GOBIERNO DE PUERTO RICO

JUNTA DE PLANIFICACIÓN DE PUERTO RICO

26 de enero de 2023

VÍA CORREO ELECTRÓNICO: secretaria@senado.pr.gov

Yamil Rivera Vélez
Secretario del Senador
Senado de Puerto Rico
San Juan, Puerto Rico

PETICIÓN DE INFORMACIÓN 2023-0024

Estimado señor Secretario:

En cumplimiento con la Petición de Información 2023-0024, solicitud de documentación conforme a la Regla 18 del Reglamento del Senado de Puerto Rico, vigente, la Junta de Planificación (JP) somete ante ustedes una Presentación con la información solicitada en la petición. La Presentación incluye la información del proceso metodológico de modelaje estadístico y econométrico de las proyecciones económicas a corto y largo plazo de Puerto Rico. La misma fue elaborada por los economistas del Programa de Planificación Económica y Social de la JP.

Según solicitado, el reporte debe incluir lo siguiente:

a) Se debe indicar el orden de integración de las variables y las pruebas que se utilizaron para llegar a esas conclusiones. Por ejemplo, se podrían haber utilizado las siguientes pruebas: Phillips Perron o Dickey Fuller Aumentada, etc.
El orden de integración de la variable es de orden 1. La ecuación se le realizó la prueba de Dickey-Fuller Aumentada para determinación existencia raíz unitaria. Resultados demuestran ausencia de raíz unitaria. (Ver "diapositiva 45") P-value=0 y DFA=-7.66 mayor a cada valor critico de 1.0%, 0.5%% y 10.0%.
Los modelos econométricos de proyecciones económicas a corto plazo utilizados por la Junta de Planificación y sus pruebas se observan en diapositiva 6 al 26 de la presentación adjunta. La Prueba Dickey-Fuller Aumentada para Raíz Unitaria en el "diapositiva 44".

b) Se debe indicar cuántas ecuaciones estuvieron cointegradas y se debe indicar si se realizó la prueba de cointegración de Johansen.
En el modelo de la Ecuación de Ley de Okun no fue necesario hacer Prueba de Johansen de cointegración debido a que la ecuación está debidamente especificada. Con alto nivel de R2=.79% y alto nivel de DW=1.8, resultados de ambas pruebas (ver "diapositiva 42". Además, prueba ausencia de autocorrelación en los residuos Breusch-Godfrey. Prueba F=0.5840 y Chi-Cuadrada=0.5422 mayores > al 0.05 por lo tanto se rechaza presencia de autocorrelación en los residuos (diapositiva: 43).

c) Además, se debe mencionar la cantidad de rezagos que tuvieron las variables y los criterios que se utilizaron para determinar dichos rezagos.
El Modelo de Ecuación Ley de Okun está definida como la relación funcional que existe del cambio Δ en la tasa de desempleo (TD) y la tasa de crecimiento de la economia GNP. TGNP= *ƒ*(ΔTD, D07,D18). Son variables dummys por cambios en la estructura de la serie de tiempo. El Modelo Dinámico Estructural de corto plazo esta especificado con los rezagos en sus variables cualidad que lo hacen dinámico por definición. El modelo se resuelve simultáneamente por el método (SUR) Seemingly Unrelated Regression.

d) También, se debe indicar el modelo que se utilizó para realizar dichas estimaciones. Por ejemplo: podrían haberse utilizado varios modelos incluyendo ARIMA y ARMA.
Se utilizó el Modelo ARIMA para proyectar la tasa de desempleo TD. Ver Modelo ARIMA en "diapositiva 38-39".

e) Cualquier otra información relacionada a la metodología o metodologías utilizadas que la Junta de Planificación considere importante.
Se incluyen los modelos de las Proyecciones Económicas a Largo Plazo producidas por la JP en diapositiva 31 al 46. Se observará el Modelo de Ley de Okun, Pruebas de Correlación, Correlograma de Ecuación Ley de Okun, Convergencias y Solución del Modelo de Ley de Okun para Largo Plazo.

Cabe destacar, que en la presentación adjunta se incluye desde el Modelo Original de proyecciones económicas a corto plazo hasta los modelos actuales validados por el Departamento del Tesoro de los Estados Unidos, pruebas econométricas principales y el proceso metodológico del modelo econométrico de las proyecciones a largo plazo.

De tener dudas o necesitar información adicional en este u otro particular puede comunicarse con el que suscribe al 787-723-6200 extensiones 16126 16649 o 16665.

Reiteramos nuestro compromiso de servicio a Puerto Rico.

Cordialmente,

Plan. Julio Lassús Ruiz, LLM, MP, PPL
Presidente

Anejo

PETICION DE INFORMACION: 2023-0024

DEL SENADO DE PUERTO RICO A LA JUNTA DE PLANIFICACION

ECONOMETRIC FORECASTING TO PORTRAY THE PR EVOLVING ECONOMY

Puerto Rico Planning Board

Plan. Julio Lassús Ruiz – Chairman

January 19, 2023

AGENDA

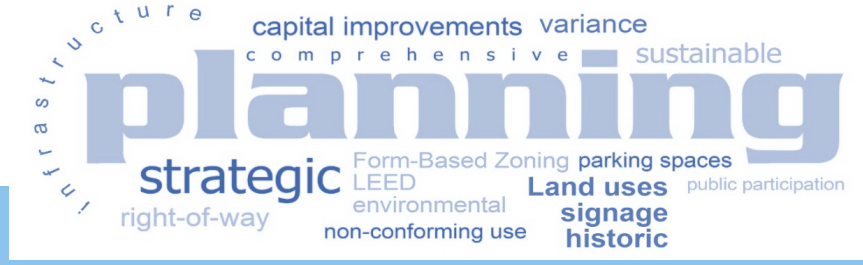
WHO WE ARE?

WHAT WE DO?

ECONOMETRIC FORECASTING TO PORTRAY THE PR EVOLVING ECONOMY

CHALLENGES

WHO WE ARE & WHAT WE DO?



The Planning Board (PRPB) - created by Law # 213 of May 12, 1942, as part of the Office of the Governor. Act 75 of 1975 as amended, states present responsibilities, which in summary are embodied in the following annual documents to the Governor and the Legislature:

- The Integral Development Plan;
- The Four Year Investment Program;
- The Economic Report to the Governor
- Regional Plans; Land Use Plans;
- Zoning Maps and Regulations.
- By law, the PRPB also has the responsibility of preparing the economic accounts for Puerto Rico on an annual basis.

WHO WE ARE & WHAT WE DO?

All these documents in the areas of physical, economic and social planning assist policy making in Puerto Rico and are aimed at achieving balanced economic, social and infrastructure growth.

- **The Physical Planning Area** is in charge of formulating and designing the plans, regulations and guidelines, to stimulate an integrated and efficient use of land in Puerto Rico.
- The **Economic and Social Planning Program** is the official center that produces, collects, analyzes, and disseminates economic and social data of Puerto Rico. Its main function is to advise the Governor and the Legislature on economic and social matters.


ECONOMETRIC
FORECASTING

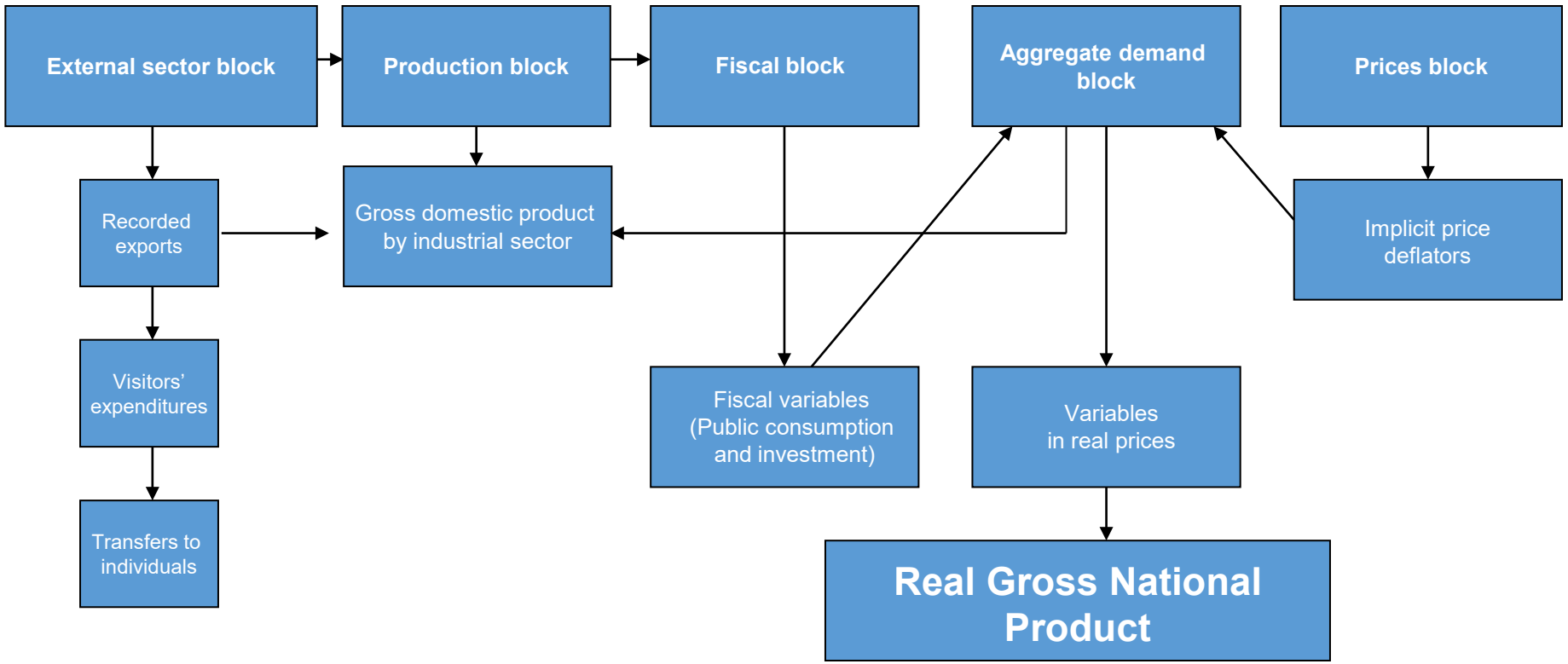
ECONOMETRIC MODELING SCENARIOS FOR PR

- THE ORIGINAL FORECASTING MODEL
- THE PRPB SHORT TERM NEW DYNAMIC FORECASTING MODEL
- FISCAL POLICY IMPLICATIONS
- APPLICATION OF OKUNS LAW FOR 10 YEAR FORECAST

THE ORIGINAL FORECASTING MODEL

The Structural Macroeconomic Model, known as Modular Stochastic Model (ECOMODULAR), consists of five blocks or modules: external sector block, production block, fiscal block, prices block and aggregate demand block.

The first step is to run the external sector block:



Oliver Blanchard, quoted in his intermediate macroeconomic book that the economic forecast is the most hard task performed by economists. Thus, it is not superfluous to have several alternative models to predict the course of the economy.

The NEW ECONOMETRIC DYNAMIC MODEL OF PUERTO RICO

includes two models to estimate the gross national product (GNP):

- ✓ **Aggregated production model in real prices**
- ✓ **Aggregated expenditure model in nominal prices**

Short Term Econometric Forecasting Models

Puerto Rico Planning Board hired the company *Econometrics and Statistics Research Inc.* (*ESR*), owned by Wilfredo Toledo, PhD to calibrate the Modular Stochastic Model (ECOMODULAR, for its acronym in Spanish). Also, to examine the properties of the NEW ECONOMETRIC DYNAMIC MODEL OF PUERTO RICO in order to decide other changes needed.

Dynamic forecasting consists of two small models for aggregate production in Puerto Rico: four multi-equation systems and two single equation in nominal terms (one for the government expenditures and the other for public construction investment). One of the models is based upon a real aggregate production function, using Gross National Product (GNP) as the output indicator. The other model has two systems of the main components of aggregate expenditure, in nominal terms and a system that defines the behavior of the GNP principal deflators. This last system is used to transform the nominal values, generated by these last two systems and the single equations, into real terms. All systems are solved simultaneously using the Seemingly Unrelated Regression (SUR) method.

Aggregated Production Model in Real Prices

Aggregated Production Model

This model represents the relationship between the factors of production and gross national product. It shows the aggregate production based on labor, capital and other inputs.

Variable descriptions		
Endogenous variables	**Local exogenous variables [1]**	**Non local exogenous variables [2]**
GNP	Salaries and wages	Prime rate at commercial banks
Employment	Transfer federal payment to individuals	Oil prices
Investment	Exports	
	Binary variables that reflect structural changes	

1) These variables are estimated using auxiliary models outside the systems.
2) The source of these projected variables is IHS Economics.

Aggregated Production Model Specification

- DLOG(PNBREAL) = c(1)*DLOG(PNBREAL(-1)) +C(5)*DLOG(INVERSIONREAL (0)) + + C(4)*DLOG(INVERSIONREAL (-1)) + C(7)*DLOG(LESTBLETOT1 (-1)) + C(8)*DLOG(LESTBLETOT1 (-2)) + C(10) + C(15)*D00 + C(16)*DLOG(SUELDYJOR/DCON) + C(17)*DLOG(EXPORTVENTAS) +c(18)*d02 + C(19)*DLOG(POIL(0)) +c(20)*d0121 +c(22)*d07*@trend

- DLOG(INVERSIONREAL) = C(21)*dlog(PNBREAL(-1)) + C(30) + C(31)*DLOG(LESTBLETOT1 (0)) +C(32)*D012 +C(35)*D(TBILL10YR(-1))

- DLOG(LESTBLETOT1) = C(46)*DLOG(INVERSIONREAL (-2)) + C(47)*DLOG(LESTBLETOT1 (-1)) + C(48)*DLOG(LESTBLETOT1 (-2)) + C(50) + C(53)*D(TBILL10YR(-1)) + C(55)*D00 + C(56)*DLOG(SUELDYJOR/DCON)

System: SYSTPRODREAL2
Estimation Method: Seemingly Unrelated Regression
Date: 04/29/16 Time: 10:17
Sample: 1981 2015
Included observations: 35
Total system (unbalanced) observations 101
Linear estimation after one-step weighting matrix

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.025037	0.129308	0.193620	0.8470
C(5)	0.023582	0.014644	1.610328	0.1115
C(4)	-0.021465	0.017838	-1.203370	0.2326
C(7)	0.316749	0.104408	3.033757	0.0033
C(8)	-0.104286	0.090607	-1.150976	0.2534
C(10)	-0.002189	0.003481	-0.628735	0.5314
C(15)	0.021013	0.006894	3.047947	0.0032
C(16)	0.344232	0.062949	5.468441	0.0000
C(17)	0.132776	0.031618	4.199337	0.0001
C(18)	-0.019009	0.005763	-3.298427	0.0015
C(19)	-0.006842	0.006328	-1.081221	0.2830
C(20)	0.018912	0.007072	2.674112	0.0092
C(22)	-0.000110	9.88E-05	-1.108798	0.2710
C(21)	-1.858476	0.798675	-2.326951	0.0226
C(30)	0.012360	0.019718	0.626816	0.5327
C(31)	3.447994	0.765701	4.503053	0.0000
C(32)	-0.039979	0.050968	-0.784392	0.4352
C(35)	-0.044871	0.015637	-2.869592	0.0053
C(46)	-0.018142	0.023756	-0.763673	0.4474
C(47)	0.536727	0.128791	4.167422	0.0001
C(48)	-0.238949	0.108441	-2.203500	0.0306
C(50)	0.003361	0.004645	0.723555	0.4716
C(53)	-0.002889	0.002340	-1.234373	0.2209
C(55)	-0.006024	0.006003	-1.003401	0.3189
C(56)	0.355207	0.088591	4.009523	0.0001

Determinant residual covariance	3.85E-11

Equation: DLOG(PNBREAL) = C(1)*DLOG(PNBREAL(-1)) +C(5)
*DLOG(INVERSIONREAL (0)) + + C(4)*DLOG(INVERSIONREAL (-1)) +
C(7)*DLOG(LESTBLETOT1 (-1)) + C(8)*DLOG(LESTBLETOT1 (-2)) +
C(10) + C(15)*D00 + C(16)*DLOG(SUELDYJOR/DCON) + C(17)
*DLOG(EXPORTVENTAS) +C(18)*D02 + C(19)*DLOG(POIL(0))
+C(20)*D0121 +C(22)*D07*@TREND
Observations: 33

R-squared	0.934282	Mean dependent var	0.014267
Adjusted R-squared	0.894851	S.D. dependent var	0.025633
S.E. of regression	0.008312	Sum squared resid	0.001382
Durbin-Watson stat	1.962158		

Equation: DLOG(INVERSIONREAL) = C(21)*DLOG(PNBREAL(-1)) + C(30)
+ C(31)*DLOG(LESTBLETOT1 (0)) +C(32)*D012 +C(35)
*D(TBILL10YR(-1))
Observations: 35

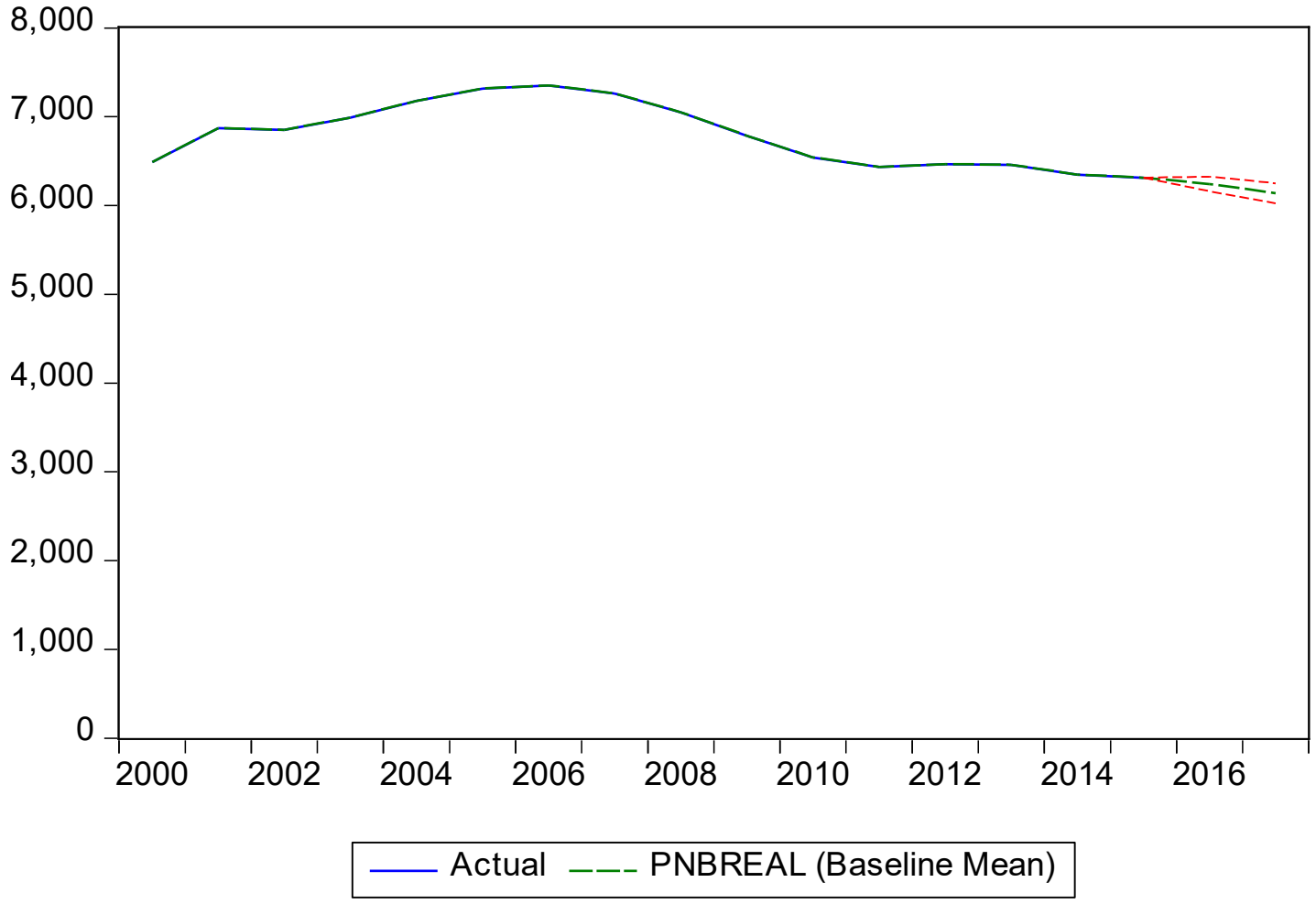
R-squared	0.604401	Mean dependent var	0.017859
Adjusted R-squared	0.551655	S.D. dependent var	0.147995
S.E. of regression	0.099095	Sum squared resid	0.294596
Durbin-Watson stat	2.135550		

Equation: DLOG(LESTBLETOT1) = C(46)*DLOG(INVERSIONREAL (-2)) +
C(47)*DLOG(LESTBLETOT1 (-1)) + C(48)*DLOG(LESTBLETOT1 (-2))
+ C(50) + C(53)*D(TBILL10YR(-1)) + C(55)*D00 + C(56)
*DLOG(SUELDYJOR/DCON)
Observations: 33

R-squared	0.800012	Mean dependent var	0.009612
Adjusted R-squared	0.753861	S.D. dependent var	0.027192
S.E. of regression	0.013490	Sum squared resid	0.004732
Durbin-Watson stat	2.425081		

E VIEWS Output

Real Gross National Product – Short Term



Aggregated Expenditure Model in Nominal Prices

Aggregated Expenditure Model in Nominal Prices

The model is part of the identity: aggregate expenditure = **consumption + investment + government expenditure + exports – imports.** Also, the model: predicts the disposable personal income, contains a system that describes the pattern of the principal GNP deflators, and is used to convert the nominal values generated by the model into real prices.

Variables descriptions		
Endogenous variables	**Local exogenous variables [1]**	**Non local exogenous variables [2]**
Consumption of durable goods	Federal tranfers payment to person	Oil prices
Consumption of non durable goods	Dichotomous variables to model structural changes	Fed funf rate
Consumption of services	Employment	
Salaries and wages	Investment	
Exports	GNP deflators	
Imports	Tendency variables	
Disposable personal income	Population	

1) These variables are estimated using auxiliary models outside the systems.
2) The source of these projected variables is IHS Economics.

Aggregated Expenditure Model Specification

- DLOG(CONSNODUR) =C(6)* DLOG(CONSNODUR(-1)) + C(8)*DLOG(SUELDYJOR(-1)) + C(9) + C(10)*DLOG(IMPORTCOMPRAS(0))+C(11)*D04+ C(12)* DLOG(CONSNODUR(-2)) + C(13)*D(FEDFUND)+ C(14)*DLOG(SUELDYJOR(-2)) + C(16)*D012 +c(17)*d0961 +c(18)*d0121

- DLOG(CONSUMOSERV) = C(25)*DLOG(CONSUMOSERV(-1)) + C(26)*DLOG(TOTAL_TRANSF__FED__RECIB(-1)) + C(29)*DLOG(SUELDYJOR(-2)) + C(31) + C(33)*D07

- DLOG(CONSUDUR)= C(45)*DLOG(CONSUDUR(-1)) + C(47)*DLOG(TOTAL_TRANSF__FED__RECIB(-1)) + C(51) + + C(55)*D(FEDFUND(-1)) + C(56)*D00 +C(58)*D012*@TREND

- DLOG(SUELDYJOR) = C(87)*DLOG(TOTAL_TRANSF__FED__RECIB(-1)) + C(91) + C(94)*DLOG(LESTBLETOT1(-1)) + C(95)*D(FEDFUND) + C(99)*DLOG(POIL(-1)) + C(101)*DLOG(POBLA)

- DLOG(YDPADJ)= C(105)*DLOG(LESTBLETOT1(-1))+ C(107)*DLOG(POIL(0)) + + C(111) + C(114)*DLOG(FEDFUND(0)) +C(116)*D012*@TREND +C(117)*D011*@TREND

- DLOG(EXPORTVENTAS)= C(120) +C(121)*DLOG(IMPORTCOMPRAS(0)) + C(124)*D00*@trend + + C(126)*DLOG(DLEFLAINVTOT1* INVERSIONREAL(-2)) + c(127)*dlog(poil(0))

- DLOG(IMPORTCOMPRAS)= C(130) + C(131)*D07 + C(132)*DLOG(LESTBLETOT1(-1)) +C(137)*DLOG(DPNB(-1))+C(138)*D(FEDFUND(-1)) +C(139)*DLOG(IMPORTCOMPRAS(-1))

Aggregated Expenditure Model Specification (Cont.)

- DLOG(CONSTRUEMPPU) = C(1)*DLOG(CONSTRUEMPPU(-1)) + C(2)*DLOG(CONSTRUEMPPU(-2)) + C(11)*DLOG(INVMAQUITOT(-2)) + C(13) + C(15)*DLOG(LESTBLETOT1(-1)) + C(25)*DELECIO

- DLOG(CONSTRUPIRV) = C(57) + C(50)*DLOG(CONSTRUPIRV(-1)) + C(59)*DLOG(LESTBLETOT1(0)) + C(60)*D92 + C(63)*D(TBILL10YR (-1)) + c(64)*dlog(poil(-1))

- DLOG(INVMAQUITOT) = + C(76)*DLOG(INVMAQUITOT(-1)) + C(77) + C(78)*D95*@TREND + C(79)*DLOG(LESTBLETOT1(0)) +C(80)*D012 + c(81)*d011 +c(82)*d991 +c(83)*d(fedfund(-1)) +c(84)*d07

- CAMINV= C(90) +C(94)*CAMINV(-1) + C(95)*CAMINV(-2)

Aggregated Expenditure Model Specification (Cont.)

- DLOG(DCON) = C(1)*DLOG(DCON(-1)) + C(6) + + C(9)*D95 + C(11)*DLOG(POIL(-1)) + C(12)*PNBREALGAP(-1) + C(13)*D(FEDFUND(-1))

- DLOG(DEFLAEXPORT) = + C(15)*DLOG(DEFLAEXPORT(-1)) + C(18)*DLOG(DPNB(-1)) + C(19) + C(20)*D00 +C(22)*D95 + C(23)*D07 + C(24)*DLOG(POIL(-2)) + C(25)*PNBREALGAP(-1) + C(26)*D(FEDFUND(0))

- DLOG(DFLAGOBTOT) = C(27)*DLOG(DCON(-1)) + C(29)*DLOG(DFLAGOBTOT(-1)) + C(32) + C(34)*D85 + C(37)*DLOG(POIL(-1)) + C(38)*PNBREALGAP(-1) + C(39)*D(FEDFUND(-1))+C(40)*DLOG(DFLAGOBTOT(-2))

- DLOG(DLEFLAINVTOT1) = + C(43)*DLOG(DLEFLAINVTOT1(-1)) + C(45) + C(46)*D00 + C(47)*D85 + C(49)*D07 + C(50)*DLOG(POIL(-1)) + C(51)*DLOG(POIL(0))

- DLOG(DPNB) = + C(57)*DLOG(DPNB(-1)) +C(59) + C(61)*D00 + C(65)*DLOG(POIL(-1)) + C(66)*PNBREALGAP(-2) + C(67)*D(FEDFUND(0)) +c(68)*d02 +c(69)*d07*@trend

System: SYSGASTONOMINAL1
Estimation Method: Seemingly Unrelated Regression
Date: 04/29/16 Time: 10:19
Sample: 1978 2015
Included observations: 38
Total system (unbalanced) observations 254
Linear estimation after one-step weighting matrix

	Coefficient	Std. Error	t-Statistic	Prob.
C(6)	0.185586	0.113497	1.635162	0.1035
C(8)	0.322186	0.120954	2.663707	0.0083
C(9)	-0.012184	0.013782	-0.884056	0.3777
C(10)	0.342275	0.104940	3.261641	0.0013
C(11)	0.040749	0.010962	3.717411	0.0003
C(12)	-0.161314	0.084652	-1.905613	0.0581
C(13)	-0.002269	0.002364	-0.959816	0.3383
C(14)	0.215047	0.126664	1.697771	0.0910
C(16)	-0.026264	0.011773	-2.230926	0.0267
C(17)	0.055460	0.016849	3.291609	0.0012
C(18)	0.047633	0.018224	2.613821	0.0096
C(25)	0.098332	0.108811	0.903690	0.3672
C(26)	0.255514	0.058269	4.385074	0.0000
C(29)	-0.106328	0.109205	-0.973661	0.3313
C(31)	0.059247	0.010385	5.705212	0.0000
C(33)	-0.053690	0.009835	-5.459040	0.0000
C(45)	0.301003	0.137086	2.195728	0.0292
C(47)	-0.375334	0.192747	-1.947286	0.0528
C(51)	0.068398	0.019624	3.485465	0.0006
C(55)	-0.013232	0.005185	-2.551832	0.0114
C(56)	-0.041203	0.019546	-2.107948	0.0362
C(58)	-0.000143	0.000484	-0.296052	0.7675
C(87)	-0.091876	0.081592	-1.126035	0.2614
C(91)	0.037147	0.005777	6.429962	0.0000

	Coefficient	Std. Error	t-Statistic	Prob.
C(91)	0.037147	0.005777	6.429962	0.0000
C(94)	0.515969	0.127046	4.061269	0.0001
C(95)	0.000835	0.002531	0.329869	0.7418
C(99)	-0.029356	0.015928	-1.843098	0.0667
C(105)	0.699334	0.304624	2.295729	0.0227
C(107)	0.089987	0.036835	2.442962	0.0154
C(111)	0.062993	0.009963	6.322803	0.0000
C(114)	-0.004768	0.018622	-0.256034	0.7982
C(116)	-0.000739	0.000386	-1.915436	0.0568
C(117)	0.001165	0.000856	1.360422	0.1752
C(120)	-0.012776	0.009407	-1.358083	0.1759
C(121)	1.185688	0.097540	12.15586	0.0000
C(124)	0.000278	0.000167	1.661893	0.0980
C(126)	0.053215	0.025045	2.124779	0.0348
C(127)	0.008349	0.017225	0.484719	0.6284
C(130)	0.072017	0.024468	2.943342	0.0036
C(131)	-0.064066	0.020099	-3.187577	0.0017
C(132)	0.251643	0.364273	0.690809	0.4904
C(137)	0.093306	0.477168	0.195541	0.8452
C(138)	0.001452	0.005022	0.289030	0.7728
C(139)	-0.186843	0.207978	-0.898380	0.3700
Determinant residual covariance		6.34E-23		

Equation: DLOG(CONSNODUR) =C(6)* DLOG(CONSNODUR(-1)) + C(8) *DLOG(SUELDYJOR(-1)) + C(9) + C(10)*DLOG(IMPORTCOMPRAS(0))+C(11)*D04+ C(12)* DLOG(CONSNODUR(-2)) + C(13)*D(FEDFUND) + C(14)*DLOG(SUELDYJOR(-2)) + C(16)*D012 +C(17)*D0961 +C(18) *D0121

Observations: 38

R-squared	0.629885	Mean dependent var	0.046131
Adjusted R-squared	0.492805	S.D. dependent var	0.029737
S.E. of regression	0.021178	Sum squared resid	0.012110
Durbin-Watson stat	2.334047		

Equation: DLOG(CONSUMOSERV) = C(25)*DLOG(CONSUMOSERV(-1)) + C(26)*DLOG(TOTAL_TRANSF__FED__RECIB(-1)) + C(29) *DLOG(SUELDYJOR(-2)) + C(31) + C(33)*D07

Observations: 38

R-squared	0.694899	Mean dependent var	0.064276
Adjusted R-squared	0.657917	S.D. dependent var	0.030814
S.E. of regression	0.018022	Sum squared resid	0.010718
Durbin-Watson stat	2.392925		

Equation: DLOG(CONSUDUR)= C(45)*DLOG(CONSUDUR(-1)) + C(47) *DLOG(TOTAL TRANSF FED RECIB(-1)) + C(51) + + C(55) *D(FEDFUND(-1)) + C(56)*D00 +C(58)*D012*@TREND

Observations: 38

R-squared	0.376245	Mean dependent var	0.041509
Adjusted R-squared	0.278783	S.D. dependent var	0.068263
S.E. of regression	0.057972	Sum squared resid	0.107544
Durbin-Watson stat	2.077052		

Equation: DLOG(SUELDYJOR) = +C(87)*DLOG(TOTAL TRANSF FED RECIB(-1)) + C(91) + C(94)*DLOG(LESTBLETOT1(-1)) + C(95) *D(FEDFUND) + C(99)*DLOG(POIL(-1)) + 1.43*DLOG(POBLA)

Observations: 34

R-squared	0.634836	Mean dependent var	0.038053
Adjusted R-squared	0.584469	S.D. dependent var	0.034646
S.E. of regression	0.022333	Sum squared resid	0.014465
Durbin-Watson stat	1.999830		

Equation: DLOG(YDPADJ)= C(105)*DLOG(LESTBLETOT1(-1))+ C(107) *DLOG(POIL(0)) + + C(111) + C(114)*DLOG(FEDFUND(0)) +C(116) *D012*@TREND +C(117)*D011*@TREND

Observations: 34

R-squared	0.353330	Mean dependent var	0.068194
Adjusted R-squared	0.237854	S.D. dependent var	0.057456
S.E. of regression	0.050159	Sum squared resid	0.070447
Durbin-Watson stat	2.644843		

Equation: DLOG(EXPORTVENTAS)= C(120) +C(121)*DLOG(IMPORTCOM PRAS(0)) + C(124)*D00*@TREND + + C(126)*DLOG(DLEFLAINVTOT1 * INVERSIONREAL(-2)) + C(127)*DLOG(POIL(0))

Observations: 38

R-squared	0.852129	Mean dependent var	0.065779
Adjusted R-squared	0.834206	S.D. dependent var	0.060931
S.E. of regression	0.024810	Sum squared resid	0.020312
Durbin-Watson stat	2.363184		

Equation: DLOG(IMPORTCOMPRAS)= C(130) + C(131)*D07 + C(132) *DLOG(LESTBLETOT1(-1)) +C(137)*DLOG(DPNB(-1))+C(138) *D(FEDFUND(-1)) +C(139)*DLOG(IMPORTCOMPRAS(-1))

Observations: 34

R-squared	0.401644	Mean dependent var	0.050074
Adjusted R-squared	0.294795	S.D. dependent var	0.045450
S.E. of regression	0.038167	Sum squared resid	0.040789
Durbin-Watson stat	1.864423		

System: SYSGASTONOMINAL2
Estimation Method: Seemingly Unrelated Regression
Date: 04/29/16 Time: 10:28
Sample: 1980 2015
Included observations: 36
Total system (unbalanced) observations 140
Linear estimation after one-step weighting matrix

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.179758	0.188649	-0.952868	0.3426
C(2)	-0.424812	0.163039	-2.605586	0.0104
C(11)	0.365888	0.328840	1.112663	0.2682
C(13)	-0.038086	0.035161	-1.083214	0.2810
C(15)	2.562254	1.409533	1.817803	0.0717
C(25)	0.104545	0.061938	1.687907	0.0941
C(57)	0.009958	0.031464	0.316488	0.7522
C(50)	0.300419	0.155054	1.937506	0.0551
C(59)	1.583312	0.857933	1.845497	0.0675
C(60)	0.013149	0.037857	0.347348	0.7290
C(63)	-0.010983	0.018538	-0.592469	0.5547
C(64)	-0.150949	0.083794	-1.801439	0.0742
C(76)	-0.229815	0.114913	-1.999898	0.0478
C(77)	0.054445	0.014936	3.645238	0.0004
C(78)	-0.000902	0.000347	-2.603735	0.0104
C(79)	3.213015	0.408567	7.864099	0.0000
C(80)	-0.064456	0.028299	-2.277669	0.0246
C(81)	-0.037305	0.043606	-0.855511	0.3940
C(82)	0.181229	0.043901	4.128089	0.0001
C(83)	-0.013847	0.005030	-2.752901	0.0069
C(84)	0.073011	0.026749	2.729528	0.0073
C(90)	249.4401	65.63788	3.800246	0.0002
C(94)	0.184257	0.161310	1.142254	0.2557
C(95)	-0.068008	0.159722	-0.425792	0.6710
Determinant residual covariance		0.009129		

Equation: DLOG(CONSTRUEMPPU) = C(1)*DLOG(CONSTRUEMPPU(-1)) + C(2)*DLOG(CONSTRUEMPPU(-2)) + C(11)*DLOG(INVMAQUITOT(-2)) + C(13) + C(15)*DLOG(LESTBLETOT1(-1)) + C(25)*DELECIO
Observations: 34

R-squared	0.355645	Mean dependent var	0.012914
Adjusted R-squared	0.240582	S.D. dependent var	0.174091
S.E. of regression	0.151711	Sum squared resid	0.644452
Durbin-Watson stat	2.090853		

Equation: DLOG(CONSTRUPIRV) = C(57) + C(50)*DLOG(CONSTRUPIRV(-1)) + C(59)*DLOG(LESTBLETOT1(0)) + C(60)*D92 + C(63)*D(TBILL10YR (-1)) + C(64)*DLOG(POIL(-1))
Observations: 35

R-squared	0.469733	Mean dependent var	0.037683
Adjusted R-squared	0.378308	S.D. dependent var	0.137578
S.E. of regression	0.108477	Sum squared resid	0.341248
Durbin-Watson stat	2.032283		

Equation: DLOG(INVMAQUITOT) = + C(76)*DLOG(INVMAQUITOT(-1)) + C(77) + C(78)*D95*@TREND + C(79)*DLOG(LESTBLETOT1(0)) +C(80)*D012 + C(81)*D011 +C(82)*D991 +C(83)*D(FEDFUND(-1)) +C(84)*D07
Observations: 35

R-squared	0.802547	Mean dependent var	0.056272
Adjusted R-squared	0.741792	S.D. dependent var	0.100538
S.E. of regression	0.051087	Sum squared resid	0.067858
Durbin-Watson stat	2.000688		

Equation: CAMINV= C(90) +C(94)*CAMINV(-1) + C(95)*CAMINV(-2)
Observations: 36

R-squared	0.036150	Mean dependent var	281.4658
Adjusted R-squared	-0.022265	S.D. dependent var	200.8283
S.E. of regression	203.0517	Sum squared resid	1360590.
Durbin-Watson stat	1.979760		

E VIEWS Output

System: SYDEFLACTORES
Estimation Method: Seemingly Unrelated Regression
Date: 04/29/16 Time: 10:29
Sample: 1980 2015
Included observations: 36
Total system (unbalanced) observations 175
Linear estimation after one-step weighting matrix

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.314488	0.113148	2.779429	0.0062
C(6)	0.018939	0.005473	3.460379	0.0007
C(9)	-0.005729	0.004887	-1.172357	0.2431
C(11)	0.012383	0.011741	1.054748	0.2934
C(12)	3.49E-05	1.71E-05	2.040735	0.0432
C(13)	0.001057	0.001500	0.704877	0.4821
C(15)	0.189080	0.107775	1.754397	0.0816
C(18)	0.633190	0.227848	2.778996	0.0062
C(19)	0.004984	0.009227	0.540143	0.5900
C(20)	-0.040079	0.010905	-3.675390	0.0003
C(22)	0.022470	0.009129	2.461353	0.0151
C(23)	0.023185	0.008592	2.698327	0.0078
C(24)	0.027656	0.014565	1.898807	0.0597
C(25)	4.32E-05	2.44E-05	1.769784	0.0790
C(26)	0.010817	0.001836	5.889988	0.0000
C(27)	-0.343026	0.238613	-1.437586	0.1528
C(29)	0.992200	0.171152	5.797187	0.0000
C(32)	0.024409	0.018884	1.292578	0.1983
C(34)	-0.017272	0.015218	-1.134991	0.2584
C(37)	-0.001063	0.017825	-0.059639	0.9525
C(38)	4.08E-05	2.73E-05	1.495589	0.1371
C(39)	-0.002402	0.002165	-1.109211	0.2693
C(40)	-0.162931	0.129702	-1.256196	0.2112
C(43)	-0.633866	0.138605	-4.573195	0.0000
C(45)	0.091475	0.011698	7.819993	0.0000
C(46)	-0.053589	0.010286	-5.210093	0.0000
C(47)	-0.045117	0.010027	-4.499295	0.0000
C(49)	0.014077	0.008974	1.568635	0.1190
C(50)	0.048443	0.014076	3.441613	0.0008
C(51)	0.055437	0.014276	3.883268	0.0002
C(57)	0.578027	0.092346	6.259365	0.0000
C(59)	0.017833	0.004031	4.423817	0.0000
C(61)	0.004152	0.004777	0.869081	0.3863
C(65)	-0.003321	0.005978	-0.555535	0.5794
C(66)	4.09E-05	9.11E-06	4.491657	0.0000
C(67)	0.002856	0.000836	3.414898	0.0008
C(68)	-0.010355	0.005592	-1.851842	0.0662
C(69)	4.68E-05	6.05E-05	0.772361	0.4412

Determinant residual covariance	1.07E-19

Equation: DLOG(DCON) = C(1)*DLOG(DCON(-1)) + C(6) + + C(9)*D95 + C(11)*DLOG(POIL(-1)) + C(12)*PNBREALGAP(-1) + C(13) *D(FEDFUND(-1))
Observations: 35

R-squared	0.564142	Mean dependent var	0.024016
Adjusted R-squared	0.488994	S.D. dependent var	0.019324
S.E. of regression	0.013814	Sum squared resid	0.005534
Durbin-Watson stat	2.482537		

Equation: DLOG(DEFLAEXPORT) = + C(15)*DLOG(DEFLAEXPORT(-1)) + C(18)*DLOG(DPNB(-1)) + C(19) + C(20)*D00 +C(22)*D95 + C(23)*D07 + C(24)*DLOG(POIL(-2)) + C(25)*PNBREALGAP(-1) + C(26) *D(FEDFUND(0))
Observations: 35

R-squared	0.719833	Mean dependent var	0.037048
Adjusted R-squared	0.633628	S.D. dependent var	0.030863
S.E. of regression	0.018681	Sum squared resid	0.009074
Durbin-Watson stat	2.035967		

Equation: DLOG(DFLAGOBTOT) = C(27)*DLOG(DCON(-1)) + C(29) *DLOG(DFLAGOBTOT(-1)) + C(32) + C(34)*D85 + C(37)*DLOG(POIL(-1)) + C(38)*PNBREALGAP(-1) + C(39)*D(FEDFUND(-1))+C(40) *DLOG(DFLAGOBTOT(-2))
Observations: 35

R-squared	0.464962	Mean dependent var	0.020386
Adjusted R-squared	0.326249	S.D. dependent var	0.026854
S.E. of regression	0.022043	Sum squared resid	0.013119
Durbin-Watson stat	1.909001		

Equation: DLOG(DLEFLAINVTOT1) = + C(43)*DLOG(DLEFLAINVTOT1(-1)) + C(45) + C(46)*D00 + C(47)*D85 + C(49)*D07 + C(50)*DLOG(POIL(-1)) + C(51)*DLOG(POIL(0))
Observations: 36

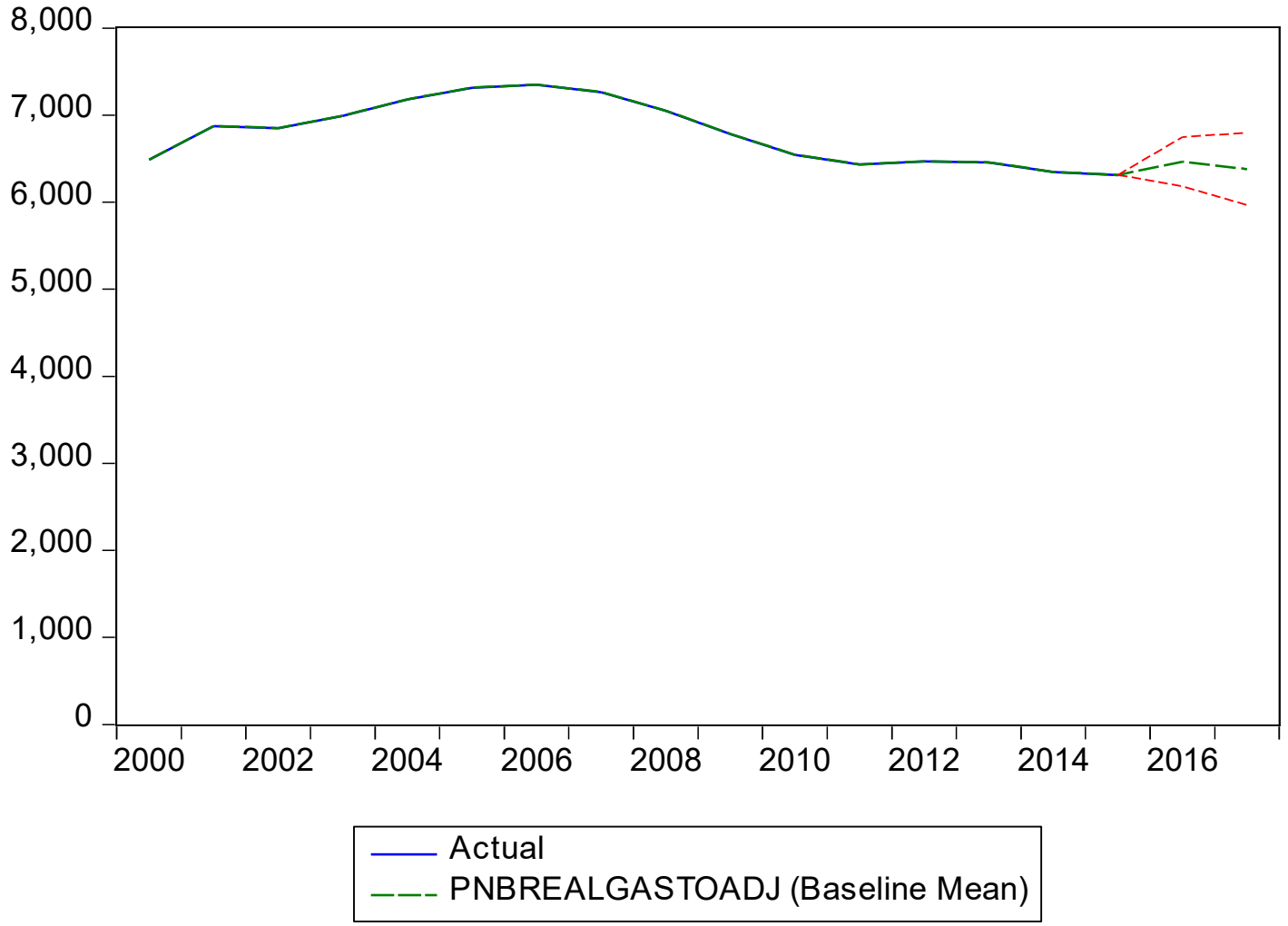
R-squared	0.636401	Mean dependent var	0.021172
Adjusted R-squared	0.561174	S.D. dependent var	0.027827
S.E. of regression	0.018434	Sum squared resid	0.009854
Durbin-Watson stat	2.009377		

Equation: DLOG(DPNB) = + C(57)*DLOG(DPNB(-1)) +C(59) + C(61)*D00 + C(65)*DLOG(POIL(-1)) + C(66)*PNBREALGAP(-2) + C(67) *D(FEDFUND(0)) +C(68)*D02 +C(69)*D07*@TREND
Observations: 34

R-squared	0.765654	Mean dependent var	0.037744
Adjusted R-squared	0.702561	S.D. dependent var	0.014312
S.E. of regression	0.007805	Sum squared resid	0.001584
Durbin-Watson stat	2.086607		

E VIEWS Output

Gross National Product with Aggregated Expenditure Model in Nominal Prices



Long term Scenarios

Long Term Projections (10 years):

PUERTO RICO ECONOMIC CHALLENGES AND APPROVED FISCAL PLAN COMMITMENTS

- In 2017, the US Treasury Department and the PRPB in their common interest of developed a new long term macroeconomic model (10 year) for Puerto Rico.
- Modeling incorporated the short term NEW ECONOMETRIC DYNAMIC MODEL (of the PRPB) , with variables of change using the OKUN model.

ECONOMIC SCENARIO PRESENTED BY PRPB USING RECOMMENDED GNP

- Additional modeling for 10-year forecast exercises are being performed using OKUN's law based on the ever-changing events inducing PR's economy.

- Applying OKUN's law a revised Real GNP is projected and used as reference in the behavior of other variables applied in the model.

- Data consistency checks are performed to ensure logic, accuracy and validate adequate economy portray.

Long Term Projections (10 years):

Table 1 -- Summary Table

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross National Product											
GNP ($millions)	70,658.3	73,314.6	75,541.1	78,270.5	81,403.6	84,644.4	87,947.6	93,864.2	97,451.8	101,182.3	105,319.8
GNP, Real (millions of 1954 dollars)	5,533.8	5,577.4	5,670.5	5,721.6	5,782.2	5,834.2	5,887.9	5,952.1	6,005.7	6,066.4	6,135.6
GNP price index (1954 = 100)	1,276.8	1,314.5	1,332.2	1,368.0	1,407.8	1,450.8	1,493.7	1,577.0	1,622.7	1,667.9	1,716.5
Gross National Product, %change											
GNP ($millions), %ch	0.7	3.8	3.0	3.6	4.0	4.0	3.9	6.7	3.8	3.8	4.1
GNP, Real (millions of 1954 dollars), %ch	**-2.0**	**0.8**	**1.7**	**0.9**	**1.1**	**0.9**	**0.9**	**1.1**	**0.9**	**1.0**	**1.1**
GNP price index (1954 = 100), %ch	2.7	2.9	1.3	2.7	2.9	3.1	3.0	5.6	2.9	2.8	2.9
Gross Domestic Product											
GDP ($millions)	103,897.9	107,869.2	111,780.2	115,773.9	120,389.3	125,106.6	129,714.6	137,054.4	142,222.8	147,647.3	153,652.3
GDP, Real (millions of 1954 dollars)	9,083.5	9,171.8	9,342.0	9,420.4	9,526.0	9,617.5	9,688.3	9,776.1	9,864.1	9,963.8	10,089.8
GDP price index (1954 = 100)	1,143.8	1,176.1	1,196.5	1,229.0	1,263.8	1,300.8	1,338.9	1,401.9	1,441.8	1,481.8	1,522.9
Gross Domestic Product, %change											
GDP ($millions), %ch	0.7	3.8	3.6	3.6	4.0	3.9	3.7	5.7	3.8	3.8	4.1
GDP, Real (millions of 1954 dollars), %ch	-1.8	1.0	1.9	0.8	1.1	1.0	0.7	0.9	0.9	1.0	1.3
GDP price index (1954 = 100), %ch	2.6	2.8	1.7	2.7	2.8	2.9	2.9	4.7	2.8	2.8	2.8
Labor and Employment											
Labor Force (1000s of persons)	1,083.8	1,072.9	1,022.2	1,038.1	1,059.1	1,080.9	1,105.7	1,130.3	1,156.1	1,180.4	1,204.1
Employment (1000s of persons)	1,002.2	1,003.8	1,022.2	1,038.1	1,059.1	1,080.9	1,105.7	1,130.3	1,156.1	1,180.4	1,204.1
Unemployment (1000s of persons)	81.6	69.1	62.9	63.9	62.1	62.5	61.6	61.9	61.1	61.2	60.4
Unemployment rate (percent)	7.5	6.4	5.8	5.8	5.5	5.5	5.3	5.2	5.0	4.9	4.8
Nonfarm Payroll employment (1000s of perso	892.7	890.5	907.1	923.6	941.3	960.1	982.4	1,004.6	1,027.3	1,048.8	1,070.0
Inflation and Price Variables											
Personal consumption exp price index	811.8	858.2	903.7	949.8	997.5	1,047.0	1,096.6	1,145.9	1,196.5	1,245.8	1,291.4
% change	5.7	5.7	5.3	5.1	5.0	5.0	4.7	4.5	4.4	4.1	3.7
Consumer price index (CPI)	119.6	120.0	120.4	120.8	121.2	121.5	121.7	121.9	122.2	122.4	122.7
% change	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2
Price of Oil (West Texas Intermediate Crude,	46.0	49.4	47.9	47.6	48.0	49.2	51.2	53.2	55.2	57.2	58.4
Additional Variables	70,951.2	70,960.6	72,122.4	72,749.8	73,503.5	74,152.3	74,822.2	75,625.2	76,297.1	77,056.1	77,912.5
Merchandise Exports (Adjusted)	63,676.0	64,758.0	66,020.0	66,678.0	67,301.0	67,901.0	68,339.0	68,832.0	69,173.0	69,748.0	70,165.0
% change	-3.4	1.7	1.9	1.0	0.9	0.9	0.6	0.7	0.5	0.8	0.6
Visitor expenditures	2,778.0	2,878.0	2,996.0	3,121.0	3,249.0	3,376.0	3,512.0	3,649.0	3,790.0	3,946.0	4,100.0
% change	-4.9	3.6	4.1	4.2	4.1	3.9	4.0	3.9	3.9	4.1	3.9
Federal Transfers to Persons	25,141.2	29,153.2	26,892.6	27,238.1	27,921.4	28,609.8	29,286.5	30,787.5	31,476.9	32,176.0	32,965.1
% change	4.2	16.0	-7.8	1.3	2.5	2.5	2.4	5.1	2.2	2.2	2.5
Interest rate (Prime rate)	3.00	3.15	3.15	3.25	3.50	4.00	4.25	4.50	5.00	5.25	5.50

The Planning Board provides information on three major topics related to development and sustainability: economy, land and human resources. All the information requirements needed to promote the financial stability, economic growth, management responsibility, and service delivery efficiency of Puerto Rico are part of the Planning Board daily agenda.

APPENDIX

Sistema del modelo dinámico de producto bruto real

DLOG(PNBREAL) = c(1)*dlog(pnbreal(-1))
+C(5)*DLOG(INVERSIONREAL (0)) + +
C(4)*DLOG(INVERSIONREAL (-1)) + C(7)*DLOG(LESTBLETOT1 (-1))
+ C(8)*DLOG(LESTBLETOT1 (-2)) + C(10) + C(15)*D00 +
C(16)*DLOG(SUELDYJOR/DCON) + C(17)*DLOG(EXPORTVENTAS)
+c(18)*d02 + C(19)*DLOG(POIL(0)) +c(20)*d0121
+c(22)*d07*@trend

DLOG(INVERSIONREAL) = C(21)*dlog(PNBREAL(-1)) + C(30) +
C(31)*DLOG(LESTBLETOT1 (0)) +C(32)*D012
+C(35)*D(TBILL10YR(-1))

DLOG(LESTBLETOT1) = C(46)*DLOG(INVERSIONREAL (-2)) +
C(47)*DLOG(LESTBLETOT1 (-1)) + C(48)*DLOG(LESTBLETOT1 (-2))
+ C(50) + C(53)*D(TBILL10YR(-1)) + C(55)*D00 +
C(56)*DLOG(SUELDYJOR/DCON) +c(57)*dehur

Output del Sistema del modelo dinámico de producto bruto real

System: SYSTPRODREAL3
Estimation Method: Seemingly Unrelated Regression
Date: 01/20/23 Time: 10:24
Sample: 1981 2020
Included observations: 40
Total system (unbalanced) observations 116
Linear estimation after one-step weighting matrix

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.170494	0.123365	-1.382027	0.1704
C(5)	-0.002718	0.011770	-0.230945	0.8179
C(4)	0.027781	0.011445	2.427265	0.0172
C(7)	0.078561	0.102555	0.766037	0.4457
C(8)	0.143394	0.076178	1.882343	0.0630
C(10)	0.000871	0.004134	0.210770	0.8335
C(15)	0.023482	0.007604	3.088162	0.0027
C(16)	0.392570	0.071634	5.480246	0.0000
C(17)	0.116548	0.029926	3.894487	0.0002
C(18)	-0.017535	0.006831	-2.567009	0.0119
C(19)	-0.017287	0.006783	-2.548558	0.0125
C(20)	0.023836	0.008048	2.961504	0.0039
C(22)	-0.000248	0.000103	-2.398176	0.0185
C(21)	-2.676859	0.941193	-2.844112	0.0055
C(30)	0.019486	0.025862	0.753461	0.4531
C(31)	3.852653	0.919717	4.188954	0.0001
C(32)	-0.005635	0.051621	-0.109160	0.9133
C(35)	-0.040924	0.020352	-2.010815	0.0473
C(46)	-0.033255	0.020381	-1.631628	0.1063
C(47)	0.429179	0.137225	3.127567	0.0024
C(48)	-0.136234	0.104797	-1.299983	0.1969
C(50)	0.003824	0.005051	0.757194	0.4509
C(53)	-0.001179	0.002438	-0.483789	0.6297
C(55)	-0.004400	0.006725	-0.654277	0.5146
C(56)	0.368409	0.092482	3.983582	0.0001
C(57)	0.007451	0.007132	1.044799	0.2989

Determinant residual covariance 1.09E-10

Equation: DLOG(PNBREAL) = C(1)*DLOG(PNBREAL(-1)) +C(5)
*DLOG(INVERSIONREAL (0)) + + C(4)*DLOG(INVERSIONREAL (-1))
+ C(7)*DLOG(LESTBLETOT1 (-1)) + C(8)*DLOG(LESTBLETOT1 (
-2)) + C(10) + C(15)*D00 + C(16)*DLOG(SUELDYJOR/DCON) +
C(17)*DLOG(EXPORTVENTAS) +C(18)*D02 + C(19)
*DLOG(POIL(0)) +C(20)*D0121 +C(22)*D07*@TREND
Observations: 38

R-squared	0.905216	Mean dependent var	0.009444
Adjusted R-squared	0.859720	S.D. dependent var	0.028210
S.E. of regression	0.010566	Sum squared resid	0.002791
Durbin-Watson stat	1.997422		

Equation: DLOG(INVERSIONREAL) = C(21)*DLOG(PNBREAL(-1)) +
C(30) + C(31)*DLOG(LESTBLETOT1 (0)) +C(32)*D012 +C(35)
*D(TBILL10YR(-1))
Observations: 40

R-squared	0.391040	Mean dependent var	0.020288
Adjusted R-squared	0.321445	S.D. dependent var	0.162867
S.E. of regression	0.134161	Sum squared resid	0.629970
Durbin-Watson stat	2.305461		

Equation: DLOG(LESTBLETOT1) = C(46)*DLOG(INVERSIONREAL (-2)) +
C(47)*DLOG(LESTBLETOT1 (-1)) + C(48)*DLOG(LESTBLETOT1 (
-2)) + C(50) + C(53)*D(TBILL10YR(-1)) + C(55)*D00 + C(56)
*DLOG(SUELDYJOR/DCON) +C(57)*DEHUR
Observations: 38

R-squared	0.720385	Mean dependent var	0.006927
Adjusted R-squared	0.655142	S.D. dependent var	0.027069
S.E. of regression	0.015896	Sum squared resid	0.007581
Durbin-Watson stat	2.378926		

Convergencia y solución del modelo dinámico del producto bruto real

Model: MODEL_FINAL_2021Y2022
Date: 03/24/21 Time: 15:02
Sample: 2021 2022
Solve Options:
Dynamic-Stochastic Simulation
Solver: Broyden
Max iterations = 5000, Convergence = 1e-08
Requested repetitions = 1000, Allow up to 2 percent failures
Solution does not account for coefficient uncertainty in linked equations
Track endogenous: mean, standard deviation, 95% confidence interval

Calculating Innovation Covariance Matrix
Sample: 1950 2020
Matrix scaled to equation specified variances

Scenario: Baseline
Solve begin 15:02:05
Repetitions 1-200: successful 15:02:05
Repetitions 201-400: successful 15:02:05
Repetitions 401-600: successful 15:02:05
Repetitions 601-800: successful 15:02:05
Repetitions 801-1000: successful 15:02:05
Solve complete 15:02:05
1000 successful repetitions, 0 failure(s)

Eviews output modelo dinámico corto plazo 2021 y 2022

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
PNBREAL										
Actuals	6,541.8	6,431.7	6,466.2	6,457.6	6,343.9	6,301.2	6,233.9	5,991.9	5,730.5	5,831.3
Baseline	6,541.8	6,431.7	6,466.2	6,457.6	6,343.9	6,301.2	6,233.9	5,991.9	5,730.5	5,831.3
Upper bound	--	--	--	--	--	--	--	--	--	--
Lower bound	--	--	--	--	--	--	--	--	--	--

	2020	2021	2022
PNBREAL			
Actuals	5,643.9	--	--
Baseline	5,643.9	5,533.8	5,577.4
Upper bound	--	5,651.9	5,737.5
Lower bound	--	5,424.0	5,427.0

Eviews output modelo dinámico corto plazo 2021 y 2022 tasas de crecimiento

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
PNBREAL										
Actuals	-3.57	-1.68	0.54	-0.13	-1.76	-0.67	-1.07	-3.88	-4.36	1.76
Baseline	-3.57	-1.68	0.54	-0.13	-1.76	-0.67	-1.07	-3.88	-4.36	1.76
Upper bound	--	--	--	--	--	--	--	--	--	--
Lower bound	--	--	--	--	--	--	--	--	--	--

	2020	2021	2022
PNBREAL			
Actuals	-3.21	--	--
Baseline	-3.21	-1.95	0.79
Upper bound	--	--	1.51
Lower bound	--	--	0.056

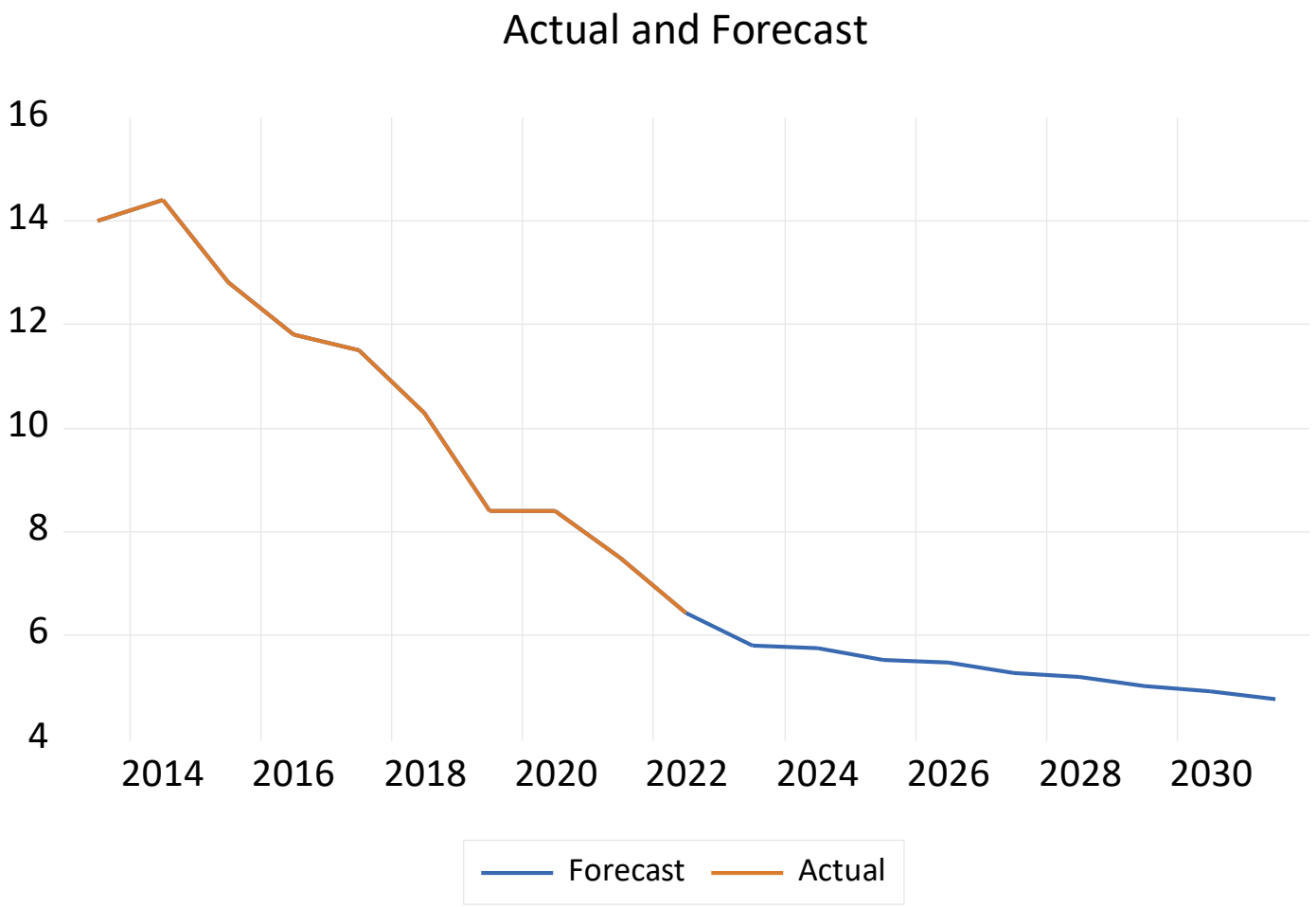
Modelo ARIMA para proyectar tasa de desempleo

Dependent Variable: DLOG(UNEMPLOYMENT_RATE)
Method: ARMA Maximum Likelihood (BFGS)
Date: 01/19/23 Time: 11:45
Sample: 1977 2022
Included observations: 46
Convergence achieved after 17 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.025172	0.022748	-1.106530	0.2749
AR(1)	-0.851648	0.146888	-5.797961	0.0000
MA(1)	1.380199	0.200634	6.879191	0.0000
MA(2)	0.590636	0.155960	3.787095	0.0005
SIGMASQ	0.006621	0.001616	4.096126	0.0002

R-squared	0.228813	Mean dependent var	-0.024196
Adjusted R-squared	0.153575	S.D. dependent var	0.093681
S.E. of regression	0.086188	Akaike info criterion	-1.944887
Sum squared resid	0.304561	Schwarz criterion	-1.746121
Log likelihood	49.73240	Hannan-Quinn criter.	-1.870428
F-statistic	3.041197	Durbin-Watson stat	2.036402
Prob(F-statistic)	0.027665		

Inverted AR Roots	-.85	
Inverted MA Roots	-.69-.34i	-.69+.34i


Actual and Forecast
16
14
12
10
8
6
4
2014
2016
2018
2020
2022
2024
2026
2028
2030
Forecast
Actual

Last updated: 01/19/23 - 11:45
Forecast of graficas y resultados arima tasa using automatic ARIMA ...
unemployment_rate.autoarma(forclen=9, agraph, atable, etable, fgr...

1976	
1977	19.9
1978	18.1
1979	17
1980	17.1
1981	19.9
1982	22.8
1983	23.4
1984	20.7
1985	21.8
1986	18.9
1987	16.8
1988	15
1989	14.6
1990	14.2
1991	16
1992	16.7
1993	17
1994	14.6
1995	13.7
1996	13.4
1997	13.5
1998	13.3
1999	11.7
2000	11
2001	10.4
2002	12.1
2003	12.1
2004	11.4
2005	10.6
2006	11.1
2007	10.6
2008	11.2
2009	13.7
2010	16.3
2011	16.2
2012	15.2
2013	14
2014	14.4
2015	12.8
2016	11.8
2017	11.5
2018	10.3
2019	8.4
2020	8.4
2021	7.5
2022	6.44
2023	5.80744796...
2024	5.75997009...
2025	5.53622900...
2026	5.46544472...
2027	5.27403028...
2028	5.18903269...
2029	5.02173147...
2030	4.92870382...
2031	4.77976388...

Ecuación Ley de Okun en Eviews

Dependent Variable: GNP
Method: Least Squares
Date: 01/19/23 Time: 11:30
Sample: 1978 2022
Included observations: 45

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.085985	0.242852	8.589538	0.0000
RATEDIF	-0.939369	0.138794	-6.768104	0.0000
D07	-3.820677	0.409754	-9.324327	0.0000
D18	-3.755019	1.337006	-2.808528	0.0076

R-squared	0.788857	Mean dependent var	0.925053
Adjusted R-squared	0.773407	S.D. dependent var	2.705739
S.E. of regression	1.287980	Akaike info criterion	3.428714
Sum squared resid	68.01457	Schwarz criterion	3.589307
Log likelihood	-73.14607	Hannan-Quinn criter.	3.488581
F-statistic	51.06030	Durbin-Watson stat	1.813641
Prob(F-statistic)	0.000000		

Prueba de correlación serial para la ecuación Ley de Okun

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.545360	Prob. F(2,39)	0.5840
Obs*R-squared	1.224283	Prob. Chi-Square(2)	0.5422

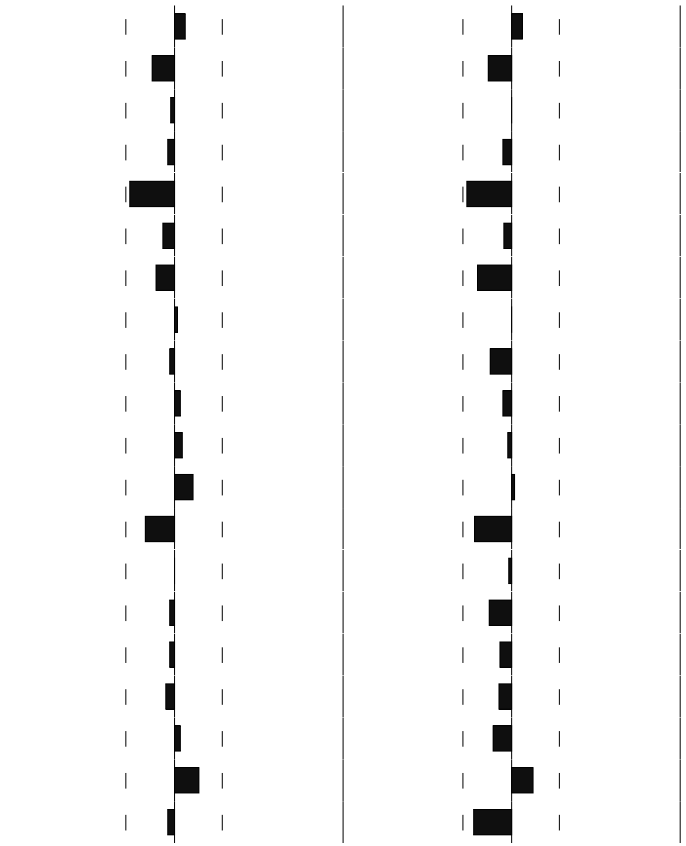
Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/19/23 Time: 15:34
Sample: 1978 2022
Included observations: 45
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.011599	0.246279	0.047098	0.9627
RATEDIF	0.014117	0.141555	0.099725	0.9211
D07	-0.020529	0.415844	-0.049367	0.9609
D18	0.065199	1.382381	0.047164	0.9626
RESID(-1)	0.091588	0.165390	0.553768	0.5829
RESID(-2)	-0.152783	0.165190	-0.924893	0.3607

R-squared	0.027206	Mean dependent var	-3.16E-16
Adjusted R-squared	-0.097511	S.D. dependent var	1.243296
S.E. of regression	1.302504	Akaike info criterion	3.490020
Sum squared resid	66.16415	Schwarz criterion	3.730908
Log likelihood	-72.52545	Hannan-Quinn criter.	3.579821
F-statistic	0.218144	Durbin-Watson stat	1.953487
Prob(F-statistic)	0.952639		

Correlograma de ecuación Ley de Okun

Date: 01/19/23 Time: 15:16
Sample: 1978 2022
Included observations: 45



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.073	0.073	0.2587	0.611
		2	-0.134	-0.140	1.1431	0.565
		3	-0.020	0.002	1.1625	0.762
		4	-0.036	-0.054	1.2282	0.873
		5	-0.272	-0.274	5.1301	0.400
		6	-0.071	-0.046	5.4001	0.494
		7	-0.113	-0.205	6.1112	0.527
		8	0.024	0.007	6.1454	0.631
		9	-0.031	-0.128	6.2031	0.719
		10	0.039	-0.050	6.2973	0.790
		11	0.055	-0.022	6.4846	0.839
		12	0.122	0.021	7.4368	0.827
		13	-0.174	-0.226	9.4371	0.739
		14	0.006	-0.016	9.4392	0.802
		15	-0.029	-0.132	9.4972	0.850
		16	-0.030	-0.066	9.5640	0.888
		17	-0.051	-0.077	9.7572	0.913
		18	0.039	-0.115	9.8779	0.936
		19	0.149	0.139	11.690	0.898
		20	-0.039	-0.233	11.818	0.922

Prueba de Dickey- Fuller Aumentada para raíz unitaria

Null Hypothesis: D(GNP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.657404	0.0000
Test critical values:	1% level	-3.584743	
	5% level	-2.928142	
	10% level	-2.602225	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GNP,2)
Method: Least Squares
Date: 01/19/23 Time: 18:02
Sample (adjusted): 1978 2022
Included observations: 45 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GNP(-1))	-1.166392	0.152322	-7.657404	0.0000
C	-0.083801	0.314115	-0.266785	0.7909

R-squared	0.576921	Mean dependent var	0.023519
Adjusted R-squared	0.567082	S.D. dependent var	3.199329
S.E. of regression	2.105047	Akaike info criterion	4.369979
Sum squared resid	190.5426	Schwarz criterion	4.450275
Log likelihood	-96.32454	Hannan-Quinn criter.	4.399913
F-statistic	58.63584	Durbin-Watson stat	2.020228
Prob(F-statistic)	0.000000		

Convergencia y solucion del modelo Ley Okun para largo plazo en Eviews

Model: MODEL_GNP_NUEVO_NELSON
Date: 01/19/23 Time: 14:57
Sample: 2023 2031
Solve Options:
Dynamic-Stochastic Simulation
Solver: Broyden
Max iterations = 5000, Convergence = 1e-08
Requested repetitions = 1000, Allow up to 2 percent failures
Solution does not account for coefficient uncertainty in linked equations
Track endogenous: mean, standard deviation, 95% confidence interval

Calculating Innovation Covariance Matrix
Sample: 1976 2022
Matrix scaled to equation specified variances

Scenario: Baseline
Solve begin 14:57:34
Repetitions 1-200: successful 14:57:34
Repetitions 201-400: successful 14:57:34
Repetitions 401-600: successful 14:57:34
Repetitions 601-800: successful 14:57:34
Repetitions 801-1000: successful 14:57:34
Solve complete 14:57:34
1000 successful repetitions, 0 failure(s)

Eviews output producto bruto real a largo plazo

2021 al 2031

	2021	2022	2023	2024	2025
GNP					
Actuals	-1.95	0.79	--	--	--
Baseline	-1.95	0.79	-1.06	-1.63	-1.46
Upper bound	--	--	1.67	0.90	1.06
Lower bound	--	--	-3.55	-4.03	-4.00

	2026	2027	2028	2029	2030
GNP					
Actuals	--	--	--	--	--
Baseline	-1.63	-1.52	-1.57	-1.55	-1.63
Upper bound	0.85	0.92	1.09	0.90	1.01
Lower bound	-4.13	-3.87	-4.04	-4.03	-4.12

	2031
GNP	
Actuals	--
Baseline	-1.49
Upper bound	1.14
Lower bound	-4.26