
Standard Error	0.02495072670	SE of Sample Mean	0.004102
t-Statistic	193.25938	Signif Level (Mean=0)	0.00000000
Skewness	0.09004	Signif Level (Sk=0)	0.83014640
Kurtosis	-1.56166	Signif Level (Ku=0)	0.07847676

Dependent Variable CPRL - Estimation by Nonlinear Least Squares
Iterations Taken 2
Annual Data From 1965:01 To 2001:01
Usable Observations 31 Degrees of Freedom 28
Total Observations 37 Skipped/Missing 6

```
Centered R**2     0.917951      R Bar **2   0.912090
Uncentered R**2   0.999943      T x R**2     30.998
Mean of Dependent Variable      9.6711098312
Std Error of Dependent Variable 0.2595805790
Standard Error of Estimate      0.0769647222
Sum of Squared Residuals        0.1658599170
Durbin-Watson Statistic         0.431548

   Variable                  Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  CPR_A0              -1.401727618  0.276437085    -5.07069  0.00002286
2.  CPR_A1               3.141537998  0.681883687     4.60715  0.00008114
3.  CPR_A2              -0.522717929  0.277778884    -1.88178  0.07029968

Dependent Variable CPRL - Estimation by Nonlinear Least Squares
Iterations Taken    2
Annual Data From 1965:01 To 2001:01
Usable Observations    30      Degrees of Freedom    26
 Total Observations    37      Skipped/Missing        7
Centered R**2     0.995191      R Bar **2   0.994636
Uncentered R**2   0.999997      T x R**2     30.000
Mean of Dependent Variable      9.6888491490
Std Error of Dependent Variable 0.2441598367
Standard Error of Estimate      0.0178826158
Sum of Squared Residuals        0.0083144866
Durbin-Watson Statistic         1.493602

   Variable                  Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  CPR_A5               0.016339571  0.005175804     3.15691  0.00400793
2.  CPR_A3              -0.043456123  0.046054339    -0.94358  0.35406871
3.  CPR_A4               0.356467838  0.075761747     4.70512  0.00007320
4.  CPR_A6               0.238624214  0.129719047     1.83955  0.07728062

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)=      1.498501 with Significance Level 0.22090214
Chi-Squared(2)=      1.498501 with Significance Level 0.47272070
Bera-Jarque Normality tests
Chi-Squared(2)=      9.487291 with Significance Level 0.00870685
ARCH(1) test
Chi-Squared(1)=      9.411725 with Significance Level 0.00215602
ADF(1) test: a and ta are:      0.06419      -2.26615


****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES            *
*         Using data from 1971:01 to 2001:01                   *
*    Choosing the optimal lag length for the ADF regression    *
*     between 0 and  4  lags.                                  *
****************************************************************

Model Selection Criteria
   Minimum AIC at lag:     0
   Minimum BIC at lag:     0

****************************************************************
* Augmented Dickey-Fuller t-test with 0 lags:       -2.4418    *
*              1%        5%        10%                          *
*            -2.62     -1.95     -1.61                          *
*                                                               *
* Augmented Dickey-Fuller Z-test with 0 lags:       -8.2167    *
*              1%        5%        10%                          *
*            -12.9      -7.7      -5.5                          *
****************************************************************

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES           SAMPLE 1971:01 TO 2001:01
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT  5.0 %  SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND
```

t(rho-1)/tao = -2.27105 with critical value -3.41000
Cannot reject a unit root with t(rho-1)/tao
Next is joint test of trend=0 and root=1
psi3 = 2.62632 with critical value 6.25000
PSI3 cannot reject unit root and no linear trend

REGRESSIONS WITH CONSTANT,NO TREND
t(rho-1)/mu = -2.32426 with critical value -2.86000
Cannot reject a unit root with t(rho-1)/mu
Next is joint test of constant=0 and root=1
psi1 = 2.85531 with critical value 4.59000
PSI1 cannot reject constant=0 and root=1

REGRESSIONS WITH NO CONSTANT, NO TREND
t(rho-1) = -2.34933 with critical value -1.95000
Unit root rejected

CONCLUSION: Series stationary around a zero mean

Dependent Variable IMRL - Estimation by Nonlinear Least Squares
Iterations Taken 2
Annual Data From 1965:01 To 2001:01
Usable Observations 37 Degrees of Freedom 34
Centered R**2 0.990056 R Bar **2 0.989472
Uncentered R**2 0.999939 T x R**2 36.998
Mean of Dependent Variable 8.2051903209
Std Error of Dependent Variable 0.6530100235
Standard Error of Estimate 0.0670042095
Sum of Squared Residuals 0.1526451790
Durbin-Watson Statistic 2.166441

Variable	Coeff	Std Error	T-Stat	Signif
1. IMR_A0	-0.049394675	0.059356600	-0.83217	0.41112106
2. IMR_A1	0.893363543	0.043816412	20.38879	0.00000000
3. IMR_A2	0.180221544	0.076873038	2.34441	0.02503743

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)= 2.456394 with Significance Level 0.11704719
Chi-Squared(2)= 2.456394 with Significance Level 0.29282000
Bera-Jarque Normality tests
Chi-Squared(2)= 2.146750 with Significance Level 0.34185276
ARCH(1) test
Chi-Squared(1)= 10.837060 with Significance Level 0.00099489
ADF(1) test: a and ta are: -0.57866 -2.93513

```
*****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES             *
*       Using data from 1965:01 to 2001:01                      *
*   Choosing the optimal lag length for the ADF regression      *
*    between 0 and  4  lags.                                    *
*****************************************************************
```

Model Selection Criteria
Minimum AIC at lag: 1
Minimum BIC at lag: 0

```
*****************************************************************
* Augmented Dickey-Fuller t-test with 0 lags:     -6.4855      *
*             1%       5%       10%                            *
*           -2.62    -1.95     -1.61                           *
*                                                              *
* Augmented Dickey-Fuller Z-test with 0 lags:     -39.2624     *
*             1%       5%       10%                            *
*           -12.9    -7.7      -5.5                            *
*****************************************************************
```

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES SAMPLE 1965:01 TO 2001:01
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT 5.0 % SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

```
REGRESSIONS WITH CONSTANT,TREND

  t(rho-1)/tao =       -5.33804 with critical value      -3.41000
  Unit root rejected with t(rho-1)/tao

CONCLUSION: Series has no unit root

Dependent Variable EXRL - Estimation by Nonlinear Least Squares
Iterations Taken     2
Annual Data From 1965:01 To 2001:01
Usable Observations     32      Degrees of Freedom     29
 Total Observations     37      Skipped/Missing         5
Centered R**2     0.918857      R Bar **2   0.913261
Uncentered R**2   0.999653      T x R**2      31.989
Mean of Dependent Variable      8.1178198030
Std Error of Dependent Variable 0.5405235536
Standard Error of Estimate      0.1591918036
Sum of Squared Residuals        0.7349188798
Durbin-Watson Statistic         0.221629

   Variable                  Coeff      Std Error      T-Stat     Signif
*******************************************************************************
1.  EXR_A1                2.359048990  0.133830261     17.62717  0.00000000
2.  EXR_A2               -0.822510224  0.373329532     -2.20317  0.03567954
3.  EXR_A0               -8.345136711  1.684118453     -4.95520  0.00002873

## NL6. NONLIN Parameter EXR_A3 Has Not Been Initialized. Trying 0
## NL6. NONLIN Parameter EXR_A4 Has Not Been Initialized. Trying 0
## NL6. NONLIN Parameter EXR_A5 Has Not Been Initialized. Trying 0

Dependent Variable EXRL - Estimation by Nonlinear Least Squares
Iterations Taken     2
Annual Data From 1965:01 To 2001:01
Usable Observations     31      Degrees of Freedom     28
 Total Observations     37      Skipped/Missing         6
Centered R**2     0.982255      R Bar **2   0.980988
Uncentered R**2   0.999937      T x R**2      30.998
Mean of Dependent Variable      8.1598928779
Std Error of Dependent Variable 0.4933272949
Standard Error of Estimate      0.0680222550
Sum of Squared Residuals        0.1295567609
Durbin-Watson Statistic         1.611794

   Variable                  Coeff      Std Error      T-Stat     Signif
*******************************************************************************
1.  EXR_A3                0.029626558  0.016712156      1.77275  0.08715017
2.  EXR_A4               -0.179177661  0.081728775     -2.19234  0.03682970
3.  EXR_A5                0.661732801  0.183755043      3.60117  0.00121056

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)=      1.499336 with Significance Level 0.22077363
Chi-Squared(2)=      1.499336 with Significance Level 0.47252351
Bera-Jarque Normality tests
Chi-Squared(2)=     11.348927 with Significance Level 0.00343251
ARCH(1) test
Chi-Squared(1)=     10.681954 with Significance Level 0.00108186
ADF(1) test: a and ta are:       0.54918      -1.28359


****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RESEXRSTAR     *
*          Using data from 1970:01 to 2001:01                  *
*   Choosing the optimal lag length for the ADF regression     *
*    between 0 and  4  lags.                                   *
****************************************************************

Model Selection Criteria
   Minimum AIC at lag:     0
   Minimum BIC at lag:     0

****************************************************************
* Augmented Dickey-Fuller t-test with 0 lags:       -1.7655    *
```

*   1%   5%   10%   *
*   -2.62   -1.95   -1.61   *
*   *
* Augmented Dickey-Fuller Z-test with 0 lags: -4.4844   *
*   1%   5%   10%   *
*   -12.9   -7.7   -5.5   *
****

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RESEXRSTAR   SAMPLE 1970:01 TO 2001:01
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT 5.0 % SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

t(rho-1)/tao =   -2.06814 with critical value   -3.41000
Cannot reject a unit root with t(rho-1)/tao
Next is joint test of trend=0 and root=1
psi3 =   2.55785 with critical value   6.25000
PSI3 cannot reject unit root and no linear trend

REGRESSIONS WITH CONSTANT,NO TREND
t(rho-1)/mu =   -1.99056 with critical value   -2.86000
Cannot reject a unit root with t(rho-1)/mu
Next is joint test of constant=0 and root=1
psi1 =   2.22360 with critical value   4.59000
PSI1 cannot reject constant=0 and root=1

REGRESSIONS WITH NO CONSTANT, NO TREND
t(rho-1) =   -1.99183 with critical value   -1.95000
Unit root rejected

CONCLUSION: Series stationary around a zero mean

Dependent Variable IPRL - Estimation by Least Squares
Annual Data From 1965:01 To 2001:01
Usable Observations   31   Degrees of Freedom   27
Total Observations   37   Skipped/Missing   6
Centered R**2   0.396920   R Bar **2   0.329911
Uncentered R**2   0.999760   T x R**2   30.993
Mean of Dependent Variable   8.4252431296
Std Error of Dependent Variable 0.1707659085
Standard Error of Estimate   0.1397871774
Sum of Squared Residuals   0.5275922842
Regression F(3,27)   5.9234
Significance Level of F   0.00305525
Durbin-Watson Statistic   0.833838
Q(9-0)   16.206431
Significance Level of Q   0.06269393

Variable	Coeff	Std Error	T-Stat	Signif
1. Constant	8.629394507	1.798420190	4.79832	0.00005237
2. FDRL	-0.027824668	0.178564517	-0.15582	0.87733081
3. CC	0.428789601	0.647520429	0.66220	0.51345455
4. DUM1	0.267524727	0.092462594	2.89333	0.00745040

NL6. NONLIN Parameter IPR_A0 Has Not Been Initialized. Trying 0

Dependent Variable IPRL - Estimation by Nonlinear Least Squares
Iterations Taken   2
Annual Data From 1965:01 To 2001:01
Usable Observations   31   Degrees of Freedom   30
Total Observations   37   Skipped/Missing   6
Centered R**2   -0.686024   R Bar **2 -0.686024
Uncentered R**2   0.999330   T x R**2   30.979
Mean of Dependent Variable   8.4252431296
Std Error of Dependent Variable 0.1707659085
Standard Error of Estimate   0.2217343976
Sum of Squared Residuals   1.4749842928
Durbin-Watson Statistic   0.402107

Variable	Coeff	Std Error	T-Stat	Signif
1. IPR_A0	-1.579773591	0.039824673	-39.66821	0.00000000

Dependent Variable IPRL - Estimation by Nonlinear Least Squares
Iterations Taken 2
Annual Data From 1965:01 To 2001:01
Usable Observations 30 Degrees of Freedom 28
Total Observations 37 Skipped/Missing 7
Centered R**2 0.567514 R Bar **2 0.552068
Uncentered R**2 0.999826 T x R**2 29.995
Mean of Dependent Variable 8.4292252054
Std Error of Dependent Variable 0.1722150743
Standard Error of Estimate 0.1152596415
Sum of Squared Residuals 0.3719739790
Durbin-Watson Statistic 1.787469

Variable	Coeff	Std Error	T-Stat	Signif
1. IPR_A2	-0.129489948	0.096794401	-1.33778	0.19173198
2. IPR_A3	0.075826859	0.047680299	1.59032	0.12299195

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)= 2.003422 with Significance Level 0.15694451
Chi-Squared(2)= 2.003422 with Significance Level 0.36725050
Bera-Jarque Normality tests
Chi-Squared(2)= 3.711670 with Significance Level 0.15632238
ARCH(1) test
Chi-Squared(1)= 5.435449 with Significance Level 0.01973202
ADF(1) test: a and ta are: -0.13995 -2.75705

```
******************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES              *
*       Using data from 1971:01 to 2001:01                       *
*   Choosing the optimal lag length for the ADF regression       *
*    between 0 and  4  lags.                                     *
******************************************************************
```

Model Selection Criteria
Minimum AIC at lag: 1
Minimum BIC at lag: 1

```
******************************************************************
* Augmented Dickey-Fuller t-test with 1 lags:      -3.0482      *
*              1%       5%       10%                             *
*            -2.62    -1.95     -1.61                            *
*                                                                *
* Augmented Dickey-Fuller Z-test with 1 lags:      -14.0095     *
*              1%       5%       10%                             *
*            -12.9     -7.7      -5.5                            *
******************************************************************
```

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES SAMPLE 1971:01 TO 2001:01
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT 5.0 % SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

t(rho-1)/tao = -2.66651 with critical value -3.41000
Cannot reject a unit root with t(rho-1)/tao
Next is joint test of trend=0 and root=1
psi3 = 4.67429 with critical value 6.25000
PSI3 cannot reject unit root and no linear trend

REGRESSIONS WITH CONSTANT,NO TREND
t(rho-1)/mu = -3.03922 with critical value -2.86000
Unit root rejected by t(rho-1)/mu

CONCLUSION: Series stationary around a non-zero mean

```
Dependent Variable WRATEL - Estimation by Nonlinear Least Squares
Iterations Taken    2
Annual Data From 1965:01 To 2001:01
Usable Observations    31      Degrees of Freedom    29
 Total Observations    37     Skipped/Missing       6
Centered R**2    0.968554      R Bar **2   0.967470
Uncentered R**2   0.998999      T x R**2     30.969
Mean of Dependent Variable      0.8852333291
Std Error of Dependent Variable 0.1631350036
Standard Error of Estimate      0.0294232660
Sum of Squared Residuals        0.0251061288
Durbin-Watson Statistic         1.886270

   Variable                  Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  W_A1                   0.617063840  0.128812638      4.79040  0.00004541
2.  W_A2                  -0.660465468  0.133632124     -4.94242  0.00002977

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)=      3.042980 with Significance Level 0.08108692
Chi-Squared(2)=      3.042980 with Significance Level 0.21838622
Bera-Jarque Normality tests
Chi-Squared(2)=     19.656649 with Significance Level 0.00005390
ARCH(1) test
Chi-Squared(1)=     14.440430 with Significance Level 0.00014466
ADF(1) test: a and ta are:      -0.34661      -2.59922


*****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES           *
*          Using data from 1971:01 to 2001:01                  *
*    Choosing the optimal lag length for the ADF regression    *
*     between 0 and  4  lags.                                 *
*****************************************************************

Model Selection Criteria
   Minimum AIC at lag:     0
   Minimum BIC at lag:     0

*****************************************************************
* Augmented Dickey-Fuller t-test with 0 lags:       -5.1775    *
*               1%        5%        10%                       *
*             -2.62     -1.95      -1.61                      *
*                                                             *
* Augmented Dickey-Fuller Z-test with 0 lags:      -28.7108    *
*               1%        5%        10%                       *
*            -12.9      -7.7       -5.5                       *
*****************************************************************

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES           SAMPLE 1971:01 TO 2001:01
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT  5.0 %  SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

  t(rho-1)/tao =       -4.31341 with critical value      -3.41000
  Unit root rejected with t(rho-1)/tao

CONCLUSION: Series has no unit root

Dependent Variable EMPL - Estimation by Nonlinear Least Squares
Iterations Taken    2
Annual Data From 1965:01 To 2001:01
Usable Observations    37      Degrees of Freedom    34
Centered R**2    0.977310      R Bar **2   0.975975
Uncentered R**2   0.999998      T x R**2     37.000
Mean of Dependent Variable      8.1586522914
Std Error of Dependent Variable 0.0820957100
Standard Error of Estimate      0.0127247793
Sum of Squared Residuals        0.0055052803
Durbin-Watson Statistic         0.627783
```

```
  Variable                  Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  EMP_A0                 3.339103304  0.198222279     16.84525  0.00000000
2.  EMP_A1                 0.495393925  0.021077202     23.50378  0.00000000
3.  EMP_A2                -0.171630906  0.017669742     -9.71327  0.00000000

## NL6. NONLIN Parameter EMP_A3 Has Not Been Initialized. Trying 0
## NL6. NONLIN Parameter EMP_A4 Has Not Been Initialized. Trying 0
## NL6. NONLIN Parameter EMP_A5 Has Not Been Initialized. Trying 0

Dependent Variable EMPL - Estimation by Nonlinear Least Squares
Iterations Taken    2
Annual Data From 1970:01 To 2001:01
Usable Observations     32      Degrees of Freedom    29
Centered R**2    0.977063      R Bar **2   0.975481
Uncentered R**2   0.999998      T x R**2     32.000
Mean of Dependent Variable      8.1728373860
Std Error of Dependent Variable 0.0791112511
Standard Error of Estimate      0.0123876824
Sum of Squared Residuals        0.0044501856
Durbin-Watson Statistic         2.532936

  Variable                  Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  EMP_A3                -0.057611152  0.059499091     -0.96827  0.34091634
2.  EMP_A4                 0.955211066  0.045152297     21.15531  0.00000000
3.  EMP_A5                -0.022287754  0.033517569     -0.66496  0.51133165

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)=      2.784521 with Significance Level 0.09517913
Chi-Squared(2)=      2.784521 with Significance Level 0.24851288
Bera-Jarque Normality tests
Chi-Squared(2)=     11.226432 with Significance Level 0.00364931
ARCH(1) test
Chi-Squared(1)=      4.246350 with Significance Level 0.03933478
ADF(1) test: a and ta are:       0.07250      -1.72140


*****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES              *
*         Using data from 1965:01 to 2001:01                     *
*    Choosing the optimal lag length for the ADF regression      *
*     between 0 and  4  lags.                                    *
*****************************************************************

Model Selection Criteria
  Minimum AIC at lag:    1
  Minimum BIC at lag:    0

*****************************************************************
* Augmented Dickey-Fuller t-test with 0 lags:      -2.0994     *
*            1%       5%       10%                      *
*          -2.62    -1.95     -1.61                     *
*                                               *
* Augmented Dickey-Fuller Z-test with 0 lags:      -10.5763    *
*            1%       5%       10%                      *
*          -12.9     -7.7      -5.5                     *
*****************************************************************

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES           SAMPLE 1965:01 TO 2001:01
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT  5.0 %  SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

  t(rho-1)/tao =       -2.35333 with critical value      -3.41000
  Cannot reject a unit root with t(rho-1)/tao
    Next is joint test of trend=0 and root=1
    psi3 =        3.65935 with critical value       6.25000
    PSI3 cannot reject unit root and no linear trend
```

```
REGRESSIONS WITH CONSTANT,NO TREND
 t(rho-1)/mu =      -2.52780 with critical value     -2.86000
 Cannot reject a unit root with t(rho-1)/mu
  Next is joint test of constant=0 and root=1
  psi1 =       3.26475 with critical value      4.59000
   PSI1 cannot reject constant=0 and root=1

REGRESSIONS WITH NO CONSTANT, NO TREND
 t(rho-1) =      -2.59491 with critical value     -1.95000
 Unit root rejected

CONCLUSION: Series stationary around a zero mean

Dependent Variable PCPL - Estimation by Nonlinear Least Squares
Iterations Taken     2
Annual Data From 1965:01 To 2001:01
Usable Observations     37      Degrees of Freedom    36
Centered R**2     0.999903      R Bar **2   0.999903
Uncentered R**2   0.999961      T x R**2     36.999
Mean of Dependent Variable      -1.812759635
Std Error of Dependent Variable  1.499804630
Standard Error of Estimate       0.014797003
Sum of Squared Residuals         0.0078822465
Durbin-Watson Statistic          2.090773

   Variable                  Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  PCP_A1               0.1876781733 0.0638747541      2.93822  0.00572882

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)=      4.857252 with Significance Level 0.02753015
Chi-Squared(2)=      4.857252 with Significance Level 0.08815787
Bera-Jarque Normality tests
Chi-Squared(2)=      2.605471 with Significance Level 0.27178728
ARCH(1) test
Chi-Squared(1)=      9.116485 with Significance Level 0.00253316
ADF(1) test: a and ta are:      -2.15607      -4.84644


*****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES           *
*        Using data from 1965:01 to 2001:01                   *
*   Choosing the optimal lag length for the ADF regression    *
*    between 0 and  4  lags.                                  *
*****************************************************************

Model Selection Criteria
   Minimum AIC at lag:     1
   Minimum BIC at lag:     1

*****************************************************************
* Augmented Dickey-Fuller t-test with 1 lags:       -2.0675    *
*              1%       5%       10%                       *
*            -2.62     -1.95      -1.61                     *
*                                                   *
* Augmented Dickey-Fuller Z-test with 1 lags:       -2.1240    *
*              1%       5%       10%                       *
*           -12.9      -7.7       -5.5                    *
*****************************************************************

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES            SAMPLE 1965:01 TO 2001:01
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT  5.0 %  SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

 t(rho-1)/tao =      -1.99293 with critical value     -3.41000
 Cannot reject a unit root with t(rho-1)/tao
  Next is joint test of trend=0 and root=1
  psi3 =       2.87113 with critical value      6.25000
  PSI3 cannot reject unit root and no linear trend
```

```
REGRESSIONS WITH CONSTANT,NO TREND
  t(rho-1)/mu =       -1.53051 with critical value      -2.86000
  Cannot reject a unit root with t(rho-1)/mu
    Next is joint test of constant=0 and root=1
    psi1 =        2.09093 with critical value       4.59000
      PSI1 cannot reject constant=0 and root=1

REGRESSIONS WITH NO CONSTANT, NO TREND
  t(rho-1) =       -2.06749 with critical value      -1.95000
  Unit root rejected

CONCLUSION: Series stationary around a zero mean

Dependent Variable PITL - Estimation by Nonlinear Least Squares
Iterations Taken     2
Annual Data From 1965:01 To 2001:01
Usable Observations     37      Degrees of Freedom    36
Centered R**2    0.999526       R Bar **2   0.999526
Uncentered R**2   0.999798      T x R**2      36.993
Mean of Dependent Variable      -1.798469059
Std Error of Dependent Variable  1.574104093
Standard Error of Estimate       0.034267797
Sum of Squared Residuals         0.0422741483
Durbin-Watson Statistic          1.470851

   Variable                  Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  PIT_A1               1.0085453750 0.0424034377     23.78452  0.00000000

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)=      3.004761 with Significance Level 0.08302020
Chi-Squared(2)=      3.004761 with Significance Level 0.22259960
Bera-Jarque Normality tests
Chi-Squared(2)=     10.072224 with Significance Level 0.00649897
ARCH(1) test
Chi-Squared(1)=     12.063502 with Significance Level 0.00051419
ADF(1) test: a and ta are:       0.39362      -2.00122


*****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES            *
*         Using data from 1965:01 to 2001:01                    *
*   Choosing the optimal lag length for the ADF regression    *
*    between 0 and  4  lags.                                   *
*****************************************************************

Model Selection Criteria
   Minimum AIC at lag:     1
   Minimum BIC at lag:     1

*****************************************************************
* Augmented Dickey-Fuller t-test with 1 lags:       -2.0675    *
*              1%        5%        10%                       *
*            -2.62     -1.95      -1.61                      *
*                                                        *
* Augmented Dickey-Fuller Z-test with 1 lags:       -2.1240    *
*              1%        5%        10%                       *
*            -12.9      -7.7       -5.5                    *
*****************************************************************

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES           SAMPLE 1965:01 TO 2001:01
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT  5.0 %  SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

  t(rho-1)/tao =       -1.99293 with critical value      -3.41000
  Cannot reject a unit root with t(rho-1)/tao
    Next is joint test of trend=0 and root=1
    psi3 =        2.87113 with critical value       6.25000
```

```
   PSI3 cannot reject unit root and no linear trend

REGRESSIONS WITH CONSTANT,NO TREND
  t(rho-1)/mu =       -1.53051 with critical value      -2.86000
  Cannot reject a unit root with t(rho-1)/mu
    Next is joint test of constant=0 and root=1
    psi1 =        2.09093 with critical value       4.59000
      PSI1 cannot reject constant=0 and root=1

REGRESSIONS WITH NO CONSTANT, NO TREND
  t(rho-1) =       -2.06749 with critical value      -1.95000
  Unit root rejected

CONCLUSION: Series stationary around a zero mean

Dependent Variable PEXL - Estimation by Nonlinear Least Squares
Iterations Taken     2
Annual Data From 1965:01 To 2001:01
Usable Observations     37      Degrees of Freedom    35
Centered R**2    0.999576      R Bar **2   0.999564
Uncentered R**2   0.999821      T x R**2     36.993
Mean of Dependent Variable      -1.531863399
Std Error of Dependent Variable  1.324399573
Standard Error of Estimate       0.027667153
Sum of Squared Residuals        0.0267914978
Durbin-Watson Statistic            2.100099

   Variable                  Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  PEX_A1               0.6627051598 0.0882822277      7.50667  0.00000001
2.  PEX_A2               0.2949662038 0.0858033386      3.43770  0.00153082

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)=      4.929091 with Significance Level 0.02640821
Chi-Squared(2)=      4.929091 with Significance Level 0.08504749
Bera-Jarque Normality tests
Chi-Squared(2)=      9.229810 with Significance Level 0.00990313
ARCH(1) test
Chi-Squared(1)=     11.552912 with Significance Level 0.00067643
ADF(1) test: a and ta are:      -1.14937       -3.89192


****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES           *
*         Using data from 1965:01 to 2001:01                  *
*   Choosing the optimal lag length for the ADF regression    *
*    between 0 and  4  lags.                                  *
****************************************************************

Model Selection Criteria
   Minimum AIC at lag:     1
   Minimum BIC at lag:     1

****************************************************************
* Augmented Dickey-Fuller t-test with 1 lags:       -5.9726    *
*              1%        5%        10%                    *
*            -2.62     -1.95      -1.61                  *
*                                                      *
* Augmented Dickey-Fuller Z-test with 1 lags:      -74.9502    *
*              1%        5%        10%                    *
*           -12.9      -7.7       -5.5                  *
****************************************************************

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES           SAMPLE 1965:01 TO 2001:01
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT  5.0 %  SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND
  t(rho-1)/tao =       -6.19245 with critical value      -3.41000
  Unit root rejected with t(rho-1)/tao
CONCLUSION: Series has no unit root
```

Dependent Variable PIML - Estimation by Nonlinear Least Squares
Iterations Taken 2
Annual Data From 1965:01 To 2001:01
Usable Observations 37 Degrees of Freedom 34
Centered R**2 0.998553 R Bar **2 0.998468
Uncentered R**2 0.999367 T x R**2 36.977
Mean of Dependent Variable -1.507425791
Std Error of Dependent Variable 1.348413757
Standard Error of Estimate 0.052780463
Sum of Squared Residuals 0.0947164256
Durbin-Watson Statistic 2.111203

Variable	Coeff	Std Error	T-Stat	Signif
1. PIM_A1	0.7987766919	0.3045975700	2.62240	0.01297130
2. PIM_A2	0.0897891864	0.0322174958	2.78697	0.00864284
3. PIM_A3	0.4955916911	0.1331968779	3.72075	0.00071525

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)= 4.314610 with Significance Level 0.03778643
Chi-Squared(2)= 4.314610 with Significance Level 0.11563634
Bera-Jarque Normality tests
Chi-Squared(2)= 15.318665 with Significance Level 0.00047162
ARCH(1) test
Chi-Squared(1)= 13.621331 with Significance Level 0.00022363
ADF(1) test: a and ta are: 0.19138 -2.18138

```
******************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES              *
*        Using data from 1965:01 to 2001:01                      *
*   Choosing the optimal lag length for the ADF regression       *
*    between 0 and  4  lags.                                     *
******************************************************************
```

Model Selection Criteria
Minimum AIC at lag: 2
Minimum BIC at lag: 0

```
******************************************************************
* Augmented Dickey-Fuller t-test with 0 lags:      -6.4092   *
*             1%       5%       10%                   *
*           -2.62    -1.95     -1.61                  *
*                                               *
* Augmented Dickey-Fuller Z-test with 0 lags:     -38.6393   *
*             1%       5%       10%                   *
*           -12.9     -7.7      -5.5                *
******************************************************************
```

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES SAMPLE 1965:01 TO 2001:01
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT 5.0 % SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

t(rho-1)/tao = -3.08180 with critical value -3.41000
Cannot reject a unit root with t(rho-1)/tao
Next is joint test of trend=0 and root=1
psi3 = 4.83809 with critical value 6.25000
PSI3 cannot reject unit root and no linear trend

REGRESSIONS WITH CONSTANT,NO TREND
t(rho-1)/mu = -3.03374 with critical value -2.86000
Unit root rejected by t(rho-1)/mu

CONCLUSION: Series stationary around a non-zero mean

Dependent Variable PGL - Estimation by Nonlinear Least Squares
Iterations Taken 2
Annual Data From 1965:01 To 2001:01
Usable Observations 37 Degrees of Freedom 35

```
Centered R**2     0.999718      R Bar **2   0.999710
Uncentered R**2   0.999887      T x R**2     36.996
Mean of Dependent Variable      -1.948463785
Std Error of Dependent Variable  1.618358694
Standard Error of Estimate       0.027559675
Sum of Squared Residuals         0.0265837482
Durbin-Watson Statistic          2.601190

   Variable                  Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  PG_A0                0.0088936587 0.0046829637      1.89915  0.06581181
2.  PG_A1                0.1809121513 0.1034338701      1.74906  0.08904638

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)=      4.132425 with Significance Level 0.04206903
Chi-Squared(2)=      4.132425 with Significance Level 0.12666464
Bera-Jarque Normality tests
Chi-Squared(2)=      6.237037 with Significance Level 0.04422265
ARCH(1) test
Chi-Squared(1)=     12.483773 with Significance Level 0.00041050
ADF(1) test: a and ta are:      -0.83118      -2.97434


*****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES           *
*         Using data from 1965:01 to 2001:01               *
*   Choosing the optimal lag length for the ADF regression    *
*    between 0 and  4  lags.                          *
*****************************************************************

Model Selection Criteria
   Minimum AIC at lag:     0
   Minimum BIC at lag:     0

*****************************************************************
* Augmented Dickey-Fuller t-test with 0 lags:       -8.0690    *
*              1%        5%        10%                    *
*            -2.62     -1.95      -1.61                  *
*                                            *
* Augmented Dickey-Fuller Z-test with 0 lags:      -46.8244    *
*              1%        5%        10%                    *
*           -12.9      -7.7       -5.5                  *
*****************************************************************

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES           SAMPLE 1965:01 TO 2001:01
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT  5.0 %  SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

  t(rho-1)/tao =        -5.33218 with critical value      -3.41000
  Unit root rejected with t(rho-1)/tao

CONCLUSION: Series has no unit root

Dependent Variable CAPR - Estimation by Nonlinear Least Squares
Iterations Taken     2
Annual Data From 1965:01 To 2001:01
Usable Observations     37      Degrees of Freedom    36
Centered R**2     0.999988      R Bar **2   0.999988
Uncentered R**2   0.999998      T x R**2     37.000
Mean of Dependent Variable      87222.551351
Std Error of Dependent Variable 35290.334834
Standard Error of Estimate       124.100669
Sum of Squared Residuals         554435.14147
Durbin-Watson Statistic          0.163225

   Variable                  Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  CAPR_A1                0.0202357133 0.0002247447     90.03865  0.00000000
```

```
Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)=      4.132425 with Significance Level 0.04206903
Chi-Squared(2)=      4.132425 with Significance Level 0.12666464
Bera-Jarque Normality tests
Chi-Squared(2)=      6.237037 with Significance Level 0.04422265
ARCH(1) test
Chi-Squared(1)=     12.483773 with Significance Level 0.00041050
ADF(1) test: a and ta are:      -0.83118      -2.97434


*****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES             *
*         Using data from 1965:01 to 2001:01                    *
*    Choosing the optimal lag length for the ADF regression     *
*     between 0 and  4  lags.                                   *
*****************************************************************

Model Selection Criteria
   Minimum AIC at lag:     0
   Minimum BIC at lag:     0

*****************************************************************
* Augmented Dickey-Fuller t-test with 0 lags:       -8.0690     *
*               1%        5%        10%                         *
*             -2.62     -1.95      -1.61                        *
*                                                               *
* Augmented Dickey-Fuller Z-test with 0 lags:      -46.8244     *
*               1%        5%        10%                         *
*            -12.9      -7.7       -5.5                         *
*****************************************************************

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES           SAMPLE 1965:01 TO 2001:01
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT  5.0 %  SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

  t(rho-1)/tao =       -5.33218 with critical value      -3.41000
  Unit root rejected with t(rho-1)/tao

CONCLUSION: Series has no unit root
## NL6. NONLIN Parameter DR_A0 Has Not Been Initialized. Trying 0

Dependent Variable DR - Estimation by Nonlinear Least Squares
Iterations Taken     2
Annual Data From 1965:01 To 2001:01
Usable Observations     37      Degrees of Freedom    36
Centered R**2     0.994064       R Bar **2   0.994064
Uncentered R**2   0.999274       T x R**2      36.973
Mean of Dependent Variable       1724.6868120
Std Error of Dependent Variable  652.8454591
Standard Error of Estimate        50.2986283
Sum of Squared Residuals          91078.272303
Durbin-Watson Statistic           1.778291

   Variable                   Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  DR_A0                 -0.741692689  8.269043703     -0.08970  0.92902669

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)=      4.132425 with Significance Level 0.04206903
Chi-Squared(2)=      4.132425 with Significance Level 0.12666464
Bera-Jarque Normality tests
Chi-Squared(2)=      6.237037 with Significance Level 0.04422265
ARCH(1) test
Chi-Squared(1)=     12.483773 with Significance Level 0.00041050
ADF(1) test: a and ta are:      -0.83118      -2.97434


*****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES             *
```

```
*        Using data from 1965:01 to 2001:01                *
*   Choosing the optimal lag length for the ADF regression    *
*    between 0 and  4  lags.                               *
******************************************************************

Model Selection Criteria
   Minimum AIC at lag:     0
   Minimum BIC at lag:     0

******************************************************************
* Augmented Dickey-Fuller t-test with 0 lags:      -8.0690    *
*              1%        5%        10%                     *
*            -2.62     -1.95      -1.61                    *
*                                                      *
* Augmented Dickey-Fuller Z-test with 0 lags:      -46.8244    *
*              1%        5%        10%                     *
*            -12.9      -7.7       -5.5                  *
******************************************************************

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES           SAMPLE 1965:01 TO 2001:01
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT  5.0 %  SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

  t(rho-1)/tao =       -5.33218 with critical value      -3.41000
  Unit root rejected with t(rho-1)/tao

CONCLUSION: Series has no unit root
## NL6. NONLIN Parameter R12_A0 Has Not Been Initialized. Trying 0
## NL6. NONLIN Parameter R12_A2 Has Not Been Initialized. Trying 0

Dependent Variable R12MTB - Estimation by Nonlinear Least Squares
Iterations Taken     2
Annual Data From 1965:01 To 2001:01
Usable Observations     30      Degrees of Freedom    28
 Total Observations     37      Skipped/Missing        7
Centered R**2    0.549836       R Bar **2   0.533759
Uncentered R**2   0.945554       T x R**2      28.367
Mean of Dependent Variable      14.306666667
Std Error of Dependent Variable  5.397456191
Standard Error of Estimate       3.685484007
Sum of Squared Residuals         380.31818617
Durbin-Watson Statistic          1.902317

   Variable                  Coeff       Std Error      T-Stat     Signif
*********************************************************************************
1.  R12_A0               0.8293137391 0.7561280925      1.09679  0.28207678
2.  R12_A2               0.6302258965 0.1469699596      4.28813  0.00019322

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)=      0.151311 with Significance Level 0.69728560
Chi-Squared(2)=      0.151311 with Significance Level 0.92713552
Bera-Jarque Normality tests
Chi-Squared(2)=      4.502817 with Significance Level 0.10525089
ARCH(1) test
Chi-Squared(1)=      6.399617 with Significance Level 0.01141450
ADF(1) test: a and ta are:       0.07728      -2.23003


******************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES           *
*        Using data from 1965:01 to 2001:01                *
*   Choosing the optimal lag length for the ADF regression    *
*    between 0 and  4  lags.                               *
******************************************************************

Model Selection Criteria
   Minimum AIC at lag:     0
   Minimum BIC at lag:     0
```

```
****************************************************************
* Augmented Dickey-Fuller t-test with 0 lags:      -8.0690    *
*             1%       5%       10%                    *
*            -2.62     -1.95     -1.61                  *
*                                                 *
* Augmented Dickey-Fuller Z-test with 0 lags:      -46.8244    *
*             1%       5%       10%                    *
*            -12.9     -7.7      -5.5                 *
****************************************************************

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES           SAMPLE 1965:01 TO 2001:01
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT  5.0 %  SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

  t(rho-1)/tao =       -5.33218 with critical value      -3.41000
  Unit root rejected with t(rho-1)/tao

CONCLUSION: Series has no unit root
## NL6. NONLIN Parameter R3_A0 Has Not Been Initialized. Trying 0
## NL6. NONLIN Parameter R3_A1 Has Not Been Initialized. Trying 0

Dependent Variable R3M - Estimation by Nonlinear Least Squares
Iterations Taken     2
Annual Data From 1965:01 To 2001:01
Usable Observations     27      Degrees of Freedom    25
 Total Observations     37      Skipped/Missing       10
Centered R**2     0.954880      R Bar **2   0.953075
Uncentered R**2   0.995739      T x R**2      26.885
Mean of Dependent Variable       13.587777778
Std Error of Dependent Variable  4.471443007
Standard Error of Estimate       0.968609004
Sum of Squared Residuals         23.455085078
Durbin-Watson Statistic          1.302607

   Variable                  Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  R3_A0                -0.825813678  0.228391299     -3.61578  0.00131918
2.  R3_A1                 0.380560899  0.084571777      4.49986  0.00013624

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)=      4.132425 with Significance Level 0.04206903
Chi-Squared(2)=      4.132425 with Significance Level 0.12666464
Bera-Jarque Normality tests
Chi-Squared(2)=      6.237037 with Significance Level 0.04422265
ARCH(1) test
Chi-Squared(1)=     12.483773 with Significance Level 0.00041050
ADF(1) test: a and ta are:      -0.83118      -2.97434


****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES           *
*         Using data from 1965:01 to 2001:01                *
*    Choosing the optimal lag length for the ADF regression    *
*     between 0 and  4  lags.                          *
****************************************************************

Model Selection Criteria
   Minimum AIC at lag:     0
   Minimum BIC at lag:     0

****************************************************************
* Augmented Dickey-Fuller t-test with 0 lags:      -8.0690    *
*             1%       5%       10%                    *
*            -2.62     -1.95     -1.61                  *
*                                                 *
* Augmented Dickey-Fuller Z-test with 0 lags:      -46.8244    *
*             1%       5%       10%                    *
*            -12.9     -7.7      -5.5                 *
****************************************************************
```

```
URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES           SAMPLE 1965:01 TO 2001:01
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT  5.0 %  SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

  t(rho-1)/tao =       -5.33218 with critical value      -3.41000
  Unit root rejected with t(rho-1)/tao

CONCLUSION: Series has no unit root

Dependent Variable EXRATEL - Estimation by Nonlinear Least Squares
Iterations Taken     2
Annual Data From 1967:01 To 2001:01
Usable Observations     32      Degrees of Freedom    30
 Total Observations     35      Skipped/Missing        3
Centered R**2     0.996219      R Bar **2   0.996093
Uncentered R**2   0.999908      T x R**2     31.997
Mean of Dependent Variable      5.5745187974
Std Error of Dependent Variable 0.8933953172
Standard Error of Estimate      0.0558399312
Sum of Squared Residuals        0.0935429375
Durbin-Watson Statistic         1.059433

   Variable                  Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  EXRATE_A0            4.5646212646 0.0150484418    303.32850  0.00000000
2.  EXRATE_A1            0.9985991073 0.0112314036     88.91134  0.00000000

Dependent Variable EXRATEL - Estimation by Nonlinear Least Squares
Iterations Taken     2
Annual Data From 1967:01 To 2001:01
Usable Observations     31      Degrees of Freedom    29
 Total Observations     35      Skipped/Missing        4
Centered R**2     0.996921      R Bar **2   0.996815
Uncentered R**2   0.999927      T x R**2     30.998
Mean of Dependent Variable      5.5320573901
Std Error of Dependent Variable 0.8747240258
Standard Error of Estimate      0.0493655754
Sum of Squared Residuals        0.0706718409
Durbin-Watson Statistic         1.701378

   Variable                  Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  EXRATE_A3            0.4818750585 0.1728618120      2.78763  0.00927241
2.  EXRATE_A4            0.9030545414 0.0956389685      9.44233  0.00000000

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)=      1.433143 with Significance Level 0.23125220
Chi-Squared(2)=      1.433143 with Significance Level 0.48842398
Bera-Jarque Normality tests
Chi-Squared(2)=     12.986361 with Significance Level 0.00151373
ARCH(1) test
Chi-Squared(1)=     10.812918 with Significance Level 0.00100794
ADF(1) test: a and ta are:      -0.02700      -1.99315


****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES            *
*         Using data from 1970:01 to 2001:01                   *
*   Choosing the optimal lag length for the ADF regression     *
*    between 0 and  4  lags.                                   *
****************************************************************

Model Selection Criteria
   Minimum AIC at lag:     0
   Minimum BIC at lag:     0

****************************************************************
* Augmented Dickey-Fuller t-test with 0 lags:       -3.2602    *
*               1%        5%        10%                        *
```

```
*            -2.62     -1.95      -1.61                     *
*                                                     *
* Augmented Dickey-Fuller Z-test with 0 lags:      -16.6199    *
*              1%        5%        10%                    *
*           -12.9      -7.7       -5.5                   *
*****************************************************************

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES           SAMPLE 1970:01 TO 2001:01
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT  5.0 %  SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

  t(rho-1)/tao =       -3.05410 with critical value      -3.41000
  Cannot reject a unit root with t(rho-1)/tao
    Next is joint test of trend=0 and root=1
    psi3 =        4.83739 with critical value       6.25000
    PSI3 cannot reject unit root and no linear trend

REGRESSIONS WITH CONSTANT,NO TREND
  t(rho-1)/mu =       -3.15031 with critical value      -2.86000
  Unit root rejected by t(rho-1)/mu

CONCLUSION: Series stationary around a non-zero mean


*****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN EXRATEL        *
*         Using data from 1960:01 to 2001:01                 *
*    Choosing the optimal lag length for the ADF regression    *
*     between 0 and  4  lags.                              *
*****************************************************************

Model Selection Criteria
   Minimum AIC at lag:    4
   Minimum BIC at lag:    2

*****************************************************************
* Augmented Dickey-Fuller t-test with 2 lags:       -1.5898    *
*              1%        5%        10%                    *
*            -2.62     -1.95      -1.61                     *
*                                                     *
* Augmented Dickey-Fuller Z-test with 2 lags:       -0.4509    *
*              1%        5%        10%                    *
*           -12.9      -7.7       -5.5                   *
*****************************************************************

URAUTO Procedure by Paco Goerlich
TESTING SERIES: EXRATEL       SAMPLE 1960:01 TO 2001:01
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT  5.0 %  SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

  t(rho-1)/tao =       -2.19292 with critical value      -3.41000
  Cannot reject a unit root with t(rho-1)/tao
    Next is joint test of trend=0 and root=1
    psi3 =        2.56690 with critical value       6.25000
    PSI3 cannot reject unit root and no linear trend

REGRESSIONS WITH CONSTANT,NO TREND
  t(rho-1)/mu =       -0.04333 with critical value      -2.86000
  Cannot reject a unit root with t(rho-1)/mu
    Next is joint test of constant=0 and root=1
    psi1 =        2.01847 with critical value       4.59000
      PSI1 cannot reject constant=0 and root=1

REGRESSIONS WITH NO CONSTANT, NO TREND
  t(rho-1) =       -1.99970 with critical value      -1.95000
  Unit root rejected
```

CONCLUSION: Series stationary around a zero mean

Statistics on Series DX
Annual Data From 1967:01 To 2001:01
Observations 35
Sample Mean -0.0704153868 Variance 0.003382
Standard Error 0.0581546438 SE of Sample Mean 0.009830
t-Statistic -7.16337 Signif Level (Mean=0) 0.00000003
Skewness -0.82140 Signif Level (Sk=0) 0.05761283
Kurtosis 0.72631 Signif Level (Ku=0) 0.42870684

Dependent Variable POP - Estimation by Nonlinear Least Squares
Iterations Taken 3
Annual Data From 1965:01 To 2001:01
Usable Observations 37 Degrees of Freedom 35
Centered R**2 0.997434 R Bar **2 0.997361
Uncentered R**2 0.999988 T x R**2 37.000
Mean of Dependent Variable 9677.4108108
Std Error of Dependent Variable 678.1342217
Standard Error of Estimate 34.8352554
Sum of Squared Residuals 42472.325761
Durbin-Watson Statistic 2.081104

Variable	Coeff	Std Error	T-Stat	Signif
1. POP_A0	0.0022905715	0.0009887863	2.31655	0.02650490
2. POP_A1	0.5830188397	0.1375664822	4.23809	0.00015594

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)= 0.154066 with Significance Level 0.69467957
Chi-Squared(2)= 0.154066 with Significance Level 0.92585927
Bera-Jarque Normality tests
Chi-Squared(2)= 8.319609 with Significance Level 0.01561061
ARCH(1) test
Chi-Squared(1)= 10.113748 with Significance Level 0.00147167
ADF(1) test: a and ta are: 0.22350 -1.93156

Dependent Variable EMPPOP - Estimation by Nonlinear Least Squares
Iterations Taken 2
Annual Data From 1965:01 To 2001:01
Usable Observations 37 Degrees of Freedom 35
Centered R**2 0.912704 R Bar **2 0.910209
Uncentered R**2 0.999762 T x R**2 36.991
Mean of Dependent Variable 0.3855944217
Std Error of Dependent Variable 0.0204565780
Standard Error of Estimate 0.0061298295
Sum of Squared Residuals 0.0013151183
Durbin-Watson Statistic 1.555306

Variable	Coeff	Std Error	T-Stat	Signif
1. EMPPOP_A0	-0.001252083	0.020247738	-0.06184	0.95104348
2. EMPPOP_A1	1.004925877	0.052533134	19.12937	0.00000000

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)= 5.231630 with Significance Level 0.02217974
Chi-Squared(2)= 5.231630 with Significance Level 0.07310819
Bera-Jarque Normality tests
Chi-Squared(2)= 8.871133 with Significance Level 0.01184835
ARCH(1) test
Chi-Squared(1)= 7.180417 with Significance Level 0.00737036
ADF(1) test: a and ta are: 0.38680 -2.01231

Dependent Variable UL - Estimation by Nonlinear Least Squares
Iterations Taken 2
Annual Data From 1965:01 To 2001:01
Usable Observations 37 Degrees of Freedom 35
Centered R**2 0.996710 R Bar **2 0.996616
Uncentered R**2 0.999656 T x R**2 36.987
Mean of Dependent Variable 5.2545560356
Std Error of Dependent Variable 1.8204830128
Standard Error of Estimate 0.1059007247

```
Sum of Squared Residuals       0.3925237220
Durbin-Watson Statistic        1.560388

   Variable                 Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  U_A0                 -0.661654700  0.312549337     -2.11696  0.04144408
2.  U_A1                  0.770723944  0.108425561      7.10832  0.00000003

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)=      2.300617 with Significance Level 0.12932260
Chi-Squared(2)=      2.300617 with Significance Level 0.31653907
Bera-Jarque Normality tests
Chi-Squared(2)=      5.029415 with Significance Level 0.08088657
ARCH(1) test
Chi-Squared(1)=      9.592678 with Significance Level 0.00195355
ADF(1) test: a and ta are:       0.09018      -2.57440

Dependent Variable VR - Estimation by Nonlinear Least Squares
Iterations Taken     2
Annual Data From 1965:01 To 2001:01
Usable Observations     37      Degrees of Freedom    35
Centered R**2     0.410153      R Bar **2   0.393300
Uncentered R**2   0.441407      T x R**2      16.332
Mean of Dependent Variable      125.89189189
Std Error of Dependent Variable 539.56223221
Standard Error of Estimate      420.27000512
Sum of Squared Residuals        6181940.7020
Durbin-Watson Statistic         2.057278

   Variable                 Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  VR_A0                 42.577388564 71.126019053     0.59862  0.55328175
2.  VR_A1                  0.641147417  0.129963221     4.93330  0.00001962

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)=      1.215064 with Significance Level 0.27033150
Chi-Squared(2)=      1.215064 with Significance Level 0.54469348
Bera-Jarque Normality tests
Chi-Squared(2)=      9.459844 with Significance Level 0.00882716
ARCH(1) test
Chi-Squared(1)=     12.797308 with Significance Level 0.00034712
ADF(1) test: a and ta are:       0.06391      -2.38466

Dependent Variable V - Estimation by Nonlinear Least Squares
Iterations Taken     2
Annual Data From 1965:01 To 2001:01
Usable Observations     37      Degrees of Freedom    35
Centered R**2     0.365492      R Bar **2   0.347363
Uncentered R**2   0.433710      T x R**2      16.047
Mean of Dependent Variable      30.597297297
Std Error of Dependent Variable 89.372698064
Standard Error of Estimate      72.200565144
Sum of Squared Residuals        182452.25625
Durbin-Watson Statistic         0.951959

   Variable                 Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  V_A0                 25.587529793 11.922023679     2.14624  0.03886609
2.  V_A1                  0.812135438  0.180873071     4.49008  0.00007405

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)=     10.496119 with Significance Level 0.00119626
Chi-Squared(2)=     10.496119 with Significance Level 0.00525771
Bera-Jarque Normality tests
Chi-Squared(2)=     27.888298 with Significance Level 0.00000088
ARCH(1) test
Chi-Squared(1)=     11.161975 with Significance Level 0.00083491
ADF(1) test: a and ta are:       0.16430      -2.72657

Dependent Variable GRL - Estimation by Nonlinear Least Squares
Iterations Taken     2
Annual Data From 1965:01 To 2001:01
Usable Observations     37      Degrees of Freedom    35
```

```
Centered R**2     0.992653      R Bar **2   0.992443
Uncentered R**2   0.999987      T x R**2     37.000
Mean of Dependent Variable      8.0713759174
Std Error of Dependent Variable 0.3477401506
Standard Error of Estimate      0.0302292709
Sum of Squared Residuals        0.0319833086
Durbin-Watson Statistic         1.965582
   Variable                     Coeff       Std Error      T-Stat     Signif
********************************************************************************
1.  GR_A0                 0.5697126318 0.1092020054      5.21705  0.00000832
2.  GR_A1                 0.9331776726 0.0135702296     68.76654  0.00000000

Dependent Variable TDNR - Estimation by Nonlinear Least Squares
Iterations Taken     2
Annual Data From 1965:01 To 2001:01
Usable Observations     37      Degrees of Freedom     34
Centered R**2     0.915098      R Bar **2   0.910104
Uncentered R**2   0.920566      T x R**2     34.061
Mean of Dependent Variable      0.0113471898
Std Error of Dependent Variable 0.0438442641
Standard Error of Estimate      0.0131456921
Sum of Squared Residuals        0.0058755135
Durbin-Watson Statistic         2.255675
   Variable                     Coeff       Std Error      T-Stat     Signif
********************************************************************************
1.  TDNR_A0               -0.002312458  0.002472712     -0.93519  0.35628495
2.  TDNR_A1                0.794714498  0.073443719     10.82073  0.00000000
3.  TDNR_A2                0.030846598  0.007120614      4.33201  0.00012384

Dependent Variable TINR - Estimation by Nonlinear Least Squares
Iterations Taken     2
Annual Data From 1965:01 To 2001:01
Usable Observations     37      Degrees of Freedom     33
Centered R**2     0.723662      R Bar **2   0.698540
Uncentered R**2   0.997253      T x R**2     36.898
Mean of Dependent Variable      0.1035213770
Std Error of Dependent Variable 0.0105165458
Standard Error of Estimate      0.0057741501
Sum of Squared Residuals        0.0011002467
Durbin-Watson Statistic         1.915388
   Variable                     Coeff       Std Error      T-Stat     Signif
********************************************************************************
1.  TINR_A0                0.031015244  0.010851286      2.85821  0.00732516
2.  TINR_A1                0.997478161  0.163787029      6.09009  0.00000074
3.  TINR_A2               -0.338656903  0.163877397     -2.06653  0.04669946
4.  TINR_A3                0.000184796  0.000106057      1.74242  0.09074934

Dependent Variable REERL - Estimation by Nonlinear Least Squares
Iterations Taken     2
Annual Data From 1965:01 To 2001:01
Usable Observations     31      Degrees of Freedom     29
 Total Observations     37      Skipped/Missing        6
Centered R**2     0.429784      R Bar **2   0.410122
Uncentered R**2   0.999835      T x R**2     30.995
Mean of Dependent Variable      4.5388832687
Std Error of Dependent Variable 0.0784634540
Standard Error of Estimate      0.0602627131
Sum of Squared Residuals        0.1053162432
Durbin-Watson Statistic         1.688457
   Variable                     Coeff       Std Error      T-Stat     Signif
********************************************************************************
1.  REER_A0                1.7000964513 0.6072914733      2.79947  0.00900988
2.  REER_A1                0.6250541002 0.1336943412      4.67525  0.00006251

Dependent Variable INT - Estimation by Nonlinear Least Squares
Iterations Taken     2
Annual Data From 1965:01 To 2001:01
Usable Observations     37      Degrees of Freedom     35
Centered R**2     0.970918      R Bar **2   0.970087
Uncentered R**2   0.981629      T x R**2     36.320
Mean of Dependent Variable      943.8621622
Std Error of Dependent Variable 1253.1216690
Standard Error of Estimate      216.7331802
```

Sum of Squared Residuals 1644064.4987
Durbin-Watson Statistic 1.459027

Variable	Coeff	Std Error	T-Stat	Signif
1. INT_A0	65.885080356	43.923193521	1.50001	0.14258014
2. INT_A1	1.015532307	0.029708690	34.18300	0.00000000

Dependent Variable PIN - Estimation by Nonlinear Least Squares
Iterations Taken 2
Annual Data From 1965:01 To 2001:01
Usable Observations 37 Degrees of Freedom 35
Centered R**2 0.962229 R Bar **2 0.961150
Uncentered R**2 0.975260 T x R**2 36.085
Mean of Dependent Variable 288.87567568
Std Error of Dependent Variable 403.52252753
Standard Error of Estimate 79.53565210
Sum of Squared Residuals 221407.19842
Durbin-Watson Statistic 2.253446

Variable	Coeff	Std Error	T-Stat	Signif
1. PIN_A0	19.002592142	15.895054726	1.19550	0.23992784
2. PIN_A1	1.049030751	0.035131097	29.86046	0.00000000

Dependent Variable TRA - Estimation by Nonlinear Least Squares
Iterations Taken 2
Annual Data From 1965:01 To 2001:01
Usable Observations 37 Degrees of Freedom 35
Centered R**2 0.994900 R Bar **2 0.994755
Uncentered R**2 0.997005 T x R**2 36.889
Mean of Dependent Variable 1858.5216216
Std Error of Dependent Variable 2247.7899463
Standard Error of Estimate 162.7950897
Sum of Squared Residuals 927578.44286
Durbin-Watson Statistic 1.807106

Variable	Coeff	Std Error	T-Stat	Signif
1. TRA_A0	66.439016359	34.447198107	1.92872	0.06190715
2. TRA_A1	1.074644273	0.013004968	82.63336	0.00000000

Dependent Variable GDPROEL - Estimation by Nonlinear Least Squares
Iterations Taken 2
Annual Data From 1965:01 To 2001:01
Usable Observations 37 Degrees of Freedom 36
Centered R**2 0.997075 R Bar **2 0.997075
Uncentered R**2 0.999997 T x R**2 37.000
Mean of Dependent Variable 9.5858846077
Std Error of Dependent Variable 0.3307318793
Standard Error of Estimate 0.0178868527
Sum of Squared Residuals 0.0115178220
Durbin Watson Statistic 1.400627

Variable	Coeff	Std Error	T-Stat	Signif
1. OECD_A0	0.0331479578	0.0029405805	11.27259	0.00000000

Dependent Variable PGDPOEL - Estimation by Nonlinear Least Squares
Iterations Taken 2
Annual Data From 1965:01 To 2001:01
Usable Observations 37 Degrees of Freedom 35
Centered R**2 0.999739 R Bar **2 0.999732
Uncentered R**2 0.999876 T x R**2 36.995
Mean of Dependent Variable -0.645306998
Std Error of Dependent Variable 0.622865387
Standard Error of Estimate 0.010203087
Sum of Squared Residuals 0.0036436047
Durbin-Watson Statistic 1.235767

Variable	Coeff	Std Error	T-Stat	Signif
1. PGDPOE_A0	0.0026381221	0.0036690617	0.71902	0.47690316
2. PGDPOE_A1	0.9398069756	0.0643174381	14.61201	0.00000000

Dependent Variable PGDPROWL - Estimation by Nonlinear Least Squares
Iterations Taken 2
Annual Data From 1965:01 To 2001:01

Usable Observations 30 Degrees of Freedom 28
Total Observations 37 Skipped/Missing 7
Centered R**2 0.996961 R Bar **2 0.996853
Uncentered R**2 0.999983 T x R**2 29.999
Mean of Dependent Variable 4.3117406458
Std Error of Dependent Variable 0.3265464499
Standard Error of Estimate 0.0183192395
Sum of Squared Residuals 0.0093966470
Durbin-Watson Statistic 2.008294

Variable	Coeff	Std Error	T-Stat	Signif
1. PGDPROW_A0	0.0114048870	0.0065266605	1.74743	0.09152346
2. PGDPROW_A1	0.6747821074	0.1446154713	4.66604	0.00006909

Entry	GDPRP	IPRSTARL	IPRL
2002:01	32131.690784031	8.7405969445365	8.9428447634926
2003:01	32780.693729392	8.7681952607745	9.0024825627360
2004:01	33481.642835868	8.7864381490823	9.0579715709763
2005:01	34224.978271865	8.8056039962618	9.1086375810659
2006:01	35000.548600822	8.8244949562393	9.1552246366837
2007:01	35804.662033782	8.8429239666006	9.1982253263043
2008:01	36634.514965394	8.8618026926446	9.2380442304440
2009:01	37487.944135751	8.8817082782444	9.2751515920012
2010:01	38363.371039933	8.9028373611121	9.3100314964761

Entry	CPRSTARL	CPRL	IMRL
2002:01	10.038562344070	10.106495614178	9.3951934785953
2003:01	10.058108972271	10.142335058141	9.4366150938170
2004:01	10.084130094969	10.178765205580	9.4752613268129
2005:01	10.111532215167	10.213354082959	9.5107117157613
2006:01	10.140415709620	10.247029720703	9.5426232839130
2007:01	10.166509147146	10.280512185841	9.5708528855705
2008:01	10.193212946438	10.314064843722	9.5955054664095
2009:01	10.220060314202	10.347905035571	9.6169199657269
2010:01	10.246812795061	10.382097492291	9.6354966504813

Entry	EXRL	DPCPE	EMPSTARL
2002:01	9.0543365685413	0.0267724613840	8.2794599896794
2003:01	9.1063830423157	0.0363738363018	8.2889359790519
2004:01	9.1588842235734	0.0354591473031	8.2983526226577
2005:01	9.2130668948082	0.0336665717589	8.3074995458442
2006:01	9.2694499896211	0.0301495323734	8.3163075259237
2007:01	9.3279521621961	0.0258641690749	8.3248955929340
2008:01	9.3881016661312	0.0218301765809	8.3334146749297
2009:01	9.4492527059882	0.0187071984801	8.3419926072581
2010:01	9.5110422784263	0.0167525477289	8.3507240598847

Entry	EMPL	WRATEL	PCPL
2002:01	8.3137043186424	1.1690340859554	0.2932968550758
2003:01	8.3233173812621	1.1715416237104	0.3295620191611
2004:01	8.3333092509916	1.1777450031977	0.3639411454987
2005:01	8.3436122856287	1.1878314380232	0.3946198592858
2006:01	8.3541597480095	1.2011902878463	0.4207897773516
2007:01	8.3649061456274	1.2167149162742	0.4427153765978
2008:01	8.3758297339831	1.2332139131768	0.4613551703433
2009:01	8.3869279552417	1.2497043995952	0.4779384007756
2010:01	8.3982118455726	1.2654596556868	0.4937658457514

Entry	PITL	CAPR	DR
2002:01	0.2809159155398	155090.39023984	3060.9430668957
2003:01	0.3172667316307	161939.79340454	3187.2976310618
2004:01	0.3515001682340	169257.29366581	3324.1683025237
2005:01	0.3815787970472	176954.92137291	3470.5462986329
2006:01	0.4069217365953	185012.84028236	3624.6507815726
2007:01	0.4280457147171	193412.28807424	3786.0796559764
2008:01	0.4460791554431	202135.48311899	3954.4525721474
2009:01	0.4623248887781	211166.97718781	4129.4090391334
2010:01	0.4781114769904	220494.51198264	4310.6357975082

Entry	R3M	PEXL	PIML
2002:01	NA	0.2773647224609	0.2710666316879
2003:01	NA	0.3112415180126	0.3061431395283
2004:01	NA	0.3460077217017	0.3434961826653
2005:01	NA	0.3797771130887	0.3811786810878
2006:01	NA	0.4117403217644	0.4182256781207
2007:01	NA	0.4417315517001	0.4541589492531

2008:01	NA	0.4699237658102	0.4887414903913
2009:01	NA	0.4966201592984	0.5218558442754
2010:01	NA	0.5227000695477	0.5542425767554

Entry	PGL	PGDPLSTAR	PGDPL
2002:01	0.4302791566465	0.3159433178585	0.3134467393517
2003:01	0.4776482343793	0.3361939814211	0.3494895457608
2004:01	0.5229141430773	0.3564446449838	0.3834329037818
2005:01	0.5644252451768	0.3766953085464	0.4132566533578
2006:01	0.6014109777949	0.3969459721090	0.4383848626491
2007:01	0.6341515960898	0.4171966356716	0.4593298271763
2008:01	0.6636142486534	0.4374472992342	0.4772104387583
2009:01	0.6910319948642	0.4576979627968	0.4933184899404
2010:01	0.7177068989929	0.4779486263594	0.5089713207825

Entry	EXRSTARL	EXRATEL	EXRATESTARL
2002:01	8.9937812411789	4.4052903929549	4.3771873202573
2003:01	9.0440585310051	4.3953553809894	4.3811817166865
2004:01	9.0955020213357	4.3921326035093	4.3851761131157
2005:01	9.1497729409240	4.3923876021292	4.3891705095449
2006:01	9.2073451214640	4.3944445232873	4.3931649059742
2007:01	9.2677977279027	4.3974350654551	4.3971593024034
2008:01	9.3302116304575	4.4009093399539	4.4011536988326
2009:01	9.3935259019201	4.4046342482384	4.4051480952618
2010:01	9.4572193303675	4.4084890161383	4.4091424916911

Entry	VR	V	EMPPOP
2002:01	26.54870403533	55.08603331138	0.4284543786660
2003:01	59.59902245431	94.23886428784	0.4293128089864
2004:01	80.78914872493	121.86048351231	0.4301754678293
2005:01	94.37514343979	141.45490822131	0.4310423760239
2006:01	103.08576885255	155.36978093509	0.4319135545020
2007:01	108.67056383251	165.29666509269	0.4327890242986
2008:01	112.25124070590	172.50366183392	0.4336688065520
2009:01	114.54698243279	177.94285081908	0.4345529225050
2010:01	116.01889131006	182.33502435707	0.4354413935047

Entry	POP	ITR	M3
2002:01	10598.570183110	9341.732698469	NA
2003:01	10644.303327751	9987.767844889	NA
2004:01	10695.528459654	10594.467500527	NA
2005:01	10750.103060189	11122.669784075	NA
2006:01	10806.774856063	11638.727974178	NA
2007:01	10864.811494033	12143.314593864	NA
2008:01	10923.784744495	12637.030664541	NA
2009:01	10983.444438504	13121.849763029	NA
2010:01	11043.644717261	13600.649214138	NA

Entry	CPR	CP	GR
2002:01	24501.646887646	32852.810285497	4443.2332688217
2003:01	25395.697734810	35309.140874768	4474.4450153685
2004:01	26337.925287369	37900.001949815	4505.8760106163
2005:01	27264.863010048	40456.153252242	4528.4618081094
2006:01	28198.659510368	42951.184213572	4551.1608173836
2007:01	29158.804456310	45398.195708507	4573.9736059152
2008:01	30153.758177444	47830.562067794	4596.9007440252
2009:01	31191.628970507	50304.182630509	4619.9428048932
2010:01	32276.590440666	52884.383400946	4643.1003645720

Entry	IMR	EXR	EMP
2002:01	12030.417082837	8555.559363136	4079.3964137271
2003:01	12539.200972019	9012.637538311	4118.8010028436
2004:01	13033.279499359	9498.453012826	4160.1618177300
2005:01	13503.601623367	10027.302431759	4203.2456751510
2006:01	13941.472136130	10608.915267973	4247.8138783301
2007:01	14340.642036490	11248.073653784	4293.7087357869
2008:01	14698.569666139	11945.401434851	4340.8685507954
2009:01	15016.726603687	12698.672075406	4389.3127956599
2010:01	15298.294804471	13508.066147768	4439.1218111097

Entry	U	PFD	PCP
2002:01	1905.0414291439	1.3527610560694	1.3408407667456
2003:01	2064.2917049492	1.4027680867268	1.3903590444693
2004:01	2229.1980570756	1.4525419694602	1.4389895206551
2005:01	2389.6405630827	1.4991295234826	1.4838200232928
2006:01	2549.0963633544	1.5409665980331	1.5231640411707
2007:01	2709.1710015181	1.5780024800041	1.5569291328053
2008:01	2872.7680971706	1.6112565206474	1.5862221303032
2009:01	3043.8941568155	1.6422396996511	1.6127461364126
2010:01	3227.0349741514	1.6728558568443	1.6384748600232

Entry	PIT	PG	PEX
2002:01	1.3243422426509	1.5376867191070	1.3196475883902
2003:01	1.3733688439864	1.6122782395654	1.3651188821744
2004:01	1.4211979862595	1.6869364679556	1.4134135297332
2005:01	1.4645950634310	1.7584368221776	1.4619587016581
2006:01	1.5021865348286	1.8246915842011	1.5094424160880
2007:01	1.5342562174533	1.8854218634324	1.5553981403981
2008:01	1.5621751163034	1.9417978071256	1.5998722236055
2009:01	1.5877610651908	1.9957740994663	1.6431582617815
2010:01	1.6130252885660	2.0497275850789	1.6865753781629
Entry	PIM	PGDP	IT
2002:01	1.3113624457667	1.3681325931925	12371.651232136
2003:01	1.3581767014072	1.4183433643946	13716.889179139
2004:01	1.4098681405340	1.4673130979860	15056.835877240
2005:01	1.4640091727921	1.5117329674908	16290.207257931
2006:01	1.5192635002482	1.5502014072472	17483.540445344
2007:01	1.5748482985427	1.5830127373084	18630.955916128
2008:01	1.6302632264351	1.6115725456984	19741.254848108
2009:01	1.6851521294608	1.6377420427007	20834.362157021
2010:01	1.7406220977223	1.6635790252901	21938.191123319
Entry	G	IM	EX
2002:01	6832.3007873613	15776.237169343	11290.323280891
2003:01	7214.0503324105	17030.450614459	12303.321681742
2004:01	7601.1265623949	18375.205532821	13425.241999863
2005:01	7963.0139912047	19769.396642339	14659.502044266
2006:01	8304.4648418255	21180.769756149	16013.546694162
2007:01	8623.8698393553	22584.335711177	17495.232844157
2008:01	8926.2517843221	23962.537607900	19111.115955434
2009:01	9220.3621910216	25305.468813733	20865.927934358
2010:01	9517.0908975530	26628.549994133	22782.371771422
Entry	FD	WRATE	FDR
2002:01	63402.17161920	3.2188819731468	46868.720922108
2003:01	68637.64093235	3.2269635694427	48930.147155833
2004:01	74105.06687283	3.2470438675163	51017.510960063
2005:01	79510.33145386	3.2799606914927	53037.672177431
2006:01	84908.10597584	3.3240711704377	55100.549338755
2007:01	90313.55097324	3.3760787952082	57232.836873705
2008:01	95781.68831749	3.4322427592687	59445.342261566
2009:01	101402.77776373	3.4893113631482	61746.640596269
2010:01	107304.37221760	3.5447217131896	64144.425058454
Entry	GDP	GDPR	NI
2002:01	47626.043241870	34841.998771006	36335.574594554
2003:01	51607.298294591	36394.641115549	38709.277005468
2004:01	55729.960314064	37987.556899266	41806.245994895
2005:01	59741.024575640	39537.063448770	44787.656301661
2006:01	63727.409208150	41161.770807860	47742.003854011
2007:01	67729.288423201	42894.619081927	50708.935741771
2008:01	71819.216782165	44748.954415668	53751.317636595
2009:01	76097.368837649	46731.877630798	56952.699400402
2010:01	80675.874978503	48847.897528377	60401.931151179
Entry	YD	YDR	GNP
2002:01	32279.370729256	24073.977708482	49531.084671014
2003:01	34820.211022941	25044.042516537	53671.589999540
2004:01	37606.031944581	26133.638504511	57959.158371140
2005:01	40287.904199981	27151.476302751	62130.665138723
2006:01	42945.432657395	28194.883477151	66276.505571505
2007:01	45614.281119946	29297.596248171	70438.459424719
2008:01	48350.999234706	30481.858947122	74691.984879335
2009:01	51230.742727849	31766.154369346	79141.262994465
2010:01	54333.435072429	33160.981836278	83902.909952655
Entry	SGRATIO	SP	SPRATIO
2002:01	0.010460298949	7802.0570345518	-0.012040461840
2003:01	0.012880193571	7886.5667389662	-0.009474044718
2004:01	0.011549417390	8081.5265855590	-0.005274900674
2005:01	0.012314627128	8207.2475385323	-0.002816306775
2006:01	0.013146546385	8369.7450346157	-0.000090252471
2007:01	-0.011149138266	8591.5820022323	0.003190427900
2008:01	-0.007472782221	8895.9337577056	0.007246489035
2009:01	-0.004081259784	9302.0566881325	0.012175980740
2010:01	-0.000994904807	9824.5482622753	0.017961400132
Entry	GRATIO	INTRATIO	CA
2002:01	0.1434572415068	0.0685230954526	-2580.872459309
2003:01	0.1397874054796	0.0702759006285	-2662.837227767

2004:01	0.1363921043467	0.0717187049709	-2720.765475882
2005:01	0.1332922233552	0.0726850832442	-2720.254034990
2006:01	0.1303122933289	0.0733723837999	-2618.126698633
2007:01	0.1273285168075	0.0736167210418	-2379.931865502
2008:01	0.1242877907092	0.0738114016130	-1978.653555295
2009:01	0.1211653219009	0.0739958233271	-1395.646722559
2010:01	0.1179669994294	0.0742183549318	-619.143248559

Entry	WAGE	UNEMP	UNRATE
2002:01	15914.543201349	461.60738882530	10.165316059983
2003:01	16511.285209406	450.93475849633	9.867851929454
2004:01	17360.242993242	440.79214108306	9.580451033176
2005:01	18254.213415788	430.50429041470	9.290624086622
2006:01	19171.608237169	419.77866245520	8.993472733260
2007:01	20098.525166012	408.46242990344	8.686677186144
2008:01	21029.992527484	396.43614238048	8.368390214620
2009:01	21969.308106403	383.57508426288	8.036540851429
2010:01	22927.529967653	369.73823394559	7.688687765529

Entry	UNRATEN	PRODS	PGDPLS
2002:01	8.6677487456514	7.1938575178403	0.3285953691028
2003:01	8.7877590640316	7.2593954707429	0.3485953691028
2004:01	8.8670282609461	7.3345262612962	0.3685953691028
2005:01	8.9093878435137	7.4170640090283	0.3885953691028
2006:01	8.9177963324883	7.5048652964709	0.4085953691028
2007:01	8.8946844178538	7.5971502368383	0.4285953691028
2008:01	8.8420549975305	7.6932232831506	0.4485953691028
2009:01	8.7615035829203	7.7924354356687	0.4685953691028
2010:01	8.6542220011812	7.8942009780624	0.4885953691028

Entry	DPCP	REAL	CC
2002:01	0.0372275435983	1.1227538615970	0.0572275386160
2003:01	0.0362651640853	0.3626163698153	0.0496261636982
2004:01	0.0343791263376	0.6540852696923	0.0525408526969
2005:01	0.0306787137871	0.9333428241116	0.0553334282411
2006:01	0.0261699180658	1.2850467626623	0.0588504676266
2007:01	0.0219255992462	1.7135830925098	0.0631358309251
2008:01	0.0186397937455	2.1169823419056	0.0671698234191
2009:01	0.0165832304322	2.4292801519925	0.0702928015199
2010:01	0.0158274449758	2.6247452271091	0.0722474522711

Entry	TRATIO	TRATIOSTAR	DEBTRATIO
2002:01	0.2361007463885	0.2256404319410	0.9436158865018
2003:01	0.2346696145340	0.2217894105879	0.8857356929312
2004:01	0.2333863467354	0.2218369137975	0.8276862755414
2005:01	0.2320180555514	0.2197034110791	0.7691216484137
2006:01	0.2305573281820	0.2174107816086	0.7098501020287
2007:01	0.2317961220199	0.2429452378493	0.6789367402950
2008:01	0.2326264317467	0.2400991923222	0.6443782725160
2009:01	0.2330799055662	0.2371611452280	0.6064439073003
2010:01	0.2331904507979	0.2341853543612	0.5654309996072

Entry	EXRATE	PGDPOE	OECDGDPR
2002:01	81.882917613391	1.1513077630323	25647.955279617
2003:01	81.073437602188	1.1792733945863	26270.952266603
2004:01	80.812576527634	1.2079183202208	26909.082048448
2005:01	80.833186250733	1.2372590402048	27562.712205550
2006:01	80.999624858676	1.2673124556045	28232.219246951
2007:01	81.242220217415	1.2980958780178	28917.988827217
2008:01	81.524968880162	1.3296270395474	29620.415968587
2009:01	81.829208192125	1.3619241030140	30339.905288517
2010:01	82.145249538820	1.3950056724191	31076.871232746

Entry	IPR	IGR	EUR15GDPR
2002:01	7652.936914152	1688.7957843171	7783.2779116346
2003:01	8123.225332587	1864.5425123016	7980.3125300427
2004:01	8586.715434144	2007.7520663834	8182.3351035634
2005:01	9032.979801477	2089.6899825989	8389.4719028813
2006:01	9463.756125567	2174.9718486108	8601.8523952391
2007:01	9879.580460265	2263.7341335993	8819.6093253579
2008:01	10280.911788383	2356.1188761572	9042.8787984077
2009:01	10669.575851447	2452.2739115825	9271.8003650772
2010:01	11048.296105692	2552.3531084459	9506.5171087976

Entry	V3L	V3LS	LF
2002:01	NA	NA	4541.0038025525
2003:01	NA	NA	4569.7357613400
2004:01	NA	NA	4600.9539588130
2005:01	NA	NA	4633.7499655657
2006:01	NA	NA	4667.5925407853

2007:01	NA	NA	4702.1711656903
2008:01	NA	NA	4737.3046931759
2009:01	NA	NA	4772.8878799228
2010:01	NA	NA	4808.8600450553

Entry	REER1	REER	PGDPROW
2002:01	101.19013813360	101.19013813360	115.34062737957
2003:01	102.26601321409	102.26601321409	118.26048926304
2004:01	103.20688930223	103.20688930223	121.25426780201
2005:01	103.79899286993	103.79899286993	124.32383420552
2006:01	103.97633395814	103.97633395814	127.47110705250
2007:01	103.78986373518	103.78986373518	130.69805349091
2008:01	103.35697955198	103.35697955198	134.00669046734
2009:01	102.81329376803	102.81329376803	137.39908598760
2010:01	102.22533723438	102.22533723438	140.87736040933

Entry	PGDPEU	R12MTB	PCAGDPR
2002:01	1.1845582813085	3.8000000000000	9.647613944271
2003:01	1.2157606699602	4.0000000000000	10.034236542340
2004:01	1.2465377978491	4.2000000000000	10.423252329041
2005:01	1.2768165972216	4.3000000000000	10.793341476101
2006:01	1.3065237010754	4.3000000000000	11.177947923999
2007:01	1.3355857326876	4.3000000000000	11.586299626529
2008:01	1.3639296020730	4.3000000000000	12.021921672487
2009:01	1.3914828077371	4.3000000000000	12.486445009718
2010:01	1.4195926250776	4.3000000000000	12.980684214034

ENTRY	GDPGAP_A	GDPGAP_F	PGAP_A	PGAP_F
1996:01	-0.040252872245	NA	0.072227620490	NA
1997:01	-0.012279346218	NA	0.054579763303	NA
1998:01	-0.016802193566	NA	0.082070384314	NA
1999:01	0.005496381456	NA	0.005664880994	NA
2000:01	0.032384995204	NA	-0.043546257655	NA
2001:01	0.057705858537	NA	-0.034710108366	NA
2002:01	NA	0.0809807253823	NA	-0.015148629751
2003:01	NA	0.1045818054217	NA	0.000894176658
2004:01	NA	0.1262613424945	NA	0.014837534679
2005:01	NA	0.1442828108105	NA	0.024661284255
2006:01	NA	0.1621461969074	NA	0.029789493546
2007:01	NA	0.1806682794058	NA	0.030734458073
2008:01	NA	0.2000772515614	NA	0.028615069655
2009:01	NA	0.2204071447461	NA	0.024723120838
2010:01	NA	0.2416082130323	NA	0.020375951680

ENTRY	PGDPLS_A	CARATIO_A
1996:01	0.0713024493944	-0.023754722717
1997:01	0.0837142190141	-0.023474646415
1998:01	0.0227697946624	-0.039208307199
1999:01	0.1048456458460	-0.032120312893
2000:01	0.0782815369852	-0.042276076890
2001:01	0.0200000000000	-0.040828905710
2002:01	NA	NA
2003:01	NA	NA
2004:01	NA	NA
2005:01	NA	NA
2006:01	NA	NA
2007:01	NA	NA
2008:01	NA	NA
2009:01	NA	NA
2010:01	NA	NA

ENTRY	GDPR_F	CPR_F	ITR_F	GR_F
2002:01	0.0412830752455	0.0350685998096	0.0851044564234	-0.005000000000
2003:01	0.0435980213595	0.0358394439632	0.0668693799542	0.007000000000
2004:01	0.0428371143794	0.0364301474395	0.0589708022064	0.007000000000
2005:01	0.0399798910397	0.0345888773787	0.0486534175512	0.005000000000
2006:01	0.0402713854599	0.0336756377440	0.0453528072611	0.005000000000
2007:01	0.0412364561582	0.0334824651384	0.0424406233984	0.005000000000
2008:01	0.0423216906935	0.0335526578806	0.0398526661804	0.005000000000
2009:01	0.0433584568853	0.0338401918487	0.0376473162722	0.005000000000
2010:01	0.0442848019051	0.0341924567198	0.0358387663225	0.005000000000

ENTRY	EXR_F	IMR_F	FDR_F	YDR_F
2002:01	0.0375202678671	0.0460742560160	0.0425140298223	0.0432394270134
2003:01	0.0520464737744	0.0414216152218	0.0430431911169	0.0395044815563
2004:01	0.0525011812577	0.0386462329958	0.0417752131774	0.0425873405334
2005:01	0.0541826712348	0.0354503889484	0.0388335309065	0.0382081046050
2006:01	0.0563830948129	0.0319115681517	0.0381572291025	0.0377091038084
2007:01	0.0585021725750	0.0282296016575	0.0379681189290	0.0383649488441

2008:01	0.0601495039351	0.0246525808390	0.0379294680228	0.0396262446914
2009:01	0.0611510398570	0.0214144993174	0.0379822978175	0.0412696769414
2010:01	0.0617895724381	0.0185766847544	0.0380976117777	0.0429725439053

ENTRY	GDPRP_F
2002:01	0.0180082083997
2003:01	0.0199969413201
2004:01	0.0211575773066
2005:01	0.0219584227237
2006:01	0.0224079993630
2007:01	0.0227143736597
2008:01	0.0229127185380
2009:01	0.0230285637007
2010:01	0.0230837336189

ENTRY	PCP_F	PGDP_F	PGDPLS_F	PIM_F
2002:01	0.0372275435983	0.0395614786150	0.0200000000000	0.0288711738055
2003:01	0.0363738363018	0.0363738363018	0.0200000000000	0.0363738363018
2004:01	0.0354591473031	0.0354591473031	0.0200000000000	0.0354591473031
2005:01	0.0336665717589	0.0336665717589	0.0200000000000	0.0336665717589
2006:01	0.0301495323734	0.0301495323734	0.0200000000000	0.0301495323734
2007:01	0.0258641690749	0.0258641690749	0.0200000000000	0.0258641690749
2008:01	0.0218301765809	0.0218301765809	0.0200000000000	0.0218301765809
2009:01	0.0187071984801	0.0187071984801	0.0200000000000	0.0187071984801
2010:01	0.0167525477289	0.0167525477289	0.0200000000000	0.0167525477289

ENTRY	WRATE_F	EMP_F	UNRATE_F	WAGE_F
2002:01	0.0112840227418	0.0091846807572	10.165316059983	0.0600301821140
2003:01	0.0025075377550	0.0096130626198	9.867851929454	0.0368107412782
2004:01	0.0062033794873	0.0099918697294	9.580451033176	0.0501386072377
2005:01	0.0100864348255	0.0103030346372	9.290624086622	0.0502132190388
2006:01	0.0133588498231	0.0105474623807	8.993472733260	0.0490345214952
2007:01	0.0155246284279	0.0107463976179	8.686677186144	0.0472159905729
2008:01	0.0164989969026	0.0109235883557	8.368390214620	0.0453031968404
2009:01	0.0164904864184	0.0110982212586	8.036540851429	0.0436967588591
2010:01	0.0157552560916	0.0112838903309	7.688687765529	0.0426919772645

ENTRY	R12_F	REAL_F	REER_F	M3_F
2002:01	-0.280000000000	1.1227538615970	0.012734524794	NA
2003:01	0.200000000000	0.3626163698153	0.010576088280	NA
2004:01	0.200000000000	0.6540852696923	0.009158216512	NA
2005:01	0.100000000000	0.9333428241116	0.005720660459	NA
2006:01	0.000000000000	1.2850467626623	0.001707047068	NA
2007:01	0.000000000000	1.7135830925098	-0.001795001065	NA
2008:01	0.000000000000	2.1169823419056	-0.004179497080	NA
2009:01	0.000000000000	2.4292801519925	-0.005274155536	NA
2010:01	0.000000000000	2.6247452271091	-0.005735096282	NA

ENTRY	SGRATIO_F	DEBTRATIO_F	TRATIO_F	TDNR_F
2002:01	0.010460298949	0.9436158865018	0.2361007463885	0.1116317523683
2003:01	0.012880193571	0.8857356929312	0.2346696145340	0.9000000000000
2004:01	0.011549417390	0.8276862755414	0.2333863467354	0.9000000000000
2005:01	0.012314627128	0.7691216484137	0.2320180555514	0.9000000000000
2006:01	0.013146546385	0.7098501020287	0.2305573281820	0.9000000000000
2007:01	-0.011149138266	0.6789367402950	0.2317961220199	0.9000000000000
2008:01	-0.007472782221	0.6443782725160	0.2326264317467	0.9000000000000
2009:01	-0.004081259784	0.6064439073003	0.2330799055662	0.9000000000000
2010:01	-0.000994904807	0.5654309996072	0.2331904507979	0.9000000000000

ENTRY	TINR_F
2002:01	0.1141401352140
2003:01	0.1241401352140
2004:01	0.1241401352140
2005:01	0.1241401352140
2006:01	0.1241401352140
2007:01	0.1241401352140
2008:01	0.1241401352140
2009:01	0.1241401352140
2010:01	0.1241401352140

ENTRY	CARATIO_F	URATIO_F
2002:01	-0.054190360644	0.0399999936898
2003:01	-0.051598074609	0.0399999956046
2004:01	-0.048820517017	0.0399999936213
2005:01	-0.045534104149	0.0399999929706
2006:01	-0.041083212564	0.0399999999220
2007:01	-0.035138887783	0.0399999920949
2008:01	-0.027550475262	0.0399999920061
2009:01	-0.018340275674	0.0399999921589
2010:01	-0.007674453469	0.0399999996903

BASELINE SCENARIO WITH ENDOGENOUS DIRECT TAX RATE

ENTRY	GDPR_D	CPR_D	ITR_D	GR_D
2002:01	0.052131941961	0.074130223989	0.0000000	0.000000
2003:01	0.256611171583	0.368038374902	-5.0947140e-009	0.000000
2004:01	0.127222738320	0.186026810708	1.0016726e-006	0.000000
2005:01	0.088263801358	0.131103532225	6.5975133e-008	0.000000
2006:01	0.074322579726	0.113222814737	-1.4925561e-008	0.000000
2007:01	-0.069957716395	-0.095878103421	4.0619839e-008	0.000000
2008:01	-0.096898640949	-0.136653005865	7.4477290e-007	0.000000
2009:01	-0.087773390232	-0.125150490924	5.6300792e-007	0.000000
2010:01	-0.069463901470	-0.099751201975	4.8236760e-007	0.000000

ENTRY	EXR_D	IMR_D	FDR_D	YDR_D
2002:01	-0.000012240417	0.0000022140172	0.038757813916	0.208011574767
2003:01	0.000006132034	0.0000000812726	0.190979186353	0.991786559984
2004:01	0.000007376762	0.0000002435403	0.095063718318	0.328915463671
2005:01	-0.000002989286	0.0000010061798	0.066248980415	0.318911225016
2006:01	-0.000014053674	0.0000027520620	0.056426626110	0.321095660779
2007:01	0.000000654730	0.0000019638424	-0.051043446898	-0.240255709886
2008:01	-0.000000365190	0.0000019404085	-0.071287308810	-0.226674545801
2009:01	0.000005730318	0.0000035828938	-0.064741659722	-0.183896063089
2010:01	-0.000001013963	0.0000028771563	-0.051323161193	-0.135609182767

ENTRY	PCP_D	WRATE_D	EMP_D	UNRATE_D
2002:01	0.0000100026050	-0.000011849447	0.000000093643	-0.000008412354
2003:01	0.0000095069280	-0.000002351998	0.000000313708	-0.000036715353
2004:01	0.0000017907887	0.000006019126	-0.000000080073	-0.000029592243
2005:01	0.0000010609719	0.000003322025	0.000000097840	-0.000038562099
2006:01	0.0000015633588	-0.000010110341	0.000000261177	-0.000062457205
2007:01	0.0000082269875	-0.000006856621	0.000000226997	-0.000083395584
2008:01	0.0000073422252	-0.000004668982	0.000000318564	-0.000112876807
2009:01	0.0000072402377	0.000003494530	-0.000000321912	-0.000083681496
2010:01	0.0000137880546	0.000007570675	0.000000324574	-0.000113959871

ENTRY	R12_D	REAL_D	REER_D	M3_D
2002:01	0.000000	0.000000000000	1.7342303e-006	NA
2003:01	0.000000	-0.000950692801	8.4808185e-009	NA
2004:01	0.000000	-0.000179078868	3.5203990e-006	NA
2005:01	0.000000	-0.000106097195	1.7669923e-006	NA
2006:01	0.000000	-0.000156335882	-2.4187029e-008	NA
2007:01	0.000000	-0.000822698753	8.9763119e-007	NA
2008:01	0.000000	-0.000734222516	1.7286074e-006	NA
2009:01	0.000000	-0.000724023766	0.0000107	NA
2010:01	0.000000	-0.001378805455	3.4757630e-006	NA

ENTRY	SGRATIO_D	DEBTRATIO_D	TRATIO_D	TDNR_D
2002:01	0.003950886404	-0.003950886404	-0.000438930387	0.000000
2003:01	0.021255715780	-0.025206602184	-0.002800679743	0.000000
2004:01	0.026337932628	-0.051544534812	-0.005727207830	0.000000
2005:01	0.027891765227	-0.079436300039	-0.008826292272	0.000000
2006:01	0.028097316580	-0.107533616618	-0.011948148829	0.000000
2007:01	0.017766455320	-0.125300071938	-0.013922197251	0.000000
2008:01	0.006951512213	-0.132251584151	-0.014694595248	0.000000
2009:01	-0.001348359951	-0.130903224200	-0.014544938581	0.000000
2010:01	-0.006867866334	-0.124035357866	-0.013781844168	0.000000

ENTRY	TINR_D	CARATIO_D	URATIO_D
2002:01	0.000000	0.0048119495994	0.000000
2003:01	0.000000	0.0276882576170	0.000000
2004:01	0.000000	0.0379026409773	0.000000
2005:01	0.000000	0.0439226219602	0.000000
2006:01	0.000000	0.0476058131110	0.000000
2007:01	0.000000	0.0390596453585	0.000000
2008:01	0.000000	0.0287572556487	0.000000
2009:01	0.000000	0.0198346431188	0.000000
2010:01	0.000000	0.0129631069042	0.000000

B. GRAPHS OF BASELINE SIMULATION

Figure 1: Real sector (actual and forecast)

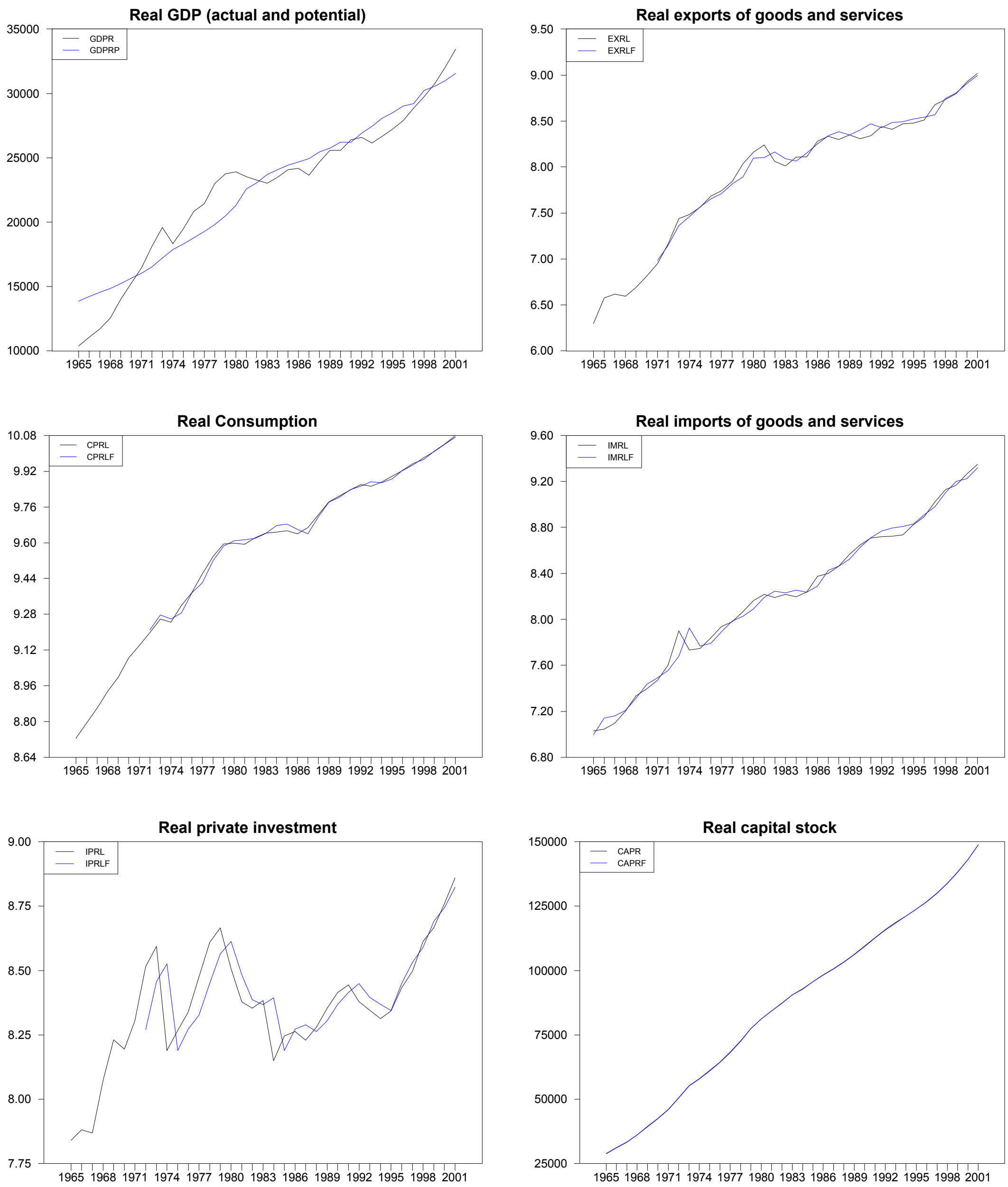


Figure 2: Labor market (actual and forecast)

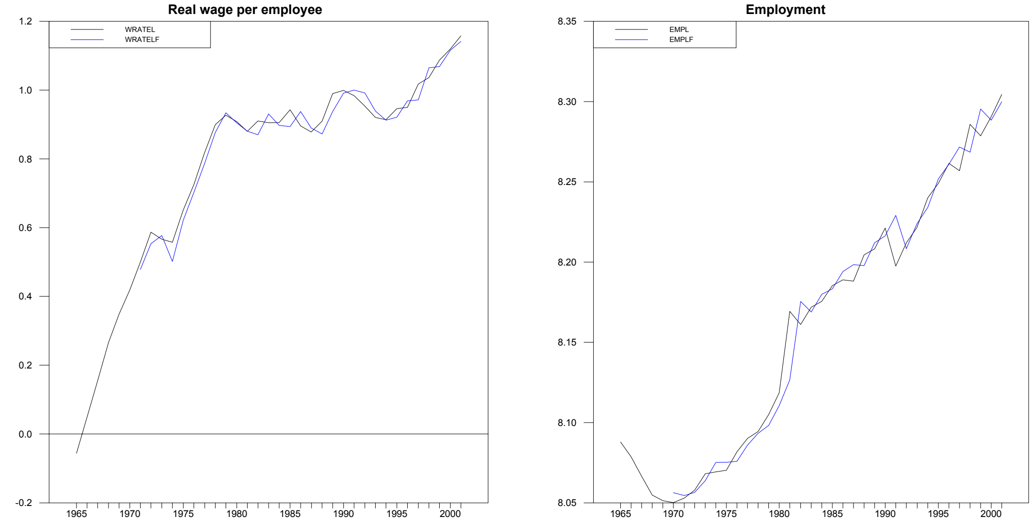


Figure 3: Money and inflation (actual and forecast)

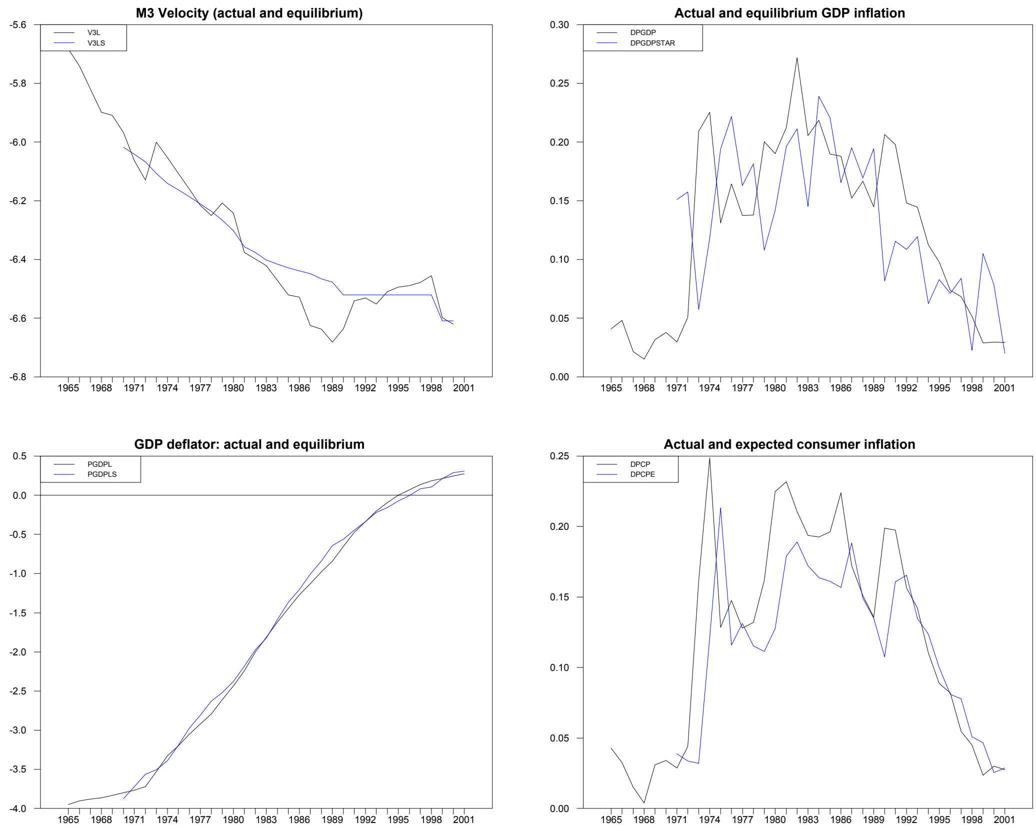


Figure 4: Prices (actual and forecast)

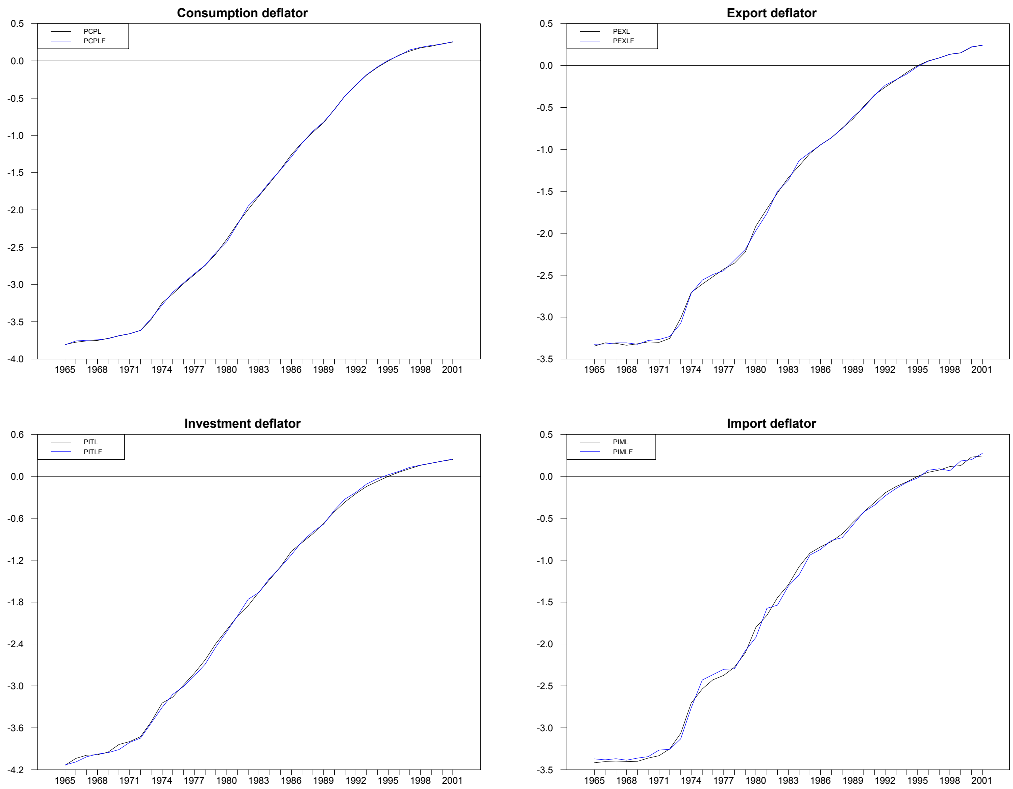


Figure 5: Interest rates (actual and forecast)

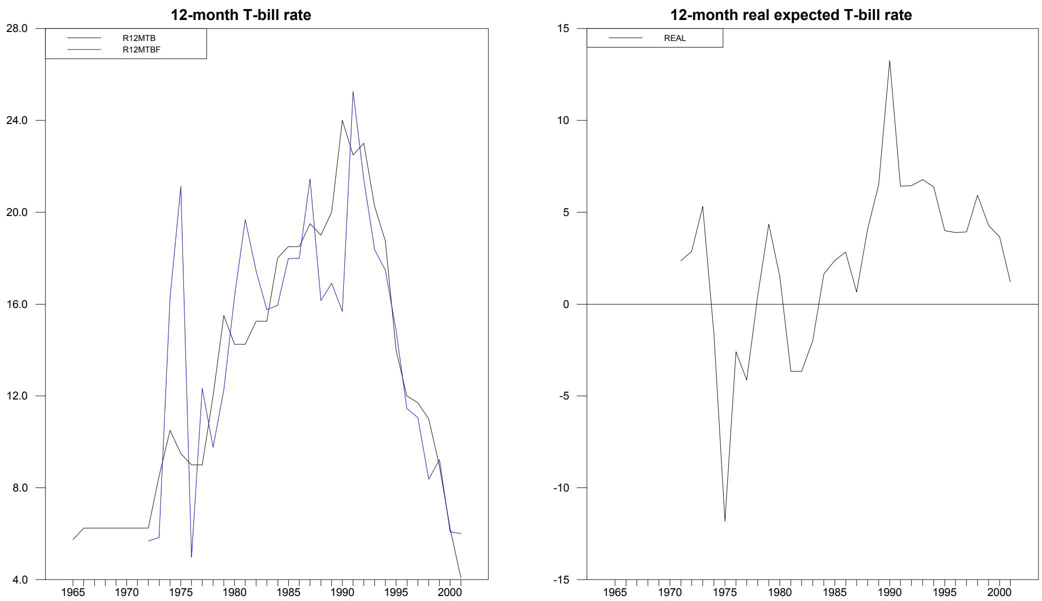


Figure 6: Exchange rate (actual and forecast)

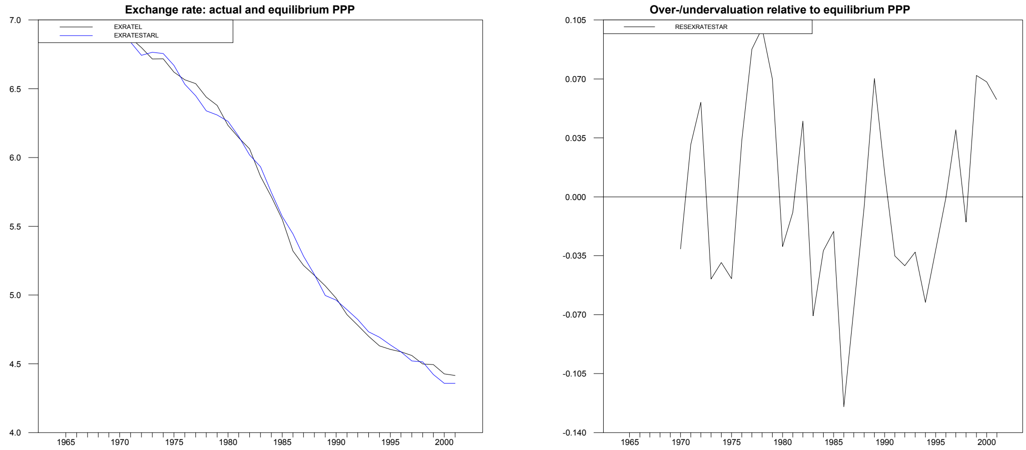


Figure 7: Baseline simulation

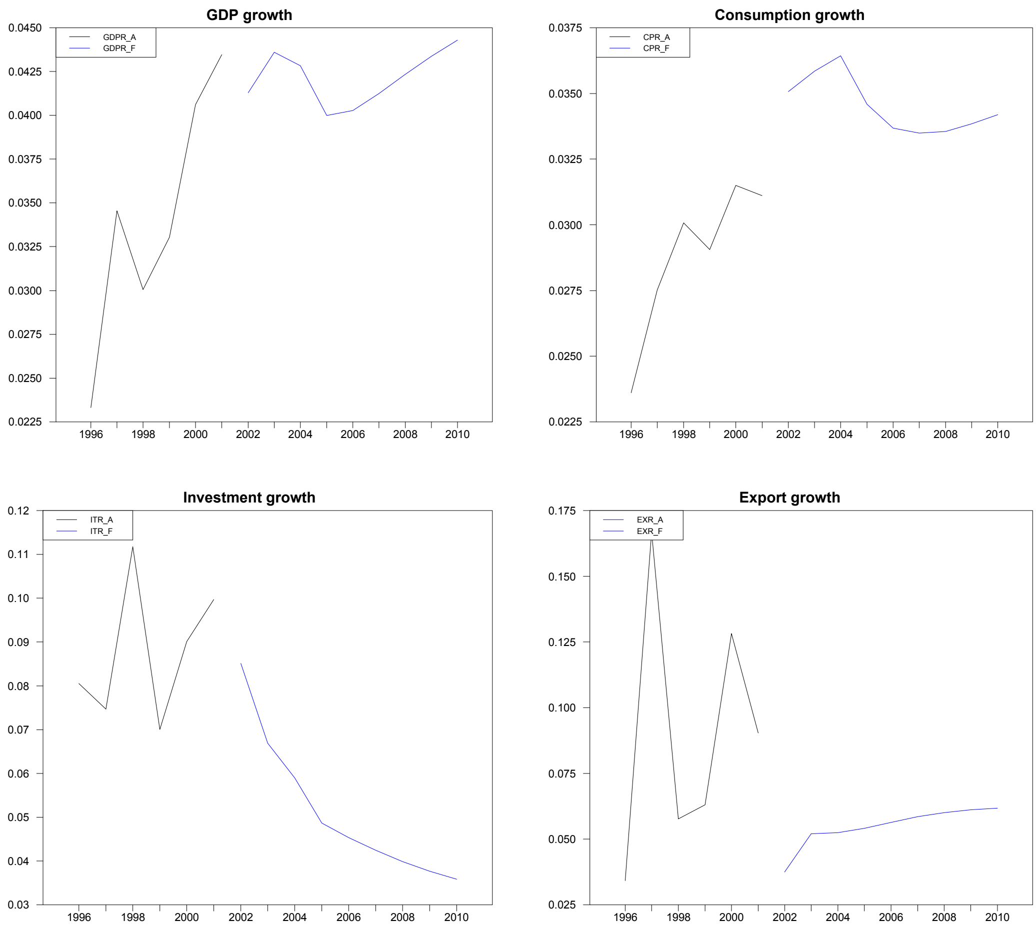


Figure 8: Baseline simulation

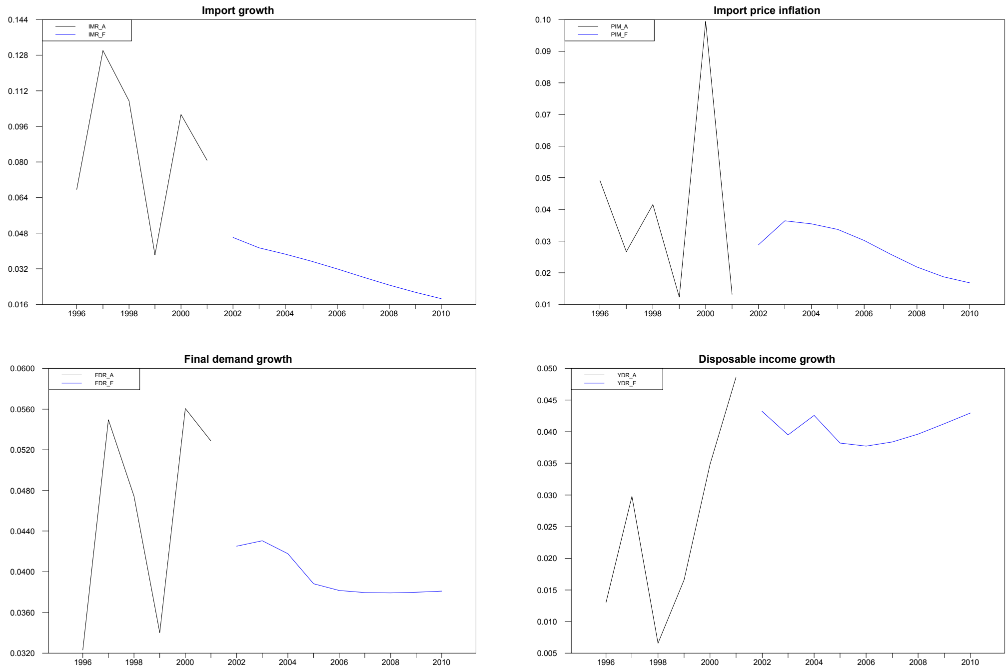


Figure 9: Baseline simulation

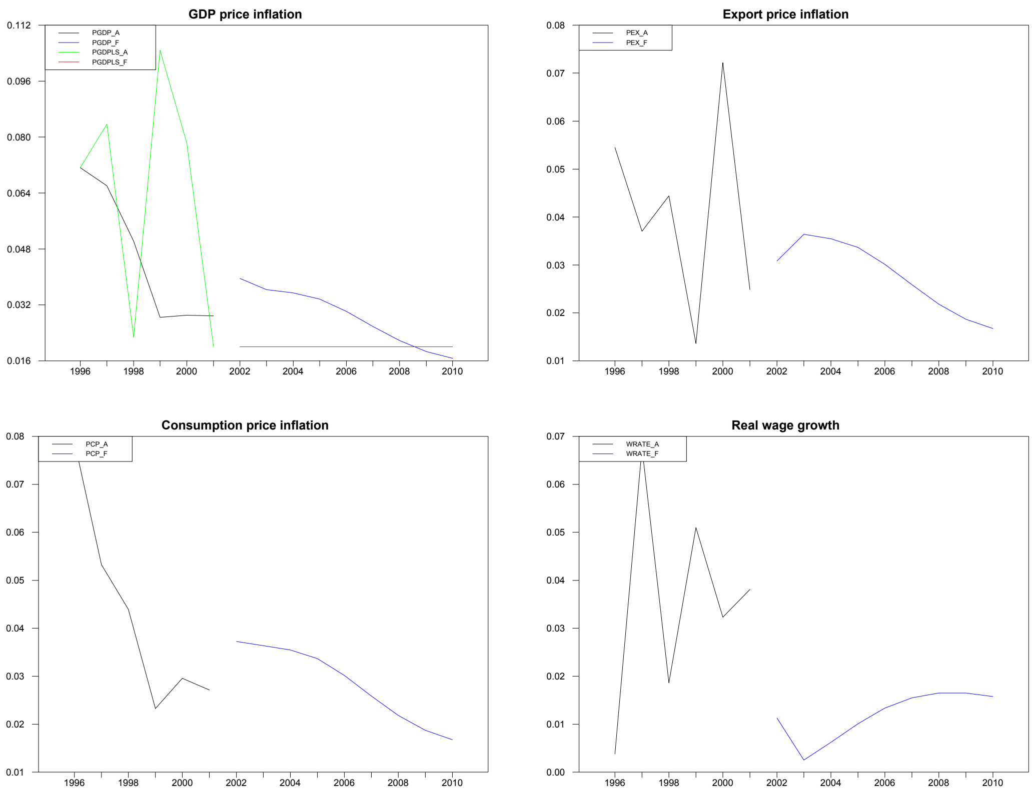


Figure 10: Baseline simulation

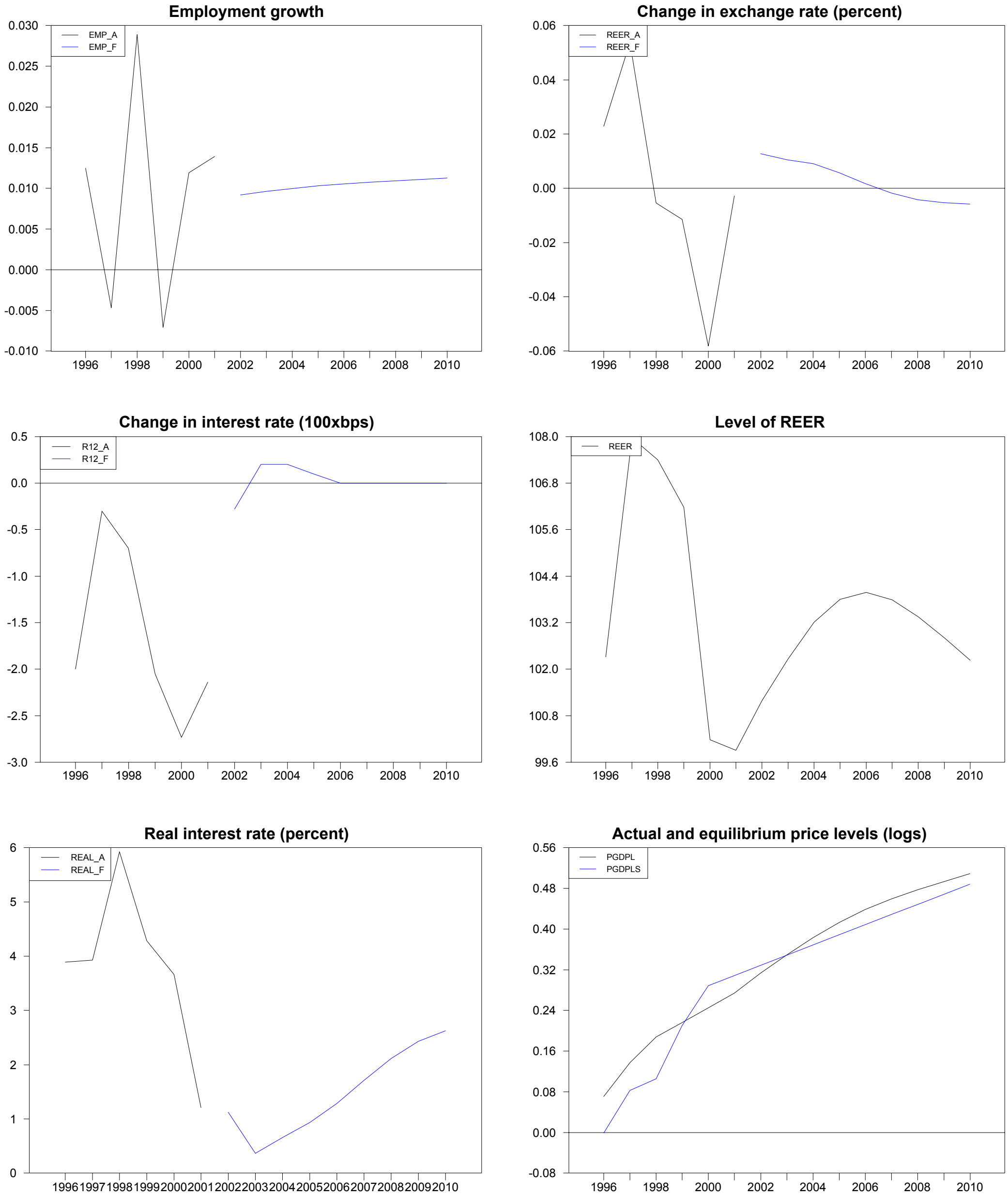
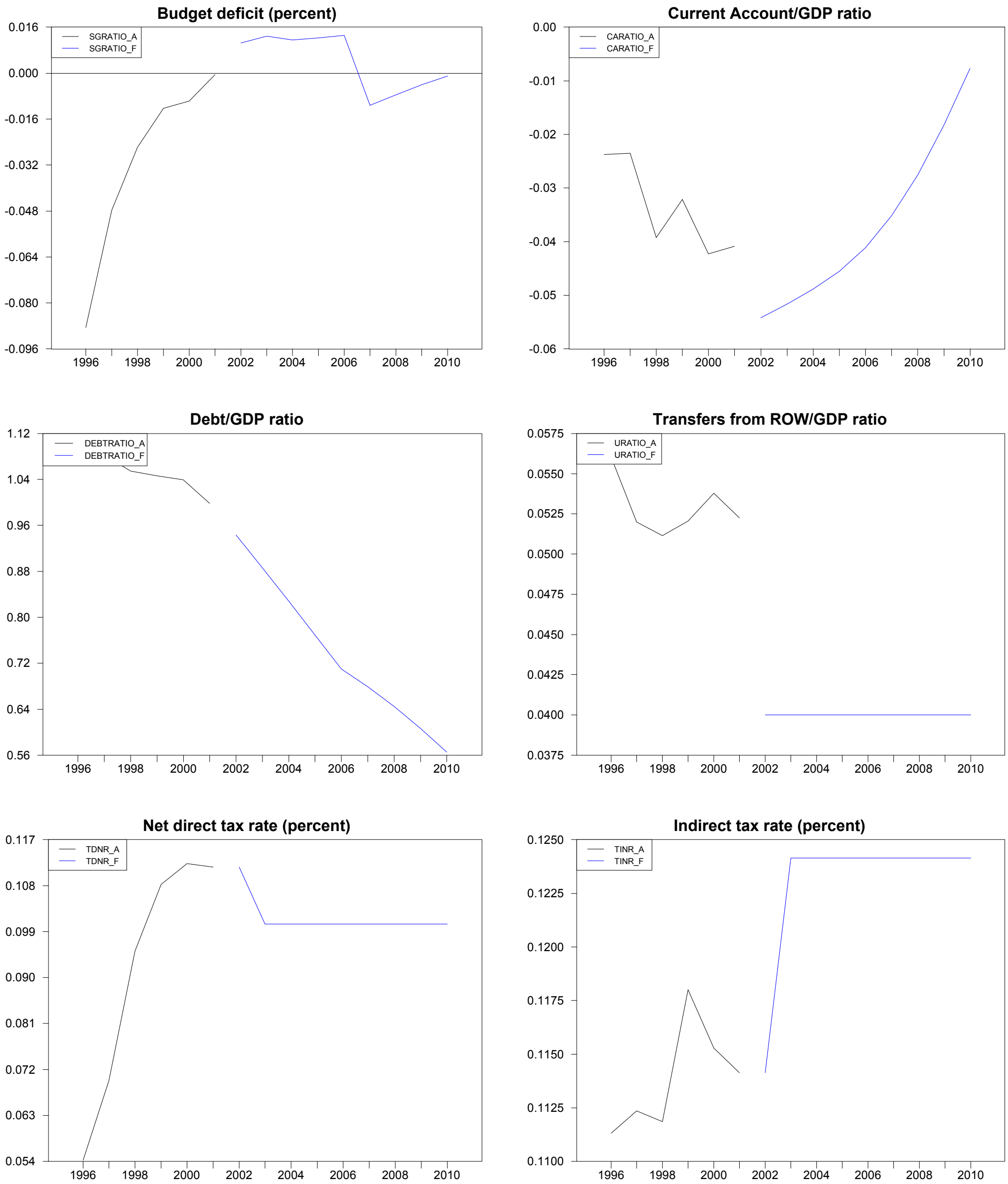


Figure 11: Baseline simulation



C. SCENARIO 1

ENTRY	GDPR_D	CPR_D	ITR_D	GR_D
2002:01	-2.143165556549	-0.830593063059	0.0000000045777	-4.4630966e-014
2003:01	-2.422855712896	-1.092573192902	0.1053226669957	2.2093438e-014
2004:01	-1.809118370044	-0.836096059246	0.2104069524708	2.2093438e-014
2005:01	-1.846074082372	-0.737598400339	0.2397811498245	2.2093438e-014
2006:01	-1.948514798970	-0.702571055580	0.2446152656777	-4.4186876e-014
2007:01	-2.064697777687	-0.719162764603	0.2402603994776	4.4186876e-014
2008:01	-2.214286090954	-0.773040067359	0.2057855624170	4.4186876e-014
2009:01	-2.355628366408	-0.835434354668	0.1818992246840	-8.8373753e-014
2010:01	-2.480800500108	-0.887436523360	0.1675737493026	6.6280315e-014

ENTRY	EXR_D	IMR_D	FDR_D	YDR_D
2002:01	-6.385230807642	0.0572892780086	-1.573879744649	-2.333019671685
2003:01	-6.961123175235	0.1431958433211	-1.749171616912	-2.610407800685
2004:01	-5.133289576839	0.2606756548779	-1.261123502787	-1.844721399196
2005:01	-5.361029886627	0.4122207580074	-1.242345883255	-1.835330392063
2006:01	-5.600552805637	0.6107814286715	-1.264277386295	-1.883770970457
2007:01	-5.709861671667	0.8142378945889	-1.299673003491	-2.024673428396
2008:01	-5.827886691301	1.0087923348236	-1.366358224455	-2.234882317322
2009:01	-5.944908481093	1.1887165687409	-1.435316456428	-2.446139224916
2010:01	-6.076229462263	1.3607032917950	-1.498497252683	-2.626549457635

ENTRY	PCP_D	WRATE_D	EMP_D	UNRATE_D
2002:01	-0.066179368463	0.044020146253	-0.000983999591	0.0883962235450
2003:01	-0.062899860108	0.083989181018	-0.002822246301	0.3430571936823
2004:01	-0.140340165024	0.108040920957	-0.005021513349	0.7981646873817
2005:01	-0.210957813151	0.115105460599	-0.007088441845	1.4436311141983
2006:01	-0.263723408000	0.117289444676	-0.008903871776	2.2585052259334
2007:01	-0.307620549922	0.082204515459	-0.009660217587	3.1479636722120
2008:01	-0.294451248513	0.019272877225	-0.008798176227	3.9648137940134
2009:01	-0.221104094547	-0.046814886811	-0.006362814703	4.5640470413152
2010:01	-0.111996079393	-0.087055762571	-0.003028156581	4.8607005801487

ENTRY	R12_D	REAL_D	REER_D	M3_D
2002:01	0.000000	-100.0000001584	0.2590193543265	NA
2003:01	0.000000	-213.7100139892	0.2425945897398	NA
2004:01	0.000000	-265.9659834976	0.3060464805984	NA
2005:01	0.000000	-298.9042186849	0.3899667289589	NA
2006:01	0.000000	-323.6276592000	0.5478031189364	NA
2007:01	0.000000	-319.2379450078	0.5025793407118	NA
2008:01	0.000000	-320.5548751487	0.5215189088255	NA
2009:01	0.000000	-327.8895905453	0.5723027882504	NA
2010:01	0.000000	-338.8003920607	0.6741794069496	NA

ENTRY	SGRATIO_D	DEBTRATIO_D	TRATIO_D	TDNR_D
2002:01	-0.205722337426	0.2057223374261	0.0228580815150	0.000000
2003:01	-0.447447077518	0.6531694149441	0.0725744737818	0.000000
2004:01	-0.626869582328	1.2800389972723	0.1422266530837	0.000000
2005:01	-0.799076537106	2.0791155343779	0.2310128236114	0.000000
2006:01	-0.964184453494	3.0432999878716	0.3381443783347	0.000000
2007:01	-1.079602951517	4.1229029393887	0.4580997276926	0.000000
2008:01	-1.199942833272	5.3228457726611	0.5914262111171	0.000000
2009:01	-1.322388497723	6.6452342703845	0.7383581109234	0.000000
2010:01	-1.441226656185	8.0864609265696	0.8984942816758	0.000000

ENTRY	TINR_D	CARATIO_D	URATIO_D
2002:01	0.000000	-1.64576595586	0.000000
2003:01	0.000000	-3.40317913103	0.000000
2004:01	0.000000	-4.66834908902	0.000000
2005:01	0.000000	-6.00477416184	0.000000
2006:01	0.000000	-7.41748157918	0.000000
2007:01	0.000000	-8.94054774886	0.000000
2008:01	0.000000	-10.59664820832	0.000000
2009:01	0.000000	-12.37697124627	0.000000
2010:01	0.000000	-14.25857402715	0.000000

D. SCENARIO 2

ENTRY	GDPR_D	CPR_D	ITR_D	GR_D
2002:01	1.9935623776048	0.799195734152	4.5777462e-009	-4.4630966e-014
2003:01	0.3505952442481	0.301281259933	5.5071085e-009	2.2093438e-014
2004:01	0.1940620748424	0.104428481108	-2.3802391e-009	2.2093438e-014
2005:01	0.1364972492081	0.034006574610	1.9962577e-007	2.2093438e-014
2006:01	0.1075307190960	0.008137089965	1.9322609e-007	-4.4186876e-014
2007:01	0.0912950754749	-0.001408732927	2.2801519e-008	4.4186876e-014
2008:01	0.0798235400506	-0.005711863506	-1.2837411e-007	4.4186876e-014
2009:01	0.0694406522579	-0.009502296126	4.4691049e-007	-8.8373753e-014
2010:01	0.0599968139821	-0.013377111851	6.1838230e-007	6.6280315e-014

ENTRY	EXR_D	IMR_D	FDR_D	YDR_D
2002:01	5.7345832527317	-5.3393219e-009	1.4857837784918	2.2419848741676
2003:01	0.5252511605270	4.3476545e-007	0.2630354791063	0.4050233030641
2004:01	0.4311305586715	1.0659042e-006	0.1472359948919	0.2203192514294
2005:01	0.3538828435270	1.0309036e-006	0.1045775284132	0.1649457453423
2006:01	0.2904700788210	7.4802068e-007	0.0850715317064	0.1416055669942
2007:01	0.2384264507675	1.2997607e-006	0.0756620641410	0.1312912446143
2008:01	0.1957072152450	1.3861965e-006	0.0699306357228	0.1237013762771
2009:01	0.1606402714872	1.7266054e-006	0.0648284709694	0.1136926884631
2010:01	0.1318627766593	6.5434739e-007	0.0601066843199	0.1027905609473

ENTRY	PCP_D	WRATE_D	EMP_D	UNRATE_D
2002:01	-0.000000049585	0.000000032376	7.8703158e-009	-0.000001340830
2003:01	-0.000000043297	0.000005004631	-3.5817274e-007	0.000030177665
2004:01	0.000001890651	0.000002909576	-1.6172092e-007	0.000044205789
2005:01	0.000002105214	0.000002707218	-2.1848414e-007	0.000063599122
2006:01	0.000000752390	-0.000002949393	1.9068002e-008	0.000061626409
2007:01	-0.000000583001	-0.000006394112	-2.4422666e-007	0.000083788855
2008:01	0.000004756566	-0.000005861434	-1.1051995e-007	0.000093936187
2009:01	0.000006979220	-0.000004392810	-7.7498870e-009	0.000094770451
2010:01	0.000007946008	0.000003070858	1.0635351e-007	0.000085129283

ENTRY	R12_D	REAL_D	REER_D	M3_D
2002:01	0.000000	-0.000000158423	-10.53605162708	NA
2003:01	0.000000	0.000004329725	0.00000396478	NA
2004:01	0.000000	-0.000189065129	0.00000226392	NA
2005:01	0.000000	-0.000210521408	0.00000046056	NA
2006:01	0.000000	-0.000075238969	-0.00000369247	NA
2007:01	0.000000	0.000058300090	-0.00000030991	NA
2008:01	0.000000	-0.000475656640	0.00000201964	NA
2009:01	0.000000	-0.000697921951	0.00000323611	NA
2010:01	0.000000	-0.000794600775	0.00000123964	NA

ENTRY	SGRATIO_D	DEBTRATIO_D	TRATIO_D	TDNR_D
2002:01	0.1449379339523	-0.144937933952	-0.016104221229	0.000000
2003:01	0.1437447193104	-0.288682653263	-0.032075943256	0.000000
2004:01	0.1321553847204	-0.420838037983	-0.046759879827	0.000000
2005:01	0.1192509747004	-0.540089012684	-0.060009992751	0.000000
2006:01	0.1065036968614	-0.646592709545	-0.071843679474	0.000000
2007:01	0.0971479192063	-0.743740628751	-0.082637916015	0.000000
2008:01	0.0874259877966	-0.831166616548	-0.092351944548	0.000000
2009:01	0.0771426422768	-0.908309258825	-0.100923380663	0.000000
2010:01	0.0663549956694	-0.974664254494	-0.108296179652	0.000000

ENTRY	TINR_D	CARATIO_D	URATIO_D
2002:01	0.000000	1.5527900914102	0.000000
2003:01	0.000000	1.7111672311539	0.000000
2004:01	0.000000	1.8423715800128	0.000000
2005:01	0.000000	1.9646706971811	0.000000
2006:01	0.000000	2.0788297725960	0.000000
2007:01	0.000000	2.1854347868688	0.000000
2008:01	0.000000	2.2831856984314	0.000000
2009:01	0.000000	2.3697240484653	0.000000
2010:01	0.000000	2.4446510639542	0.000000

E. SCENARIO 3

ENTRY	GDPR_D	CPR_D	ITR_D	GR_D
2002:01	-4.3443658e-009	-0.000000010669	4.5777462e-009	-4.4630966e-014
2003:01	0.9645892	1.752852875060	5.5071085e-009	2.2093438e-014
2004:01	0.0395851	0.370401977069	0.0000463	2.2093438e-014
2005:01	-0.2302291	-0.112792456036	0.0472616	2.2093438e-014
2006:01	-0.2842792	-0.253562954303	0.0194552	-4.4186876e-014
2007:01	-0.2567501	-0.265938997473	-0.0077401	4.4186876e-014
2008:01	-0.2069474	-0.234317870292	-0.0222866	4.4186876e-014
2009:01	-0.1591630	-0.192815276989	-0.0255714	-8.8373753e-014
2010:01	-0.1219775	-0.155391204261	-0.0215433	6.6280315e-014

ENTRY	EXR_D	IMR_D	FDR_D	YDR_D
2002:01	0.000000044965	-5.3393219e-009	-4.6000865e-009	-0.000000022711
2003:01	-0.315890941967	0.5399694	0.8560172	4.938900710274
2004:01	-0.138784272802	0.5188589	0.1621873	0.069543718031
2005:01	-0.004556354318	0.4539673	-0.0555830	-0.289388732781
2006:01	0.078371720890	0.3715407	-0.1182116	-0.384534722908
2007:01	0.115037047205	0.2904047	-0.1213757	-0.367266609829
2008:01	0.116545956260	0.2218421	-0.1056512	-0.309058652533
2009:01	0.095986386412	0.1706075	-0.0871088	-0.243840586591
2010:01	0.065538715474	0.1366127	-0.0717527	-0.188261114525

ENTRY	PCP_D	WRATE_D	EMP_D	UNRATE_D
2002:01	-0.000000049585	0.000000032376	7.8703158e-009	-0.000001340830
2003:01	-0.000000043297	-0.313630873290	0.0070099	-0.631844515852
2004:01	0.448090760810	-0.066547876455	0.0082200	-1.377195773100
2005:01	0.239915153077	0.114030745207	0.0053628	-1.868150716644
2006:01	0.003534632405	0.175232141779	0.0013167	-1.994124291973
2007:01	-0.146074263713	0.157295108003	-0.0021428	-1.805137839889
2008:01	-0.206337054773	0.102777663129	-0.0042610	-1.420920791631
2009:01	-0.200562695477	0.041744313553	-0.0049657	-0.969344798438
2010:01	-0.156131301329	-0.008417834094	-0.0045630	-0.551759118179

ENTRY	R12_D	REAL_D	REER_D	M3_D
2002:01	0.000000	-0.00000015842	-0.000000061295	NA
2003:01	0.000000	0.00000432972	0.580377085698	NA
2004:01	0.000000	-44.80907608100	0.201810026318	NA
2005:01	0.000000	-23.99151530774	-0.053750206151	NA
2006:01	0.000000	-0.35346324048	-0.190068213728	NA
2007:01	0.000000	14.60742637125	-0.231750534454	NA
2008:01	0.000000	20.63370547730	-0.209621421826	NA
2009:01	0.000000	20.05626954767	-0.153476290966	NA
2010:01	0.000000	15.61313013293	-0.087585842872	NA

ENTRY	SGRATIO_D	DEBTRATIO_D	TRATIO_D	TDNR_D
2002:01	1.4804713e-009	-1.4804726e-009	-1.6449775e-010	0.000000
2003:01	0.0507263	-0.0507263	-0.0056362	0.000000
2004:01	0.0331638	-0.0838901	-0.0093211	0.000000
2005:01	0.0104638	-0.0943539	-0.0104837	0.000000
2006:01	-0.0048958	-0.0894581	-0.0099397	0.000000
2007:01	-0.0259926	-0.0634655	-0.0070517	0.000000
2008:01	-0.0378125	-0.0256530	-0.0028505	0.000000
2009:01	-0.0430272	0.0173742	0.0019303	0.000000
2010:01	-0.0445239	0.0618981	0.0068774	0.000000

ENTRY	TINR_D	CARATIO_D	URATIO_D
2002:01	0.000000	2.5621656e-009	0.000000
2003:01	0.000000	-0.0701555	0.000000
2004:01	0.000000	-0.2340239	0.000000
2005:01	0.000000	-0.4182150	0.000000
2006:01	0.000000	-0.5883716	0.000000
2007:01	0.000000	-0.7273538	0.000000
2008:01	0.000000	-0.8296690	0.000000
2009:01	0.000000	-0.8976758	0.000000
2010:01	0.000000	-0.9389146	0.000000

F. SCENARIO 4

-ENTRY	GDPR_D	CPR_D	ITR_D	GR_D
2002:01	-0.152071386141	0.000278661743	0.0000000045777	-4.4630966e-014
2003:01	-0.292849483169	-0.038405966066	0.0000671745672	2.2093438e-014
2004:01	-0.383981206744	-0.091345801283	0.0686351808619	2.2093438e-014
2005:01	-0.551048264905	-0.152750626811	0.0855833588484	2.2093438e-014
2006:01	-0.755207756999	-0.223904336651	0.0891156534879	-4.4186876e-014
2007:01	-0.973105719596	-0.311033102512	0.1068095027170	4.4186876e-014
2008:01	-1.185792851734	-0.411219990606	0.1299844955612	4.4186876e-014
2009:01	-1.374744225978	-0.514142110957	0.1478125714018	-8.8373753e-014
2010:01	-1.544193118605	-0.608671227604	0.1541898448605	6.6280315e-014

ENTRY	EXR_D	IMR_D	FDR_ D	YDR_D
2002:01	-0.406347247196	0.1521480391845	-0.073906999839	0.032220744444
2003:01	-0.632106007142	0.3155723293201	-0.136372357703	-0.094269758943
2004:01	-0.686826382079	0.4815609114482	-0.161394178127	-0.183541205043
2005:01	-0.896505207464	0.6864655854999	-0.231873920545	-0.307371764048
2006:01	-1.145943577584	0.9366083019560	-0.319522092665	-0.469396504814
2007:01	-1.377252893549	1.2179872683742	-0.411570878706	-0.673252788480
2008:01	-1.553139950045	1.5071873293417	-0.500948651478	-0.911713496651
2009:01	-1.657624399815	1.7801626522468	-0.580698860463	-1.163606865367
2010:01	-1.737505453727	2.0329606996314	-0.654956575092	-1.404402809474

ENTRY	PCP_D	WRATE_D	EMP_D	UNRATE_D
2002:01	0.6854781022389	-0.456002559527	0.0101915813197	-0.91560477705
2003:01	0.6515093845375	-0.476249933849	0.0204331045700	-2.76069282445
2004:01	0.8910357472178	-0.422449168545	0.0290911907115	-5.40109721596
2005:01	1.0208737166105	-0.488896946663	0.0390081303104	-8.95961763975
2006:01	1.2860959385699	-0.588787059513	0.0509116306675	-13.62801649481
2007:01	1.6211947986832	-0.644592293940	0.0637533410497	-19.50606466472
2008:01	1.9298511353025	-0.626346246206	0.0758745205243	-26.54405646984
2009:01	2.1471610294478	-0.540266004725	0.0858246198090	-34.55917807261
2010:01	2.2475922068761	-0.456282400747	0.0937626656881	-43.38185398529

ENTRY	R12_D	REAL_D	REER_D	M3_D
2002:01	0.000000	-0.0000001584	0.8438521384983	NA
2003:01	0.000000	-65.1509384537	0.9957193590923	NA
2004:01	0.000000	-89.1035747218	1.1056641979052	NA
2005:01	0.000000	-102.0873716610	1.4176250423952	NA
2006:01	0.000000	-128.6095938570	1.7871790708684	NA
2007:01	0.000000	-162.1194798683	2.1055035472844	NA
2008:01	0.000000	-192.9851135303	2.3119388417967	NA
2009:01	0.000000	-214.7161029448	2.3891948817917	NA
2010:01	0.000000	-224.7592206876	2.4347169157938	NA

ENTRY	SGRATIO_D	DEBTRATIO_D	TRATIO_D	TDNR_D
2002:01	-0.031854831508	0.0318548315078	0.0035394464547	0.000000
2003:01	-0.082841594300	0.1146964258082	0.0127441040449	0.000000
2004:01	-0.139137792518	0.2538342183260	0.0282038832526	0.000000
2005:01	-0.210331034384	0.4641652527101	0.0515740270123	0.000000
2006:01	-0.300241539397	0.7644067921074	0.0849342239388	0.000000
2007:01	-0.370124073923	1.1345308660300	0.1260590870827	0.000000
2008:01	-0.457556633668	1.5920874996983	0.1768986878191	0.000000
2009:01	-0.555559501507	2.1476470012050	0.2386275025374	0.000000
2010:01	-0.657753650024	2.8054006512287	0.3117112248502	0.000000

ENTRY	TINR_D	CARATIO_D	URATIO_D
2002:01	0.000000	-0.020808283127	0.000000
2003:01	0.000000	-0.128610244471	0.000000
2004:01	0.000000	-0.294030630069	0.000000
2005:01	0.000000	-0.547047255576	0.000000
2006:01	0.000000	-0.910766081898	0.000000
2007:01	0.000000	-1.407411308419	0.000000
2008:01	0.000000	-2.049902445500	0.000000
2009:01	0.000000	-2.836089817087	0.000000
2010:01	0.000000	-3.755314814812	0.000000

G. SCENARIO 5

ENTRY	GDPR_D	CPR_D	ITR_D	GR_D
2002:01	0.3308660734240	0.1270668299190	4.5777462e-009	-4.4630966e-014
2003:01	0.7115200192127	0.3042976028830	-0.0273801	2.2093438e-014
2004:01	1.0095523971433	0.4424613975060	-0.0202315	2.2093438e-014
2005:01	0.7492393131852	0.3213825913862	-0.0259769	2.2093438e-014
2006:01	0.5420691582007	0.1910133820615	-0.0667617	-4.4186876e-014
2007:01	0.9313076563755	0.3434532059835	-0.0792474	4.4186876e-014
2008:01	1.4871772054460	0.6315700001824	-0.0296707	4.4186876e-014
2009:01	1.8520702941511	0.8468950816693	0.0387474	-8.8373753e-014
2010:01	1.9714315191998	0.9351833645585	0.0723881	6.6280315e-014

ENTRY	EXR_D	IMR_D	FDR_D	YDR_D
2002:01	0.9647561489931	-0.011457446396	0.2431351438806	0.3570683423979
2003:01	1.9823748566909	-0.026347395862	0.5236217490720	0.7840971526104
2004:01	2.6619433013218	-0.065215020236	0.7391952668137	1.0903060179339
2005:01	1.7459787498221	-0.180288602753	0.5190425724678	0.7137100266333
2006:01	1.1212536070712	-0.318522623548	0.3348477107585	0.4662860074529
2007:01	2.0394904472255	-0.407025239624	0.6170232650895	1.0012256803085
2008:01	3.1728573062288	-0.448498969248	1.0479769732164	1.7450396923134
2009:01	3.7426040821291	-0.489665198623	1.3467526356233	2.2250037737329
2010:01	3.7875406212566	-0.529734593287	1.4664692861120	2.4184399239446

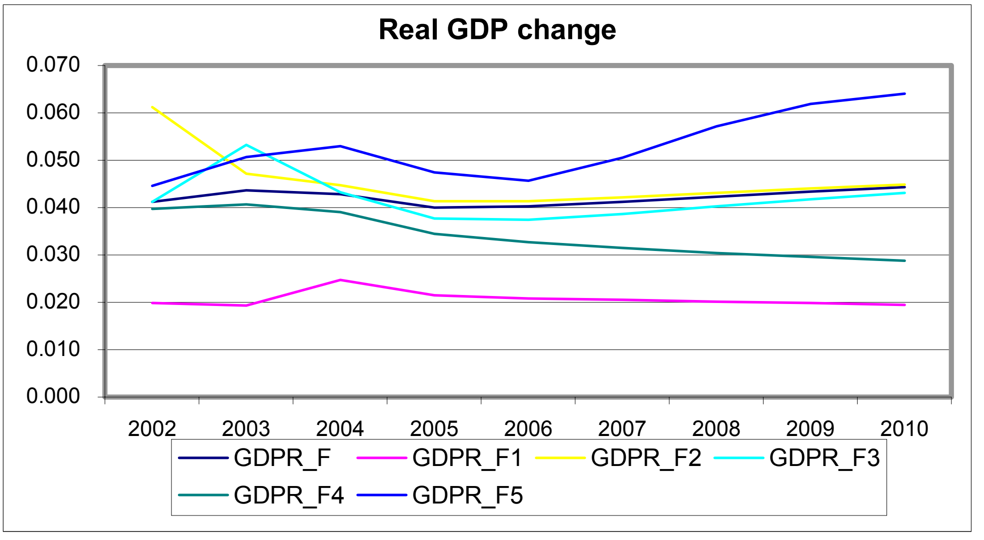
ENTRY	PCP_D	WRATE_D	EMP_D	UNRATE_D
2002:01	0.013237691659	-0.008806360012	0.000196834191	-0.017683188586
2003:01	0.012581704495	-0.015039001938	0.000525179838	-0.065078306241
2004:01	0.025553252600	-0.032736700160	0.001208978902	-0.174603286933
2005:01	0.057202056920	-0.093323257237	0.003201763093	-0.465603709632
2006:01	0.157689577765	-0.123963148760	0.005779637819	-0.993156374932
2007:01	0.242246230103	-0.063728954255	0.006851737303	-1.622249403514
2008:01	0.207883939191	0.040692121503	0.005487967883	-2.130878753106
2009:01	0.078664849407	0.104853950975	0.002741372529	-2.390764260728
2010:01	-0.042366472351	0.119191805753	-0.000154671155	-2.385525944392

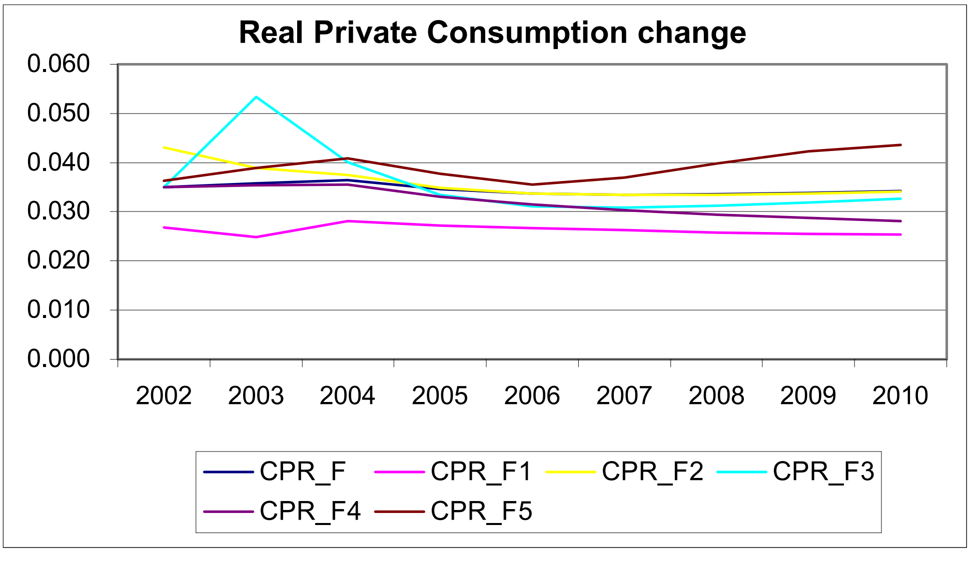
ENTRY	R12_D	REAL_D	REER_D	M3_D
2002:01	0.000000	25.99999984158	-0.051664782738	NA
2003:01	0.000000	22.74182955053	-0.038101851797	NA
2004:01	0.000000	30.44467474004	-0.136591327746	NA
2005:01	0.000000	72.27979430795	-0.422622389480	NA
2006:01	0.000000	92.23104222346	-0.338805456235	NA
2007:01	0.000000	54.77537698974	-0.062582127393	NA
2008:01	0.000000	-6.78839391907	-0.015070624016	NA
2009:01	0.000000	-43.86648494072	-0.208420629671	NA
2010:01	0.000000	-55.76335276486	-0.277896215736	NA

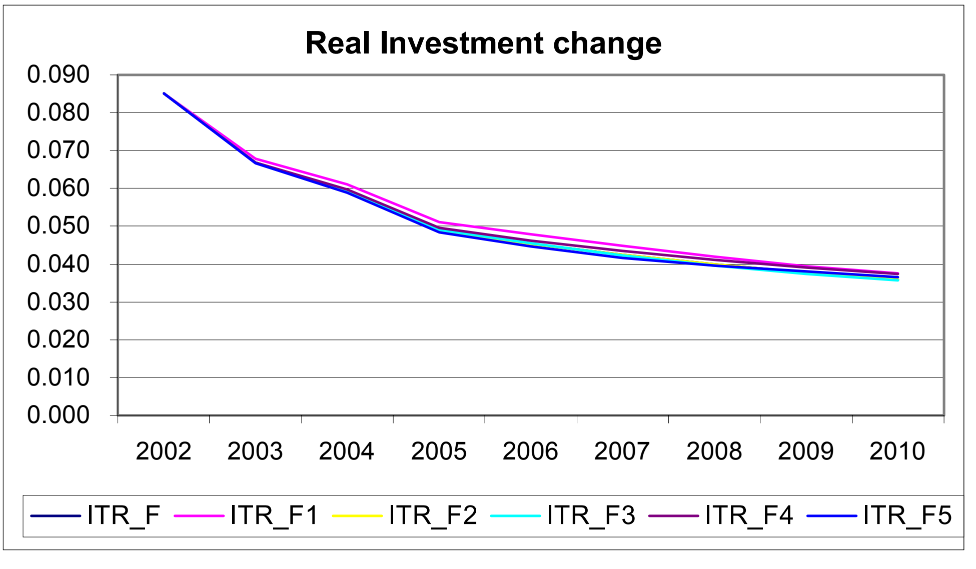
ENTRY	SGRATIO_D	DEBTRATIO_D	TRATIO_D	TDNR_D
2002:01	0.0357905532402	-0.035790553240	-0.003976728254	0.000000
2003:01	0.0886345765191	-0.124425129759	-0.013825015738	0.000000
2004:01	0.1514644812156	-0.275889610975	-0.030654404214	0.000000
2005:01	0.2014265074457	-0.477316118421	-0.053035125629	0.000000
2006:01	0.2426795285119	-0.719995646932	-0.079999453310	0.000000
2007:01	0.2955835811506	-1.015579228083	-0.112842093458	0.000000
2008:01	0.3642280518357	-1.379807279919	-0.153311902972	0.000000
2009:01	0.4227762305957	-1.802583510514	-0.200287087398	0.000000
2010:01	0.4572031480271	-2.259786658542	-0.251087571991	0.000000

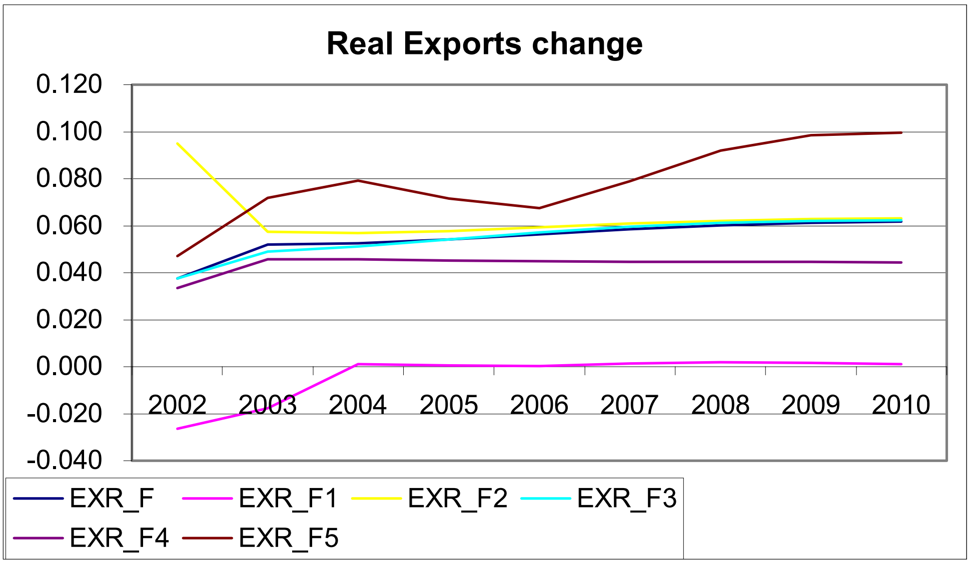
ENTRY	TINR_D	CARATIO_D	URATIO_D
2002:01	0.000000	0.2506734738537	0.000000
2003:01	0.000000	0.7817979591274	0.000000
2004:01	0.000000	1.5034209662283	0.000000
2005:01	0.000000	1.9661806692356	0.000000
2006:01	0.000000	2.2962699076820	0.000000
2007:01	0.000000	2.9924232832664	0.000000
2008:01	0.000000	4.1203227429019	0.000000
2009:01	0.000000	5.4748422117491	0.000000

H. SCENARIA GRAPHS.





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2004
2005
2006
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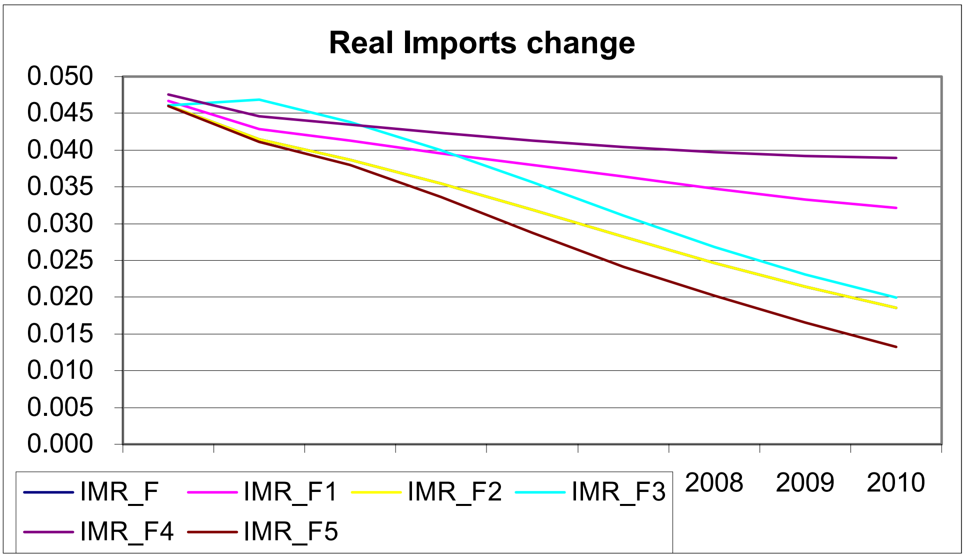
2008
2009
2010
EXR_F
EXR_F1
EXR_F2
EXR_F3
EXR_F4
EXR_F5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2009
2010
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IMR_F3
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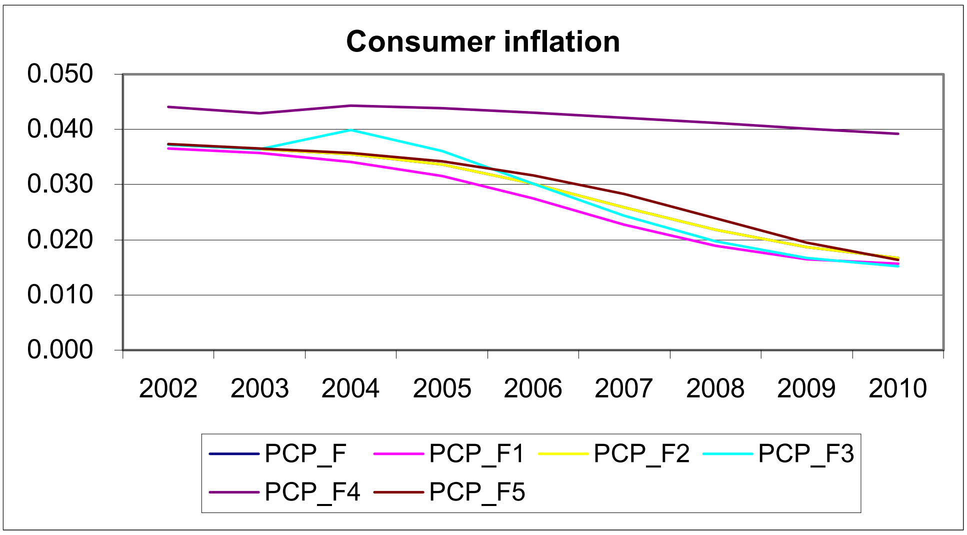
IMR_F5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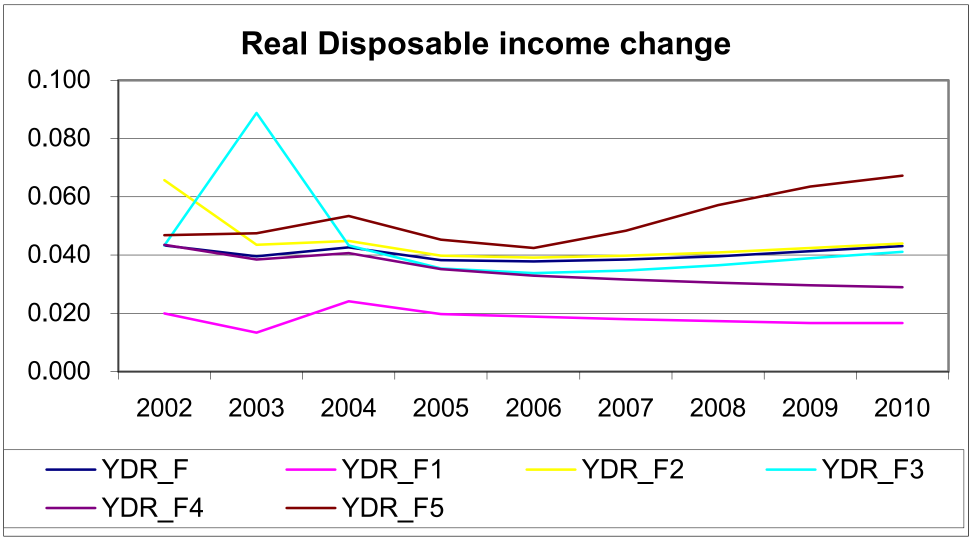
Real Disposable income change
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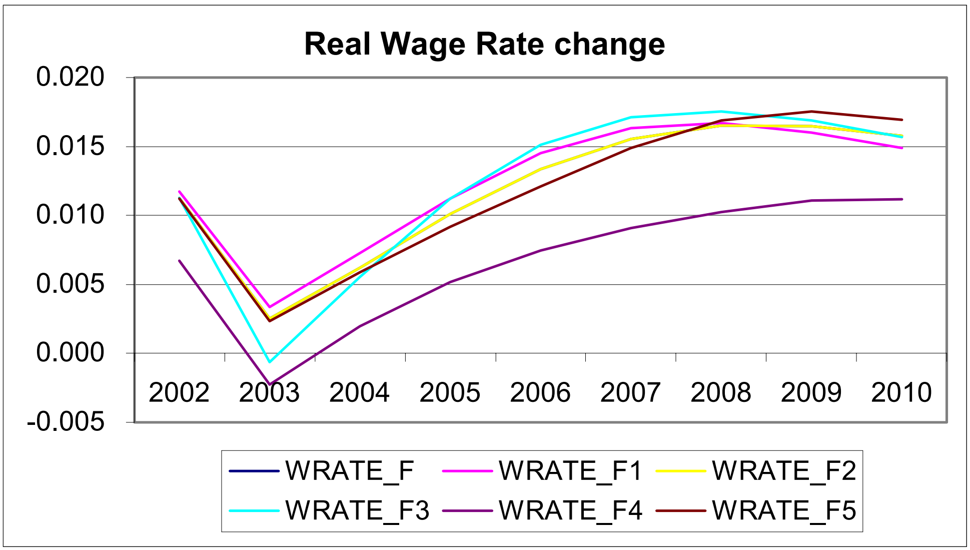
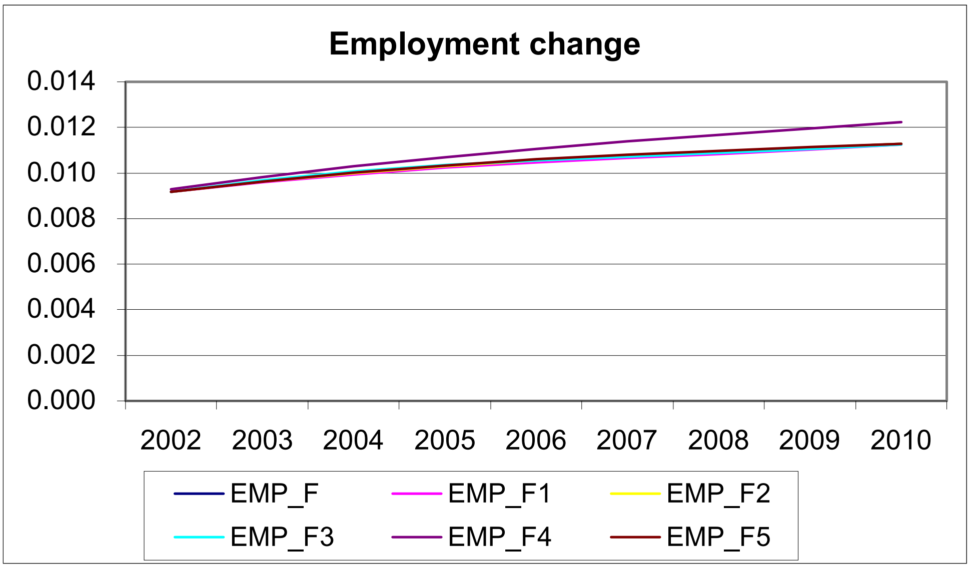
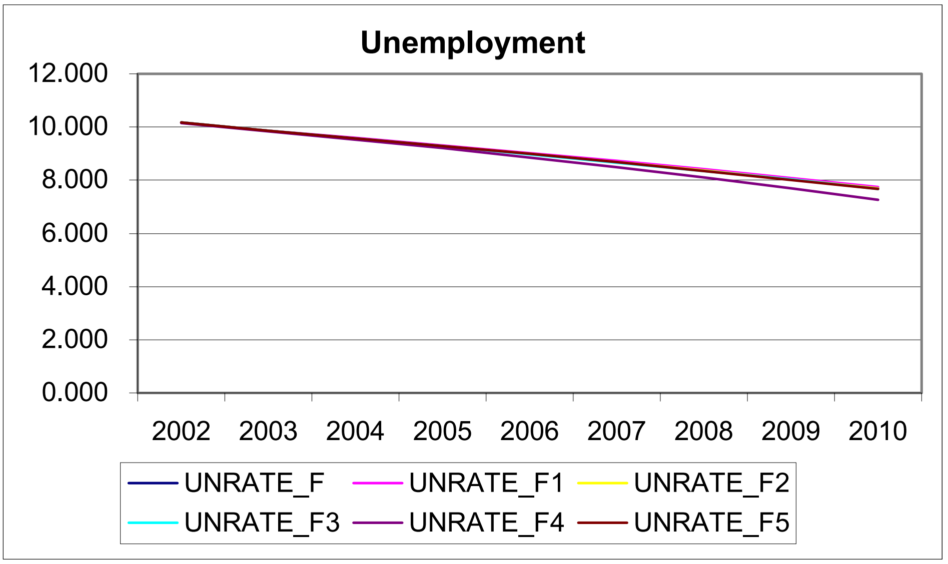
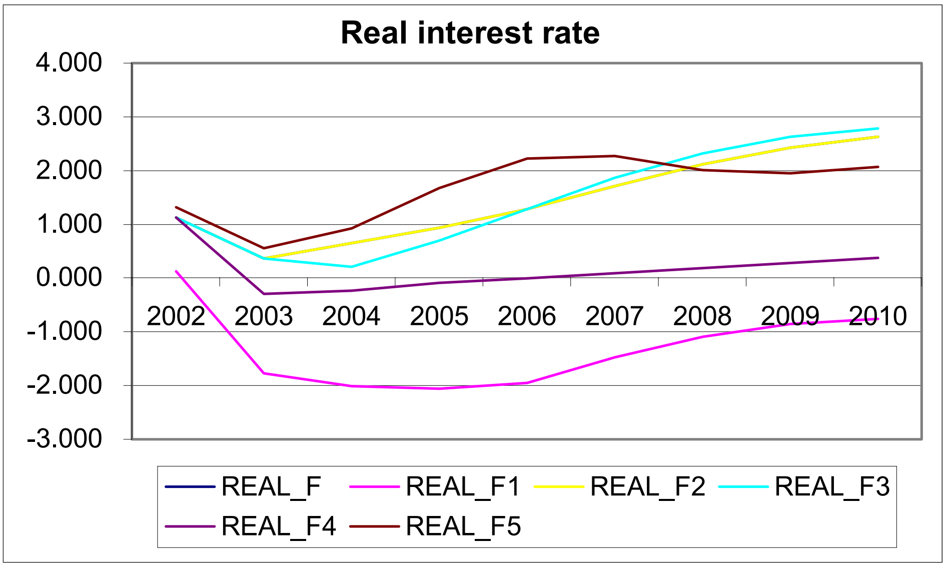
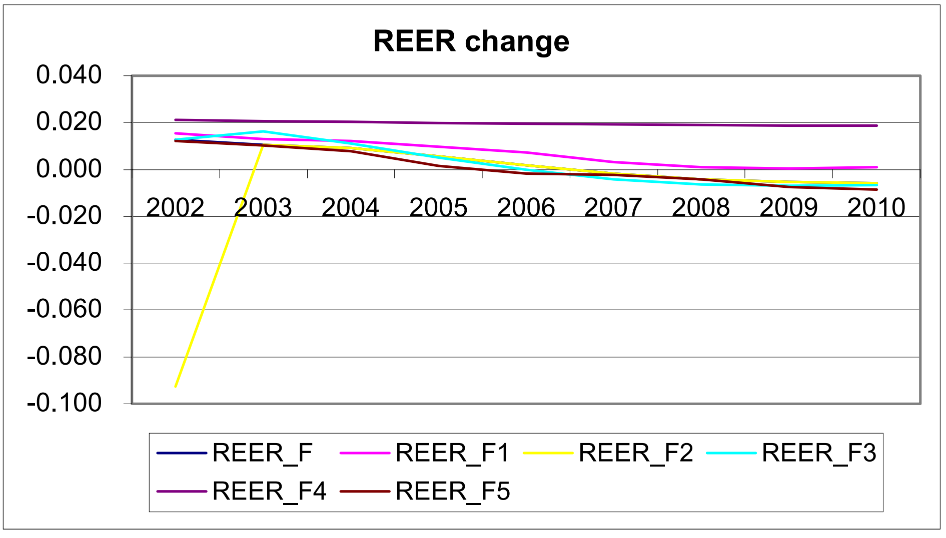
0.080
0.060
0.040
0.020
0.000
2002
2003
2004
2005
2006
2007
2008
2009
2010
YDR_F
YDR_F1
YDR_F2
YDR_F3
YDR_F4
YDR_F5

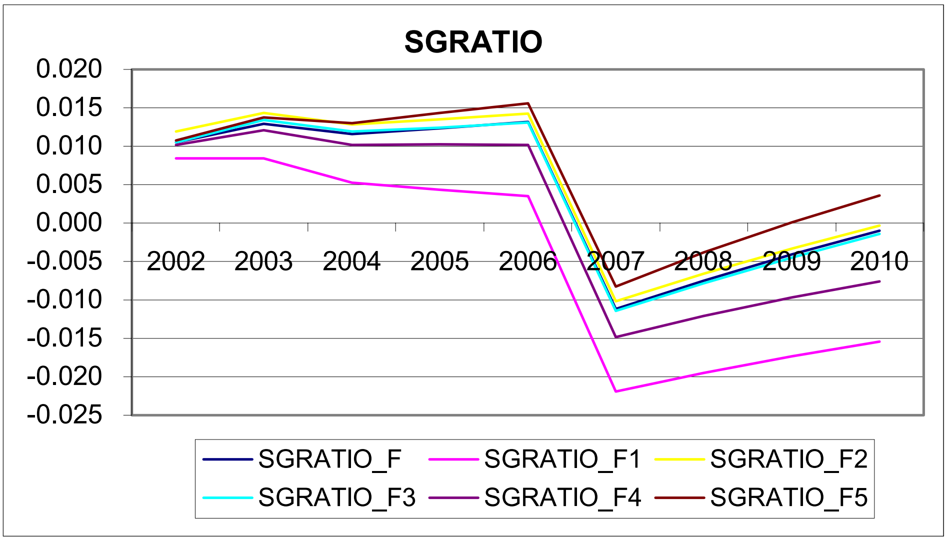

Real Wage Rate change
0.020
0.015
0.010
0.005
0.000
-0.005
2002
2003
2004
2005
2006
2007
2008
2009
2010
WRATE_F
WRATE_F1
WRATE_F2
WRATE_F3
WRATE_F4
WRATE_F5

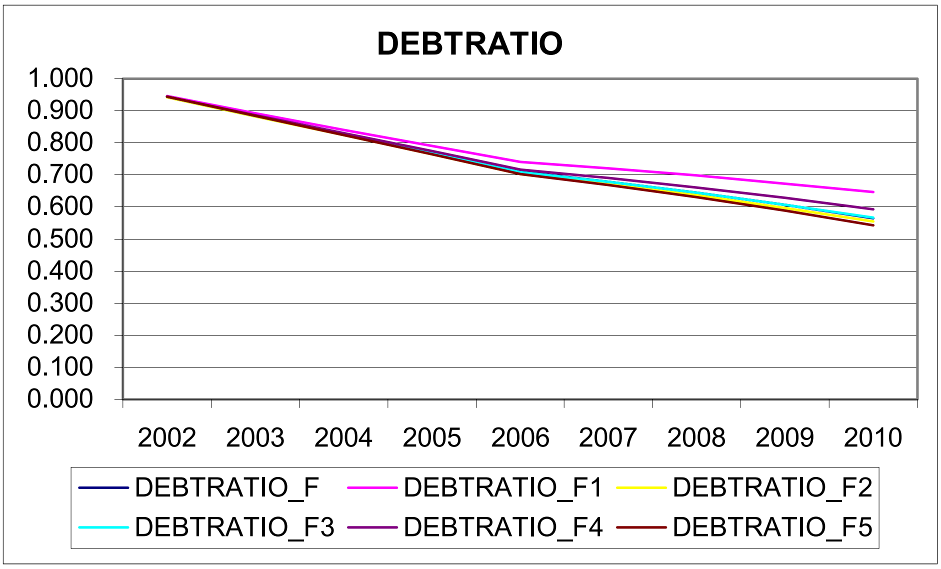

Employment change
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
2002
2003
2004
2005
2006
2007
2008
2009
2010
EMP_F
EMP_F1
EMP_F2
EMP_F3
EMP_F4
EMP_F5

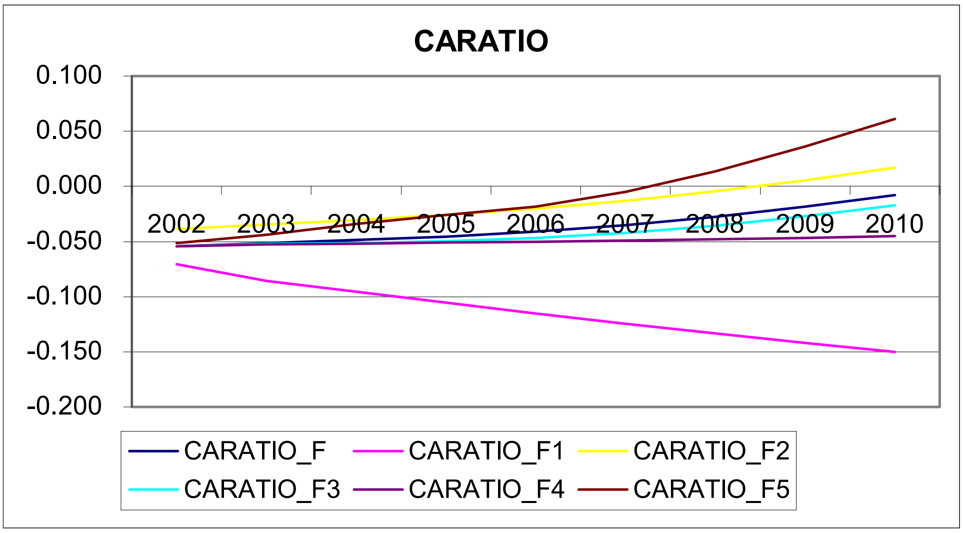

Unemployment
12.000
10.000
8.000
6.000
4.000
2.000
0.000
2002
2003
2004
2005
2006
2007
2008
2009
2010
UNRATE_F
UNRATE_F1
UNRATE_F2
UNRATE_F3
UNRATE_F4
UNRATE_F5


Real interest rate
4.000
3.000
2.000
1.000
0.000
-1.000
-2.000
-3.000
2002
2003
2004
2005
2006
2007
2008
2009
2010
REAL_F
REAL_F1
REAL_F2
REAL_F3
REAL_F4
REAL_F5


REER change
0.040
0.020
0.000
-0.020
-0.040
-0.060
-0.080
-0.100
2002
2003
2004
2005
2006
2007
2008
2009
2010
REER_F
REER_F1
REER_F2
REER_F3
REER_F4
REER_F5


SGRATIO
0.020
0.015
0.010
0.005
0.000
-0.005
-0.010
-0.015
-0.020
-0.025
2002
2003
2004
2005
2006
2007
2008
2009
2010
SGRATIO_F
SGRATIO_F1
SGRATIO_F2
SGRATIO_F3
SGRATIO_F4
SGRATIO_F5


DEBTRATIO
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
2002
2003
2004
2005
2006
2007
2008
2009
2010
DEBTRATIO_F
DEBTRATIO_F1
DEBTRATIO_F2
DEBTRATIO_F3
DEBTRATIO_F4
DEBTRATIO_F5


CARATIO
0.100
0.050
0.000
-0.050
-0.100
-0.150
-0.200
2002
2003
2004
2005
2006
2007
2008
2009
2010
CARATIO_F
CARATIO_F1
CARATIO_F2
CARATIO_F3
CARATIO_F4
CARATIO_F5

I. EMU MODEL

Statistics on Series GAP_EMU
Quarterly Data From 1970:01 To 2001:04
Observations 128
Sample Mean -0.0000000000 Variance 0.000127
Standard Error 0.0112745563 SE of Sample Mean 0.000997
t-Statistic -0.00000 Signif Level (Mean=0) 1.00000000
Skewness 0.28152 Signif Level (Sk=0) 0.19878074
Kurtosis 0.03078 Signif Level (Ku=0) 0.94486520

-6.13190e-014

Statistics on Series DYSTAREMU
Quarterly Data From 1970:02 To 2001:04
Observations 127
Sample Mean 0.00593696497 Variance 4.761298e-006
Standard Error 0.00218203978 SE of Sample Mean 0.000194
t-Statistic 30.66223 Signif Level (Mean=0) 0.00000000
Skewness -0.09226 Signif Level (Sk=0) 0.67488580
Kurtosis -0.78834 Signif Level (Ku=0) 0.07776332

0.00594
0.02375
0.04375

Dependent Variable YEMUL - Estimation by Nonlinear Least Squares
Iterations Taken 2
Quarterly Data From 1970:01 To 2001:04
Usable Observations 123 Degrees of Freedom 116
Total Observations 128 Skipped/Missing 5
Centered R**2 0.998838 R Bar **2 0.998778
Uncentered R**2 0.999999 T x R**2 123.000
Mean of Dependent Variable 7.0189475467
Std Error of Dependent Variable 0.1920376799
Standard Error of Estimate 0.0067143424
Sum of Squared Residuals 0.0052295577
Durbin-Watson Statistic 1.299875

Variable	Coeff	Std Error	T-Stat	Signif
1. YEMU_A0	0.006469212	0.001907840	3.39086	0.00095319
2. YEMU_A1	-0.438778412	0.073861380	-5.94057	0.00000003
3. YEMU_A2	-0.050627028	0.023926665	-2.11592	0.03648984
4. YEMU_A3	-0.013190759	0.008521761	-1.54789	0.12437247
5. YEMU_A4	0.045636834	0.033913500	1.34568	0.18102900
6. YEMU_A5	0.602784400	0.074252298	8.11806	0.00000000
7. YEMU_A6	0.230044396	0.120351526	1.91144	0.05841570

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)= 15.418998 with Significance Level 0.00008612
Chi-Squared(2)= 15.418998 with Significance Level 0.00044855
Bera-Jarque Normality tests
Chi-Squared(2)= 29.390067 with Significance Level 0.00000041
ARCH(1) test
Chi-Squared(1)= 34.323080 with Significance Level 0.00000000
ADF(1) test: a and ta are: 0.32251 -4.30333

```
****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES            *
*        Using data from 1971:02 to 2001:04                    *
*   Choosing the optimal lag length for the ADF regression     *
*   between 0 and  4  lags.                                    *
****************************************************************
```

Model Selection Criteria
Minimum AIC at lag: 4
Minimum BIC at lag: 0

****

```
* Augmented Dickey-Fuller t-test with 0 lags:      -7.6652    *
*              1%       5%       10%                     *
*            -2.58     -1.95     -1.62                   *
*                                               *
* Augmented Dickey-Fuller Z-test with 0 lags:      -79.6333    *
*              1%       5%       10%                     *
*            -13.6     -8.0      -5.7                   *
****************************************************************

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES           SAMPLE 1971:02 TO 2001:04
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT  5.0 %  SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

  t(rho-1)/tao =       -6.39492 with critical value      -3.41000
  Unit root rejected with t(rho-1)/tao

CONCLUSION: Series has no unit root

Dependent Variable PGDPEMUL - Estimation by Nonlinear Least Squares
Iterations Taken    2
Quarterly Data From 1970:01 To 2001:04
Usable Observations    120      Degrees of Freedom   114
 Total Observations    128      Skipped/Missing        8
Centered R**2     0.999948      R Bar **2   0.999945
Uncentered R**2   0.999999      T x R**2    120.000
Mean of Dependent Variable      4.1201938372
Std Error of Dependent Variable 0.5196804647
Standard Error of Estimate      0.0038453698
Sum of Squared Residuals        0.0016857031
Durbin-Watson Statistic         2.075314

   Variable                  Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  PGDPEMU_A0            0.001467554  0.000752183     1.91117  0.05849316
2.  PGDPEMU_A1            1.394703048  0.084291132    16.69456  0.00000000
3.  PGDPEMU_A2            0.092272151  0.039665677     2.91366  0.00430008
4.  PGDPEMU_A3            0.064445918  0.022523900     2.86122  0.00502169
5.  PGDPEMU_A4            0.002594480  0.001093979     0.72623  0.46918675
6.  PGDPEMU_A5           -0.485702401  0.088661024    -5.63610  0.00000013

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)=      1.362943 with Significance Level 0.24302810
Chi-Squared(2)=      1.362943 with Significance Level 0.50587208
Bera-Jarque Normality tests
Chi-Squared(2)=     33.403224 with Significance Level 0.00000006
ARCH(1) test
Chi-Squared(1)=     36.242819 with Significance Level 0.00000000
ADF(1) test: a and ta are:      -0.16251      -5.86093


****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES            *
*         Using data from 1972:01 to 2001:04                  *
*    Choosing the optimal lag length for the ADF regression    *
*    between 0 and  4  lags.                                  *
****************************************************************

Model Selection Criteria
   Minimum AIC at lag:    3
   Minimum BIC at lag:    3

****************************************************************
* Augmented Dickey-Fuller t-test with 3 lags:      -7.1798    *
*              1%       5%       10%                     *
*            -2.58     -1.95     -1.62                   *
*                                               *
* Augmented Dickey-Fuller Z-test with 3 lags:     -1324.0992   *
*              1%       5%       10%                     *
*            -13.6     -8.0      -5.7                   *
```

```
*****************************************************************

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES          SAMPLE 1972:01 TO 2001:04
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT  5.0 %  SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

 t(rho-1)/tao =      -7.29817 with critical value     -3.41000
 Unit root rejected with t(rho-1)/tao

CONCLUSION: Series has no unit root

Dependent Variable HICPL - Estimation by Nonlinear Least Squares
Iterations Taken    2
Quarterly Data From 1990:01 To 2001:04
Usable Observations    48      Degrees of Freedom    47
Centered R**2    0.996107      R Bar **2   0.996107
Uncentered R**2   0.999999      T x R**2     48.000
Mean of Dependent Variable      4.5744748275
Std Error of Dependent Variable 0.0860545064
Standard Error of Estimate      0.0053695266
Sum of Squared Residuals        0.0013550953
Durbin-Watson Statistic         0.529661

   Variable                  Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  HICP_A1               0.8062548491 0.0516980204     15.59547  0.00000000

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)=     25.281149 with Significance Level 0.00000050
Chi-Squared(2)=     25.281149 with Significance Level 0.00000324
Bera-Jarque Normality tests
Chi-Squared(2)=     17.193613 with Significance Level 0.00018469
ARCH(1) test
Chi-Squared(1)=     29.879734 with Significance Level 0.00000005
ADF(1) test: a and ta are:       0.56851      -3.17550


*****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES              *
*        Using data from 1990:01 to 2001:04                *
*   Choosing the optimal lag length for the ADF regression    *
*    between 0 and  4  lags.                          *
*****************************************************************

Model Selection Criteria
  Minimum AIC at lag:    3
  Minimum BIC at lag:    3

*****************************************************************
* Augmented Dickey-Fuller t-test with 3 lags:      -4.9143    *
*              1%       5%       10%                    *
*           -2.62     -1.95      -1.61                  *
*                                              *
* Augmented Dickey-Fuller Z-test with 3 lags:      107.4827    *
*              1%       5%       10%                    *
*           -12.9      -7.7       -5.5                  *
*****************************************************************

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES          SAMPLE 1990:01 TO 2001:04
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT  5.0 %  SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

 t(rho-1)/tao =      -2.50210 with critical value     -3.41000
 Cannot reject a unit root with t(rho-1)/tao
   Next is joint test of trend=0 and root=1
```

psi3 = 3.26649 with critical value 6.25000
PSI3 cannot reject unit root and no linear trend

REGRESSIONS WITH CONSTANT,NO TREND
t(rho-1)/mu = -2.58017 with critical value -2.86000
Cannot reject a unit root with t(rho-1)/mu
Next is joint test of constant=0 and root=1
psi1 = 3.33593 with critical value 4.59000
PSI1 cannot reject constant=0 and root=1

REGRESSIONS WITH NO CONSTANT, NO TREND
t(rho-1) = -2.56938 with critical value -1.95000
Unit root rejected

CONCLUSION: Series stationary around a zero mean

Dependent Variable I_SHORT1 - Estimation by Nonlinear Least Squares
Iterations Taken 2
Quarterly Data From 1990:01 To 2001:04
Usable Observations 48 Degrees of Freedom 44
Centered R**2 0.976579 R Bar **2 0.974982
Uncentered R**2 0.996121 T x R**2 47.814
Mean of Dependent Variable 0.0656015417
Std Error of Dependent Variable 0.0295380046
Standard Error of Estimate 0.0046720356
Sum of Squared Residuals 0.0009604283
Durbin-Watson Statistic 1.641458

Variable	Coeff	Std Error	T-Stat	Signif
1. ECB_A0	0.0063363615	0.0028428700	2.22886	0.03097873
2. ECB_A1	0.8486307153	0.0544692756	15.57999	0.00000000
3. ECB_A2	0.1965678841	0.0665830371	2.95222	0.00504486
4. ECB_A3	0.2846306379	0.1507423770	1.88819	0.06560474

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)= 1.679505 with Significance Level 0.19499021
Chi-Squared(2)= 1.679505 with Significance Level 0.43181734
Bera-Jarque Normality tests
Chi-Squared(2)= 8.981382 with Significance Level 0.01121289
ARCH(1) test
Chi-Squared(1)= 9.639448 with Significance Level 0.00190442
ADF(1) test: a and ta are: -0.30097 -3.67098

```
*****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES            *
*         Using data from 1990:01 to 2001:04                   *
*   Choosing the optimal lag length for the ADF regression     *
*    between 0 and  4  lags.                                   *
*****************************************************************
```

Model Selection Criteria
Minimum AIC at lag: 0
Minimum BIC at lag: 0

```
*****************************************************************
* Augmented Dickey-Fuller t-test with 0 lags:     -5.6613      *
*             1%      5%      10%                              *
*           -2.62   -1.95   -1.61                              *
*                                                              *
* Augmented Dickey-Fuller Z-test with 0 lags:     -39.2849     *
*             1%      5%      10%                              *
*           -12.9    -7.7    -5.5                              *
*****************************************************************
```

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES SAMPLE 1990:01 TO 2001:04
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT 5.0 % SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

t(rho-1)/tao = -3.75858 with critical value -3.41000
Unit root rejected with t(rho-1)/tao

CONCLUSION: Series has no unit root

Dependent Variable PGDPROWL - Estimation by Nonlinear Least Squares
Iterations Taken 2
Quarterly Data From 1970:02 To 2001:04
Usable Observations 122 Degrees of Freedom 120
Total Observations 127 Skipped/Missing 5
Centered R**2 0.999177 R Bar **2 0.999170
Uncentered R**2 0.999995 T x R**2 121.999
Mean of Dependent Variable 4.2762500224
Std Error of Dependent Variable 0.3420030778
Standard Error of Estimate 0.0098527073
Sum of Squared Residuals 0.0116491008
Durbin-Watson Statistic 1.576234

Variable	Coeff	Std Error	T-Stat	Signif
1. PGDPROW_A0	0.0028412004	0.0016837222	1.68745	0.09411412
2. PGDPROW_A1	0.9191144125	0.0371185690	24.76158	0.00000000

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)= 5.487876 with Significance Level 0.01914880
Chi-Squared(2)= 5.487876 with Significance Level 0.06431658
Bera-Jarque Normality tests
Chi-Squared(2)= 6.776074 with Significance Level 0.03377491
ARCH(1) test
Chi-Squared(1)= 19.088145 with Significance Level 0.00001248
ADF(1) test: a and ta are: 0.07195 -5.19536

```
*****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES             *
*         Using data from 1971:03 to 2001:04                    *
*    Choosing the optimal lag length for the ADF regression     *
*     between 0 and  4  lags.                                   *
*****************************************************************
```

Model Selection Criteria
Minimum AIC at lag: 3
Minimum BIC at lag: 0

```
*****************************************************************
* Augmented Dickey-Fuller t-test with 0 lags:      -8.8416      *
*             1%       5%       10%                             *
*           -2.58    -1.95     -1.62                            *
*                                                               *
* Augmented Dickey-Fuller Z-test with 0 lags:      -95.5621     *
*             1%       5%       10%                             *
*           -13.6     -8.0      -5.7                            *
*****************************************************************
```

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES SAMPLE 1971:03 TO 2001:04
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT 5.0 % SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

t(rho-1)/tao = -6.63688 with critical value -3.41000
Unit root rejected with t(rho-1)/tao

CONCLUSION: Series has no unit root

Dependent Variable YSTAREMUL - Estimation by Nonlinear Least Squares
Iterations Taken 2
Quarterly Data From 1970:01 To 2001:04
Usable Observations 123 Degrees of Freedom 120
Total Observations 128 Skipped/Missing 5

```
Centered R**2     0.999982      R Bar **2   0.999982
Uncentered R**2   1.000000      T x R**2    123.000
Mean of Dependent Variable      7.0187618139
Std Error of Dependent Variable 0.1917060119
Standard Error of Estimate      0.0008220062
Sum of Squared Residuals        0.0000810833
Durbin-Watson Statistic         0.023065

   Variable                   Coeff       Std Error      T-Stat     Signif
*******************************************************************************
1.  YSTAREMU_A0              -0.008633557  0.003313907     -2.60525  0.01034212
2.  YSTAREMU_A1               1.001231567  0.000453728   2206.67897  0.00000000
3.  YSTAREMU_A2               0.996917513  0.010346350     96.35451  0.00000000

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)=    120.943839 with Significance Level 0.00000000
Chi-Squared(2)=    120.943839 with Significance Level 0.00000000
Bera-Jarque Normality tests
Chi-Squared(2)=     61.910365 with Significance Level 0.00000000
ARCH(1) test
Chi-Squared(1)=    118.568216 with Significance Level 0.00000000
ADF(1) test: a and ta are:       0.99703      -4.04120


****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES            *
*         Using data from 1971:02 to 2001:04                   *
*    Choosing the optimal lag length for the ADF regression    *
*     between 0 and  4  lags.                                  *
****************************************************************

Model Selection Criteria
   Minimum AIC at lag:     3
   Minimum BIC at lag:     3

****************************************************************
* Augmented Dickey-Fuller t-test with 3 lags:       -4.8854    *
*              1%        5%        10%                         *
*            -2.58     -1.95     -1.62                         *
*                                                              *
* Augmented Dickey-Fuller Z-test with 3 lags:      -78.0394    *
*              1%        5%        10%                         *
*            -13.6      -8.0      -5.7                         *
****************************************************************

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES           SAMPLE 1971:02 TO 2001:04
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT  5.0 %  SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

  t(rho-1)/tao =      -11.31318 with critical value      -3.41000
  Unit root rejected with t(rho-1)/tao

CONCLUSION: Series has no unit root

Dependent Variable WRATEEMUL - Estimation by Nonlinear Least Squares
Iterations Taken     2
Quarterly Data From 1970:01 To 2001:04
Usable Observations     123      Degrees of Freedom    120
 Total Observations     128      Skipped/Missing         5
Centered R**2     0.999898      R Bar **2   0.999896
Uncentered R**2   0.999973      T x R**2    122.997
Mean of Dependent Variable      1.1340169912
Std Error of Dependent Variable 0.6857034276
Standard Error of Estimate      0.0069853850
Sum of Squared Residuals        0.0058554725
Durbin-Watson Statistic         1.735029

   Variable                   Coeff       Std Error      T-Stat     Signif
*******************************************************************************
```

1. WRATEEMU_A0 0.0129449184 0.0050540387 2.56130 0.01166699
2. WRATEEMU_A1 0.9943571928 0.0021980377 452.38405 0.00000000
3. WRATEEMU_A2 0.8992480908 0.0354338549 25.37822 0.00000000

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)= 4.903063 with Significance Level 0.02680910
Chi-Squared(2)= 4.903063 with Significance Level 0.08616153
Bera-Jarque Normality tests
Chi-Squared(2)= 36.553763 with Significance Level 0.00000001
ARCH(1) test
Chi-Squared(1)= 41.106990 with Significance Level 0.00000000
ADF(1) test: a and ta are: 0.10684 -5.15310

```
*****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES             *
*        Using data from 1971:02 to 2001:04                     *
*   Choosing the optimal lag length for the ADF regression      *
*    between 0 and  4  lags.                                    *
*****************************************************************
```

Model Selection Criteria
Minimum AIC at lag: 4
Minimum BIC at lag: 3

```
*****************************************************************
* Augmented Dickey-Fuller t-test with 3 lags:      -6.6608     *
*            1%       5%       10%                              *
*          -2.58    -1.95     -1.62                             *
*                                                               *
* Augmented Dickey-Fuller Z-test with 3 lags:     -325.4736    *
*            1%       5%       10%                              *
*          -13.6     -8.0      -5.7                             *
*****************************************************************
```

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES SAMPLE 1971:02 TO 2001:04
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT 5.0 % SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

t(rho-1)/tao = -6.49813 with critical value -3.41000
Unit root rejected with t(rho-1)/tao

CONCLUSION: Series has no unit root

Dependent Variable ULC - Estimation by Nonlinear Least Squares
Iterations Taken 2
Quarterly Data From 1970:01 To 2001:04
Usable Observations 123 Degrees of Freedom 120
Total Observations 128 Skipped/Missing 5
Centered R**2 0.998785 R Bar **2 0.998765
Uncentered R**2 0.999829 T x R**2 122.979
Mean of Dependent Variable 0.4168032666
Std Error of Dependent Variable 0.1691626026
Standard Error of Estimate 0.0059450689
Sum of Squared Residuals 0.0042412613
Durbin-Watson Statistic 0.418138

Variable	Coeff	Std Error	T-Stat	Signif
1. ULC_A0	-0.020258915	0.003993938	-5.07242	0.00000145
2. ULC_A1	1.047076625	0.006426348	162.93493	0.00000000
3. ULC_A2	0.321329688	0.026164435	12.28116	0.00000000

Godfrey-Breush lm tests for serial correlation
Chi-Squared(1)= 79.260914 with Significance Level 0.00000000
Chi-Squared(2)= 79.260914 with Significance Level 0.00000000
Bera-Jarque Normality tests
Chi-Squared(2)= 50.269543 with Significance Level 0.00000000
ARCH(1) test

```
Chi-Squared(1)=     51.674104 with Significance Level 0.00000000
ADF(1) test: a and ta are:       0.83540      -2.69036


****************************************************************
* TESTING THE NULL HYPOTHESIS OF A UNIT ROOT IN RES           *
*         Using data from 1971:02 to 2001:04                 *
*   Choosing the optimal lag length for the ADF regression    *
*    between 0 and  4  lags.                                  *
****************************************************************

Model Selection Criteria
   Minimum AIC at lag:    4
   Minimum BIC at lag:    1

****************************************************************
* Augmented Dickey-Fuller t-test with 1 lags:       -2.7403    *
*              1%       5%       10%                    *
*            -2.58     -1.95      -1.62                 *
*                                                  *
* Augmented Dickey-Fuller Z-test with 1 lags:      -14.2426    *
*              1%       5%       10%                    *
*           -13.6      -8.0       -5.7                  *
****************************************************************

URAUTO Procedure by Paco Goerlich
TESTING SERIES: RES           SAMPLE 1971:02 TO 2001:04
AUTOREGRESSIVE CORRECTIONS: 1 LAGS
WORKING AT  5.0 %  SIGNIFICANCE LEVEL
ALL TESTS OF UNIT ROOT ARE ONE-SIDED

REGRESSIONS WITH CONSTANT,TREND

  t(rho-1)/tao =       -2.76172 with critical value      -3.41000
  Cannot reject a unit root with t(rho-1)/tao
    Next is joint test of trend=0 and root=1
    psi3 =        3.86161 with critical value       6.25000
    PSI3 cannot reject unit root and no linear trend

REGRESSIONS WITH CONSTANT,NO TREND
  t(rho-1)/mu =       -2.73104 with critical value      -2.86000
  Cannot reject a unit root with t(rho-1)/mu
    Next is joint test of constant=0 and root=1
    psi1 =        3.80402 with critical value       4.59000
      PSI1 cannot reject constant=0 and root=1

REGRESSIONS WITH NO CONSTANT, NO TREND
  t(rho-1) =       -2.74027 with critical value      -1.95000
  Unit root rejected

CONCLUSION: Series stationary around a zero mean

 YEAR R3MEUR
2002
      3.76073
2003
      3.94021
2004
      4.23208
2005
      4.77755
2006
      5.08856
2007
      4.78888
2008
      4.14432
2009
      3.64324
2010
      3.39189
```

YEAR	INFEMU
2002	0.02891
2003	0.02663
2004	0.02820
2005	0.03272
2006	0.03185
2007	0.02613
2008	0.02203
2009	0.02198
2010	0.02275

YEAR	DYEMU
2002	0.02120
2003	0.03733
2004	0.04036
2005	0.03195
2006	0.02848
2007	0.03478
2008	0.04227
2009	0.04413
2010	0.04283

Figure 1: In sample actual and forecast values

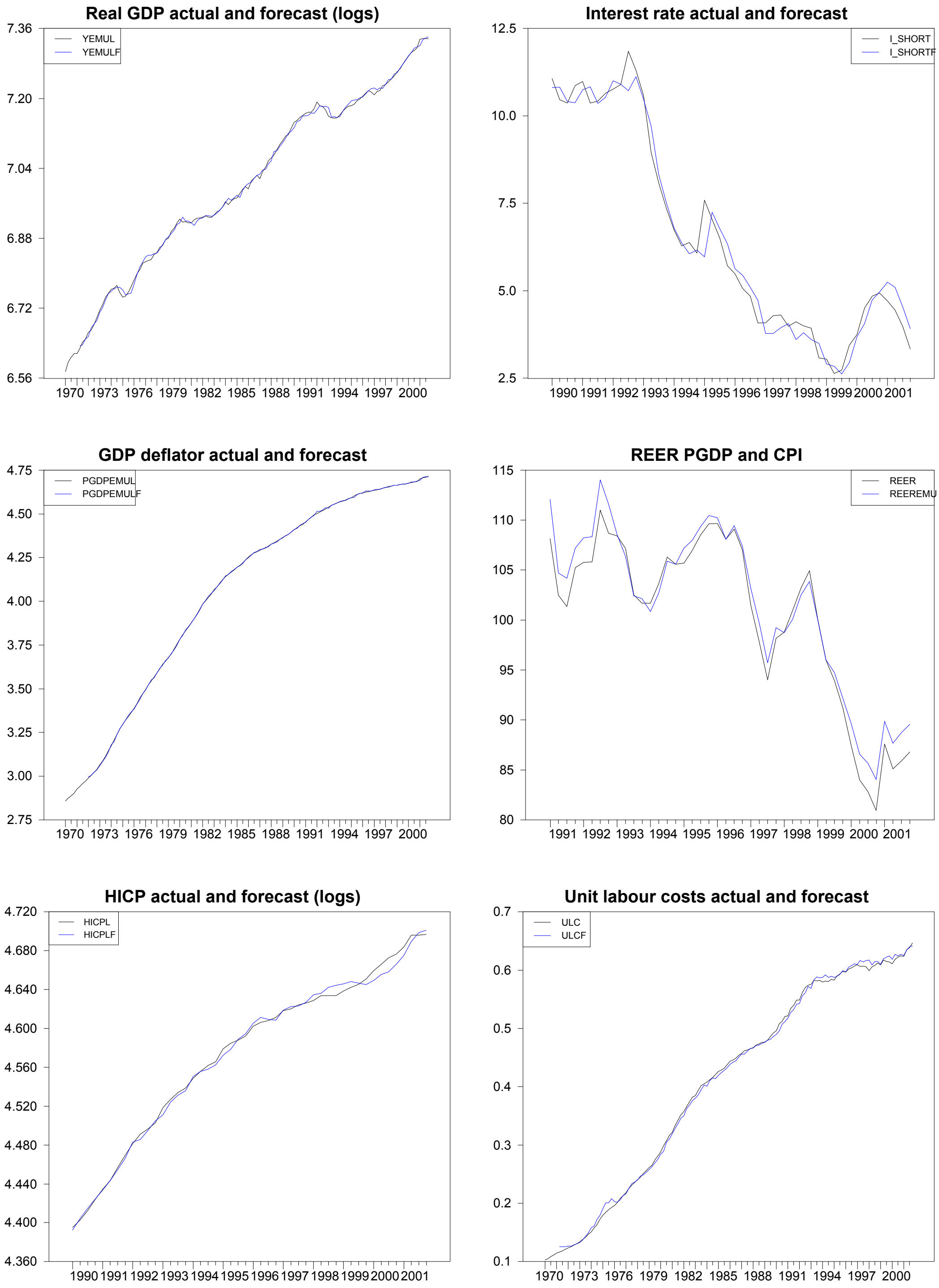


Figure 2: Baseline simulation