

TECHNICAL

NOTES & MANUALS

Solving the Canonical Quarterly Projection Model Using EViews

Sam Ouliaris and Céline Rochon

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Authorized for distribution by Natan Epstein

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I. Introduction

This technical note provides step-by-step instructions for solving the canonical quarterly projection model (QPM) using EViews.[1] The model illustrated is for "Country Z" but can be easily adapted to other countries.[2]

Users do not need to be proficient in the EViews programming language to calibrate and solve the canonical version of the QPM. All that is needed is the ability to collect the required data and to correctly modify existing EViews code (for example, selecting the appropriate equations for the exchange rate regime and setting the values of the key constants in the QPM). The EViews code that needs to be modified is explained in detail in the following sections.

This note focuses on the steps required to define the QPM using the EViews platform and on how to (1) solve the QPM for its baseline solution and (2) solve the QPM for an alternative solution (or scenario, involving one or more shocks) that, when compared with the baseline solution (produced here, by assumption, without shocks), provides an indication of the speed and trajectory of the economy's return to the baseline.[3]

A. Brief Review of the QPM[4]

The QPM is a standard model for monetary policy analysis. It was developed to provide analytical support for a "forecasting and policy analysis system" (FPAS) that assists in the formulation of forward-looking monetary policy.

The QPM is a semistructural New Keynesian gap model. It is a structural model in the sense that the equations have economic interpretations with parameters whose values are estimated or set outside the model. The model is also neo-Keynesian in that it incorporates real and nominal rigidities (Berg, Karam, and Laxton 2006). It also assumes that monetary policy is neutral over the long term.[5] In other words, monetary policy can affect the path of output around its equilibrium trajectory but cannot affect the level of output over the medium term, when output returns to its potential level.

The QPM is a gap model. It estimates gaps in output, inflation, the real interest rate, and the real exchange rate from targets (inflation), trends (real exchange rate), or equilibrium positions (potential output). The model itself does not attempt to explain movements in potential output or other trends but takes them as given. The model includes an endogenous monetary policy reaction function that suggests a path for interest rates, based on the estimated gaps.

1 EViews is an econometric software package sold and distributed by IHS Global Inc (http://www.eviews.com/). This manual is for EViews version 14 (or later). Please refer to Annex 1 for instructions on solving the quarterly projection model (QPM) using EViews 13.

2 The QPM presented in this manual has been used extensively in several IMF courses. It is a canonical version that can be tailored to specific economies. QPMs solved using EViews were developed for Tonga and Solomon Islands as part of the Institute for Capacity Development's forecasting and policy analysis system technical assistance projects.

3 Sometimes, the word "baseline" includes "judgment" in the form of non-zero shocks.

4 This section is based on Lindquist (2023).

5 Short-term forecasts are produced using near-term forecasting or nowcasting models, and medium-term forecasts are typically based on the QPM. The long term (steady state) is taken as given, and monetary policy is neutral.

The core model consists of four key behavioral equations:

- An aggregate demand equation in which the output gap, $\hat{y}_t$, is a function of output persistence, $\hat{y}_{t-1}$, a monetary conditions index, mci_t, the foreign output gap, $\hat{y}^*_t$, and an exogenous aggregate demand shock, ε^y_t. The monetary conditions index, mci_t, is a weighted average of the deviation of the real interest rate from its neutral rate, $\hat{r}_t$, optionally augmented by the credit premium, cr_{prem_t}, if any, and the deviation of the real effective exchange rate from its trend level, $\hat{z}_t$. Overall, the aggregate demand equation depends on five parameters that need to be calibrated (b_1, b_2, b_3, b_4, b_5):

$$\hat{y}_t = b_1\hat{y}_{t-1} - b_2 mci_t + b_3\hat{y}^*_t + \varepsilon^y_t$$

$$mci_t = b_4(\hat{r}_t + cr_prem_t) + (1 - b_4)(-\hat{z}_t)$$

$$cr_prem_t = b_5 cr_prem_{t-1} + (1 - b_5)\Delta cr_prem_t + \varepsilon^{cr_prem}_t.$$

- A Phillips curve equation, in which inflation, π_t, is a function of its persistence, π_{t-1}, inflationary expectations, $E_t\{\pi_{t+1}\}$, and real marginal costs, rmc_t that are a weighted average of the output gap, $\hat{y}_t$, (to capture the real marginal costs of domestic producers) and the real exchange rate gap, $\hat{z}_t$, (to capture the real marginal costs of importers), and exogenous cost-push shocks, ε^{π}_t. The standard forward-looking open-economy Phillips curve for core inflation (that is, the headline consumer price index [CPI] excluding food and oil components) depends on three parameters that need to be calibrated (a_1, a_2, a_3):

$$\pi^{core}_t = a_1\pi^{core}_{t-1} + (1 - a_1)E_t\{\pi^{core}_{t+1}\} + a_2 rmc_t + \varepsilon^{core}_t$$

$$rmc_t = a_3\hat{y}_t + (1 - a_3)\hat{z}_t.$$

  The Phillips curve block often includes subcomponents, notably food and energy:

$$\pi^{food}_t = a_{21}\pi^{food}_{t-1} + (1 - a_{21})E_t\pi^{food}_{t+1} + a_{22} rmc^{food}_t + \varepsilon^{food}_t$$

$$rmc^{food}_t = a_{23}\left(\widehat{rp}^{Wfood}_t + \hat{z}_t - \widehat{rp}^{food}_t\right) + (1 - a_{23})\hat{y}_t.$$

  The first term in rmc^{food}_t is the gap in the relative world food price, calculated using the world food price index in US dollars relative to the overall US price level, adjusted by the real exchange rate gap and by the trend in the relative price of domestic food. Similarly, for energy:

$$\pi^{energy}_t = a_{31}\pi^{energy}_{t-1} + (1 - a_{31})E_t\pi^{energy}_{t+1} + a_{32} rmc^{energy}_t + \varepsilon^{energy}_t$$

$$rmc^{energy}_t = a_{33}\left(\widehat{rp}^{Woil}_t + \hat{z}_t - \widehat{rp}^{energy}_t\right) + (1 - a_{33})\hat{y}_t.$$

  Combining the core, food, and energy inflation components using the relevant weights in the CPI basket gives headline inflation:

$$\pi_t = w^{energy}\pi^{energy}_t + w^{food}\pi^{food}_t + (1 - w^{food} - w^{energy})\pi^{core}_t.$$

- An uncovered interest parity (UIP) equation relates the nominal exchange rate, s_t, to its expected future value, $E_t\{s_{t+1}\}$, the differential between domestic, i_t, and foreign, i^*_t, nominal interest rates, and a risk premium $prem_t$:

$$s_t = (1 - e_1)E_t\{s_{t+1}\} + e_1\left(s_{t-1} + \frac{2(\bar{\pi}_t - \bar{\pi}^*_t + \Delta\bar{z}_t)}{4}\right) + \frac{i^*_t - i_t + prem_t}{4} + \varepsilon^s_t.$$

Note that the nominal exchange rate is defined as units of domestic currency per unit of foreign currency. The second term in the UIP equation,

$$\left(s_{t-1} + \frac{2(\bar{\pi}_t - \bar{\pi}_t^* + \Delta\bar{z}_t)}{4}\right),$$

is the backward-looking component of the exchange rate, representing the exchange rate as an extrapolation of past exchange rates adjusted for the trend growth rate of the real exchange rate and the average inflation differential. The effect of the backward-looking component is determined by the e_1 parameter, which needs to be calibrated.

- A Taylor rule equation that describes a monetary policy reaction function in which the nominal policy interest rate, i_t, is set as a function of interest rate persistence, i_{t-1}, the deviation of expected inflation, $E_t\{\pi_{t+N}\}$ from the inflation target, π^T_{t+N}, and the output gap, $\hat{y}_t$. The neutral interest rate, i^n_t, is the nominal interest rate that would prevail if inflation were equal to the target and the output gap were equal to zero. It is the sum of the trend real interest rate, $\bar{r}_t$, and model-consistent inflation expectations, $E_t\{\pi_{t+N}\}$ The standard UIP equation depends on three parameters that need to be calibrated (g_1, g_2, g_3):[6]

$$i_t = g_1 i_{t-1} + (1 - g_1)(i^n_t + g_2(E_t\{\pi_{t+N}\} - \pi^T_{t+N}) + g_3\hat{y}_t) + \varepsilon^i_t$$

$$i^n_t = \bar{r}_t + E_t\{\pi_{t+N}\}.$$

B. Calibrating the QPM

To be useful for monetary policy formulation, the QPM must be calibrated to fit the characteristics (stylized facts) of the country studied. Calibration involves two main steps. First, the trend paths of key endogenous variables must be modeled. This step also involves setting the steady-state values of these variables. Second, the parameters of the individual equations must be calibrated to make the QPM mimic known business-cycle properties of the economy, including, for example, how changes in the nominal policy interest rate (that is, monetary policy) affect real variables. For the purposes of this paper, we shall demonstrate the calibration process for Country Z. Table 1 is an example of choices made for Country Z, for the purpose of illustration only, and as needed to be able to run the package provided with this manual.

The steady-state values are set exogenously. By design, the QPM converges toward the long-term (that is, steady-state) values of potential output growth, equilibrium real exchange rate appreciation, and domestic and foreign trend real interest rates. Targets for domestic and foreign inflation are also set exogenously. Key long-term parameters for the canonical model applied to Country Z are set as follows:

- *Potential output growth:* Potential output growth over the medium term is set at 2.5 percent.
- *Domestic inflation target:* The inflation target is 2 percent.
- *Foreign inflation target:* The foreign sector in the model is set as the euro area. As such, the foreign inflation target is set at the European Central Bank's target of 2 percent.
- *Equilibrium real exchange rate appreciation*: Trend real exchange rate appreciation is set at 1.5 percent per year.

[6] This is a simplified version of the Taylor rule. It is possible to formulate the interest rate as a weighted average of a Taylor rule and a rate implied by uncovered interest parity to allow for a continuum of interest rate policies between strict inflation targeting and a peg, as presented in Table 1. Likewise, for the exchange rate (ER), it is possible to model a continuum between full ER flexibility (that is, ER is fully determined by uncovered interest parity) and a peg (that is, ER is set at the target). The h_1 and h_2 parameters listed in Table 1 control for such choices.

- *Domestic real neutral interest rate:* The real neutral interest rate is set at 2 percent, which implies a nominal neutral interest rate of 4 percent.
- *Foreign real neutral interest rate:* The foreign (euro area) real neutral interest rate is set at 0.75 percent, which implies a nominal neutral interest rate of 2.75 percent.

Table 1 presents the complete set of steady-state targets and the parameters that reflect the speed of adjustment to the steady states required to solve the QPM.

Table 1. Calibration of the Canonical QPM: Country Z

Parameter	Definition	Value
Aggregate demand equation		
	$\hat{y}_t = b_1\hat{y}_{t-1} - b_2 mci_t + b_3\hat{y}^*_t + \varepsilon^y_t$	
	$mci_t = b_4(\hat{r}_t + cr_prem_t) + (1-b_4)(-\hat{z}_t)$	
	$cr_prem_t = b_5 cr_prem_{t-1} + (1-b_5)\Delta cr_prem_t + \varepsilon^{cr_prem}_t$	
b_1	Output persistence	0.7
b_2	Effect of monetary conditions on the output gap	0.2
b_3	Effect of foreign output gap on the output gap	0.3
b_4	Weight of real interest rate and REER gaps in the monetary conditions index	0.7
b_5	Persistence in the credit premium	0.7
Phillips curve		
	$\pi_t = a_1\pi_{t-1} + (1-a_1)E_t\{\pi_{t+1}\} + a_2 rmc_t + \varepsilon^\pi_t$	
	$rmc_t = a_3\hat{y}_t + (1-a_3)\hat{z}_t$	
(with equivalent equations for food and energy)		
a_1	Core inflation persistence	0.5
a_2	Pass-through of marginal costs to inflation	0.25
a_3	Share of domestic costs in firms' aggregate costs	0.65
a_{21}	Persistence of food price inflation	0.50
a_{22}	Pass-through of food price inflation to overall inflation	0.10
a_{23}	Effect of world food prices and the business cycle on food prices	0.25
a_{31}	Persistence in energy prices and forward-looking component	0.50
a_{32}	Effect of real marginal cost of energy price changes on energy inflation	0.05
a_{33}	Effect of world oil prices and the business cycle on energy prices	1.0
Taylor rule		
	$i_t = h_1(4\Delta s_{t+1} + i^*_t + prem_t) + (1-h_1)\big(g_1 i_{t-1} + (1-g_1)(i^n_t + g_2(E_t\{\pi_{t+N}\} - \pi^T_{t+N}) + g_3\hat{y}_t)\big) + \varepsilon^i_t$	
	$i^n_t = \bar{r}_t + E_t\{\pi_{t+N}\}$	
g_1	Policy rate persistence	0.75
g_2	Policy reactiveness to core inflation	0.25
g_3	Policy reactiveness to the output gap	0.25
h_1	Imperfect control over the money market (zero implies a free market)	0.0
Uncovered interest parity equation		
	$s_t = h_2(s_{t-1} + \Delta s^T_t/4) + (1-h_2)((1-e_1)E_t\{\pi_{t+1}\} + e_1\big(s_{t-1} + 0.5(\pi^T_{t+N} - \pi^{RW}_{t+N} + z^T_t)\big)$	
	$+(i^*_t - i_t + prem_t)/4 + \varepsilon^s_t$	
e_1	Nominal exchange rate persistence	0.20
h_2	Degree of control over the exchange rate (dirty float or managed float or peg)	0.0

Table 1. Calibration of the Canonical QPM: Country Z *(Continued)*

Parameter	Definition	Value
Exchange rate target		
$\Delta s_t^T = f_1 \Delta s_{t-1}^T + (1-f_1)\left(\left(\pi_t^T - \bar{\pi}_t^* + \Delta \bar{z}_t\right) - f_2(\pi_t - \pi_t^T) - f_3 \hat{y}_t\right) + \bar{\varepsilon}_t^{s^T}$		
f_1	Exchange rate target persistence	0.50
f_2	Importance of inflation differential relative to the target	0.0
f_3	Importance of the output gap	0.0
Steady-state targets		
π_t^T	Inflation target (q-on-q)	2.0
$\bar{r}_t$	The domestic real interest rate: neutral rate	0.5
$\Delta \bar{z}_t$	Annualized rate of change in the trend real exchange rate	–1.5
$\Delta \bar{y}_t$	Annualized rate of change in potential output	2.5
$\bar{\pi}_t^*$	Rest of the world target inflation	2.0
$\bar{r}_t^*$	Rest of the world target real interest rate	0.75
$\log(p_t^{food}) - \log(p_t)$	Food price relative to the overall price level (p_t)	0.0
$\log(p_t^{core}) - \log(p_t)$	Core price level relative to the overall price level (p_t)	0.0
π_t^*	Rest of the world annualized inflation	2.0
π_t^{oil}	Annualized inflation: world oil prices	5.0
Speed of adjustment parameters to the steady state		
ρ_1	Food prices relative to the CPI	0.75
ρ_2	Core inflation relative to the CPI	0.75
ρ_3	Persistence in the premium	0.5
ρ_4	Real exchange rate	0.8
ρ_5	Real interest rate target	0.8
ρ_6	Potential output	0.8
ρ_7	Real interest rate (rest of the world)	0.8
ρ_8	Output gap (rest of the world)	0.8
ρ_9	Nominal interest rate (rest of the world)	0.8
ρ_{10}	Rest of the world inflation rate	0.8
ρ_{11}	Nominal exchange (cross rate)	0.25
ρ_{12}	Rest of the world food gap	0.5
ρ_{13}	Target rest of the world food inflation	0.9
ρ_{14}	Oil price gap (rest of the world)	0.5
ρ_{15}	Oil price inflation target	0.9
ρ_{16}	Inflation target	0.5

Note: CPI = consumer price index; REER = real effective exchange rate.

The suitability of the calibration of the model is assessed by generating impulse responses of the fully specified model and comparing these responses with the key stylized facts about the country of interest. These would include the reaction of the baseline solution to an exogenous change in the nominal exchange rate, to a shock in aggregate demand, a cost-push shock, and a monetary shock.

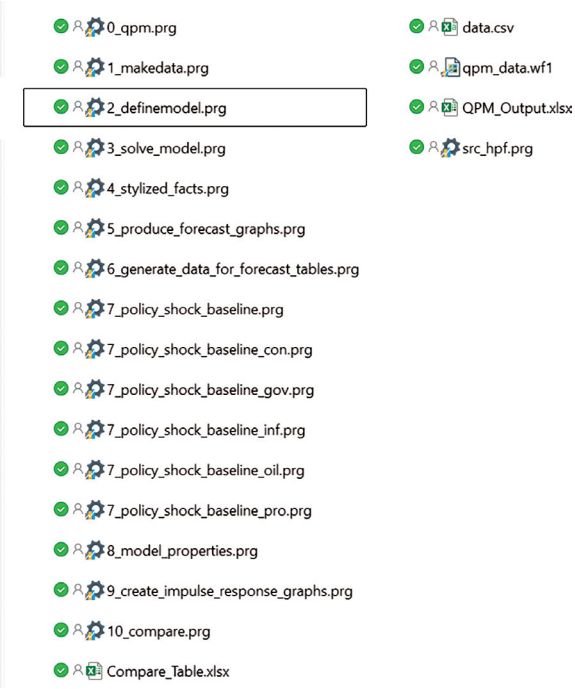
Impulse responses are generated by introducing a one-period unitary shock (1 percent) to specific structural errors in the QPM and assessing how the solution of the QPM with this shock changes relative to the baseline solution, which typically is produced without shocks. The procedure to generate impulse responses using the EViews solver is described in detail in the following section.

II. Solving the QPM Using EViews

The aim of this section is to explain how to solve the QPM using EViews. It is organized as a seven-step workflow. Users who wish only to compute the baseline solution can focus on Steps 1–6, while scenario analysis begins in Step 7. Advanced users may skip directly to Section III. In what follows, all EViews commands appear in monospace font, program file names are in bold, and variables appear in italics where first defined.

Figure 1 shows the files included in the QPM package for EViews 14.[7]

Figure 1. Contents of the QPM Package for EViews



The driver program is called **0_qpm.prg**. It contains the EViews code to initialize key QPM parameters, such as the forecasting horizon, and solves the model by calling other programs in the QPM package. This program **must** be run first to solve the QPM in EViews. Starting with any other program file will result in a run-time error because some of the key parameters required to solve the QPM are not defined.

Users can edit the driver program so that it runs only certain programs. However, at a minimum, **0_qpm.prg** needs to invoke three programs to solve the QPM. First, it calls the program file **1_makedata.prg** to generate the historical data needed to solve the model.[8] Then it calls **2_definemodel.prg**, which contains code that builds a workfile model object called "**fpas_b**". This object contains 83 equations (mostly identities) that define the QPM. The core equations of the QPM depend on the calibrated parameters of the model (as labeled

[7] The package can be downloaded by clicking on this link.

[8] Technically speaking, historical data are not required to solve the QPM. All that is needed are initial conditions for several endogenous variables. However, these conditions are often inferred using band-pass and Kalman filtering techniques, which require historical data.

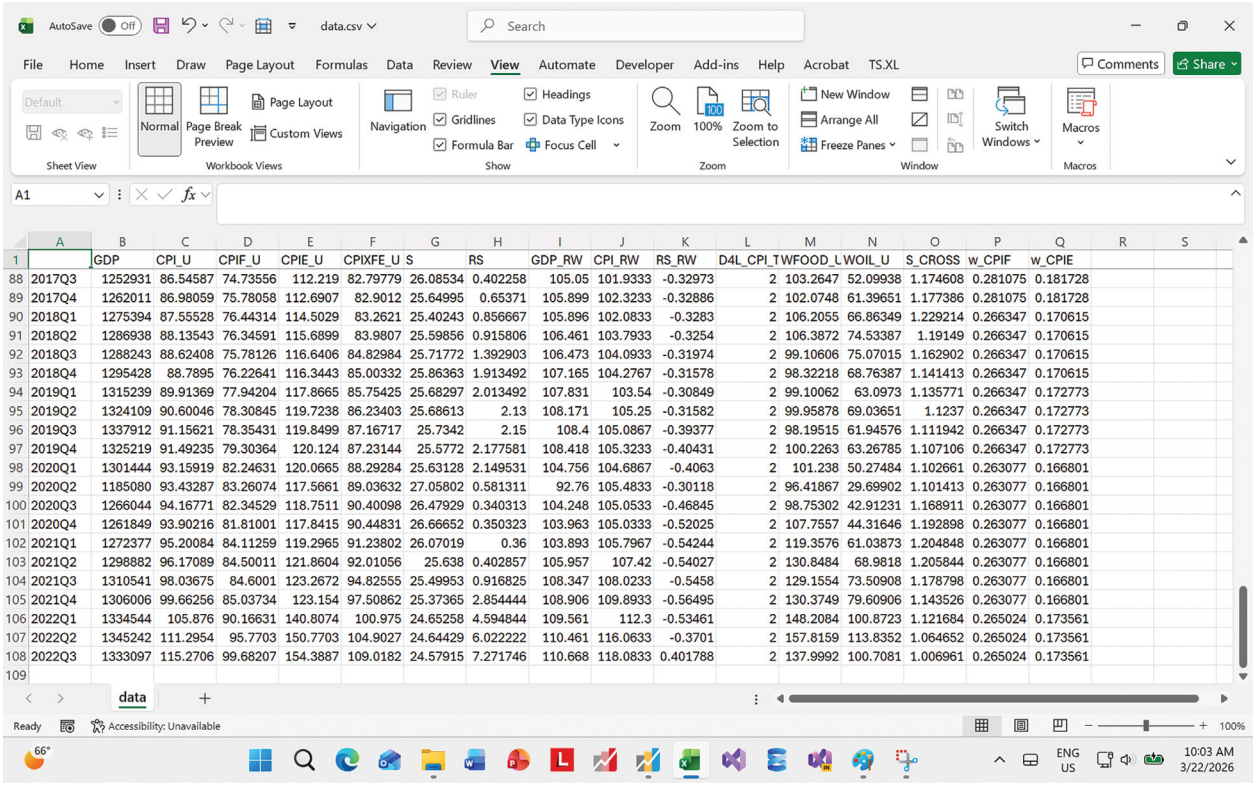
in Table 1). After this step is completed, the **0_qpm.prg** program runs the program file **3_solve_model.prg**, which solves the model for the baseline solution and, optionally, relatively simple (alternative) scenarios involving shocks to exogenous variables (for example, a 100 basis point increase in domestic interest rates).

The programs that start with the suffixes "**4**_", "**5**_", and "**6**_" in the QPM package are utility programs that produce standard reports on the current baseline and alternative scenarios. Programs beginning with "**7**_" provide relatively complex examples of how to solve the QPM under various assumptions (that is, constraints) about the paths of key endogenous variables (for example, the price of oil). Note that these programs do not need to be run to solve the QPM. They are provided to help users formulate complex baseline or alternative scenarios for their own country. Programs **8_model_properties.prg** and **9_impluse_response_graphs.prg** generate impulse response functions for the QPM. These are used to assess the implied impulse response functions for a specific calibration of the QPM and to guide adjustments to the calibrated parameters. Last, **10_compare.prg** generates graphs that compare any two solutions of the QPM (for example, the baseline solution and a specific alternative scenario).

Following are the specific steps to solve the canonical version of the QPM using EViews.

A. Step 1: Data Collection: Prepare DATA.CSV

Figure 2. Contents of DATA.CSV (as Shown in Excel)



		GDP	CPI_U	CPIF_U	CPIE_U	CPIXFE_U	S	RS	GDP_RW	CPI_RW	RS_RW	D4L_CPI_T	WFOOD_L	WOIL_U	S_CROSS	w_CPIF	w_CPIE
88	2017Q3	1252931	86.54587	74.73556	112.219	82.79779	26.08534	0.402258	105.05	101.9333	-0.32973	2	103.2647	52.09938	1.174608	0.281075	0.181728
89	2017Q4	1262011	86.98059	75.78058	112.6907	82.9012	25.64995	0.65371	105.899	102.3233	-0.32886	2	102.0748	61.39651	1.177386	0.281075	0.181728
90	2018Q1	1275394	87.55528	76.44314	114.5029	83.2621	25.40243	0.856667	105.896	102.0833	-0.3283	2	106.2055	66.86349	1.229214	0.266347	0.170615
91	2018Q2	1286938	88.13543	76.34591	115.6899	83.9807	25.59856	0.915806	106.461	103.7933	-0.3254	2	106.3872	74.53387	1.19149	0.266347	0.170615
92	2018Q3	1288243	88.62408	75.78126	116.6406	84.82984	25.71772	1.392903	106.473	104.0933	-0.31974	2	99.10606	75.07015	1.162902	0.266347	0.170615
93	2018Q4	1295428	88.7895	76.22641	116.3443	85.00332	25.86363	1.913492	107.165	104.2767	-0.31578	2	98.32218	68.76387	1.141413	0.266347	0.170615
94	2019Q1	1315239	89.91369	77.94204	117.8665	85.75425	25.68297	2.013492	107.831	103.54	-0.30849	2	99.10062	63.0973	1.135771	0.266347	0.172773
95	2019Q2	1324109	90.60046	78.30845	119.7238	86.23403	25.68613	2.13	108.171	105.25	-0.31582	2	99.95878	69.03651	1.1237	0.266347	0.172773
96	2019Q3	1337912	91.15621	78.35431	119.8499	87.16717	25.7342	2.15	108.4	105.0867	-0.39377	2	98.19515	61.94576	1.111942	0.266347	0.172773
97	2019Q4	1325219	91.49235	79.30364	120.124	87.23144	25.5772	2.177581	108.418	105.3233	-0.40431	2	100.2263	63.26785	1.107106	0.266347	0.172773
98	2020Q1	1301444	93.15919	82.24631	120.0665	88.29284	25.63128	2.149531	104.756	104.6867	-0.4063	2	101.238	50.27484	1.102661	0.263077	0.166801
99	2020Q2	1185080	93.43287	83.26074	117.5661	89.03632	27.05802	0.581311	92.76	105.4833	-0.30118	2	96.41867	29.69902	1.101413	0.263077	0.166801
100	2020Q3	1266044	94.16771	82.34529	118.7511	90.40098	26.47929	0.340313	104.248	105.0533	-0.46845	2	98.75302	42.91231	1.168911	0.263077	0.166801
101	2020Q4	1261849	93.90216	81.81001	117.8415	90.44831	26.66652	0.350323	103.963	105.0333	-0.52025	2	107.7557	44.31646	1.192898	0.263077	0.166801
102	2021Q1	1272377	95.20084	84.11259	119.2965	91.23802	26.07019	0.36	103.893	105.7967	-0.54244	2	119.3576	61.03873	1.204848	0.263077	0.166801
103	2021Q2	1298882	96.17089	84.50011	121.8604	92.01056	25.638	0.402857	105.957	107.42	-0.54027	2	130.8484	68.9818	1.205844	0.263077	0.166801
104	2021Q3	1310541	98.03675	84.6001	123.2672	94.82555	25.49953	0.916825	108.347	108.0233	-0.5458	2	129.1554	73.50908	1.178798	0.263077	0.166801
105	2021Q4	1306006	99.66256	85.03734	123.154	97.50862	25.37365	2.854444	108.906	109.8933	-0.56495	2	130.3749	79.60906	1.143526	0.263077	0.166801
106	2022Q1	1334544	105.876	90.16631	140.8074	100.975	24.65258	4.594844	109.561	112.3	-0.53461	2	148.2084	100.8723	1.121684	0.265024	0.173561
107	2022Q2	1345242	111.2954	95.7703	150.7703	104.9027	24.64429	6.022222	110.461	116.0633	-0.3701	2	157.8159	113.8352	1.064652	0.265024	0.173561
108	2022Q3	1333097	115.2706	99.68207	154.3887	109.0182	24.57915	7.271746	110.668	118.0833	0.401788	2	137.9992	100.7081	1.006961	0.265024	0.173561
109																	

Figure 2 shows the contents of the raw data file for the QPM, which is a comma-delimited ASCII file called **data.csv**.[9] The first step in developing and solving the QPM in EViews is to construct the **data.csv** file for

[9] The data shown in Figure 2 are for a fictional country called "Country Z".

the country of interest. The short names of the variables, which cannot be changed, and their definitions are given in Table 2. The default working frequency is quarterly.

Table 2. Variables in the DATA.CSV File

Short Name	Description
GDP	Real GDP
CPI_U	Overall CPI (non-seasonalized)
CPIF_U	Consumer price index for food (non-seasonalized)
CPIE_U	Consumer price index for energy (non-seasonalized)
CPIXFE_U	Consumer price index for core (non-seasonalized)
S	Nominal exchange rate with respect to a major trading partner (for example, the United States)
RS	Nominal policy rate (percent)
GDP_RW	Real GDP for the rest of the world
CPI_RW	CPI for the rest of the world
D4L_CPI_TAR	Target inflation (domestic): annual year-over-year rate
WFOOD_U	World food price index
WOIL_U	World energy price index
S_CROSS	Cross exchange rate: US$ to exchange rate comparator
w_CPIF	Weight of food items in the local or domestic CPI
w_CPIE	Weight of energy items in the local or domestic CPI

Note that the data should end with the latest period available. Baseline and alternative projections will be generated starting with the first period after the end of the actual data. To demonstrate, we shall assume that the actual data end in 2022:3 and that the end of the projection period is 2025:4.

The final step is to transfer the contents of **data.csv** into a new page file in an active EViews workfile. We recommend starting with an empty workfile for the raw data and solution variables. In what follows, we will assume that the active workfile is called **qpm_data.wf1**, and the raw data will be imported to an EViews page file called "**Country_Z**".[10]

B. Step 2: Import DATA.CSV into an EViews Workfile

EViews can read data saved in a variety of foreign file formats (including Excel, HTML, CSV, ASCII, RATS, Stata, SPSS, and SAS). EViews will recognize the file format when the foreign file is opened.

There are several ways to open a foreign file in EViews:[11]

- Click "**File → Open → Foreign Data as Workfile...**".
- Copy and paste as "**New Workfile**" in the EViews desktop.
- Drag and drop a file in the main EViews output window.

[10] The name of the EViews workfile does not need to be **qpm_data.wf1**.

[11] Always start a new session of EViews with a new workfile before importing a foreign data set. This is to avoid accidentally overriding existing data.

To illustrate, we will now create an EViews workfile from **data.csv**. For this data set, a comma-delimited text file, the first observation is for 1996:1 (quarterly), and the last observation is for 2022:3.[12] Note that data for the included variables outside of this range are set to missing values (or "**NA**" using EViews syntax).

The easiest way to import the file is to click "**File ➔ Open ➔ Foreign Data as Workfile...**" (see Figure 3). Then select the directory where the **data.csv** file is stored and open the file. A dialog box with a title of "**Text Read – Step 1 of 5**" appears (see Figure 4), with prepopulated entries assigned by EViews.

Figure 3. Importing DATA.CSV into EViews

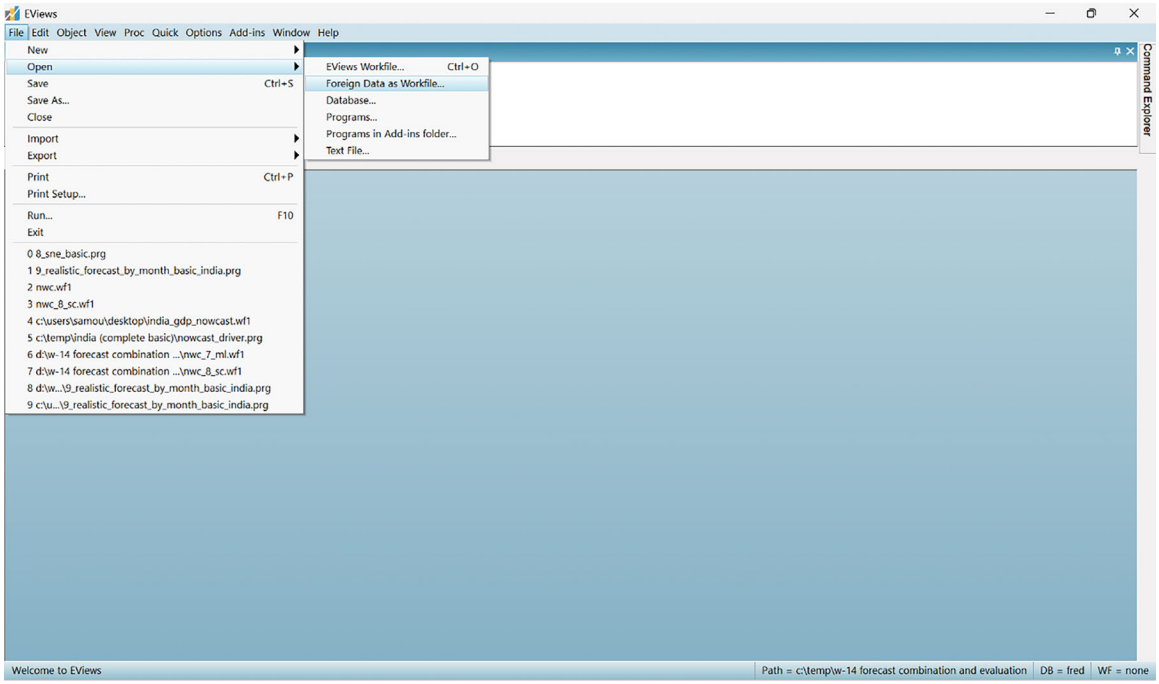
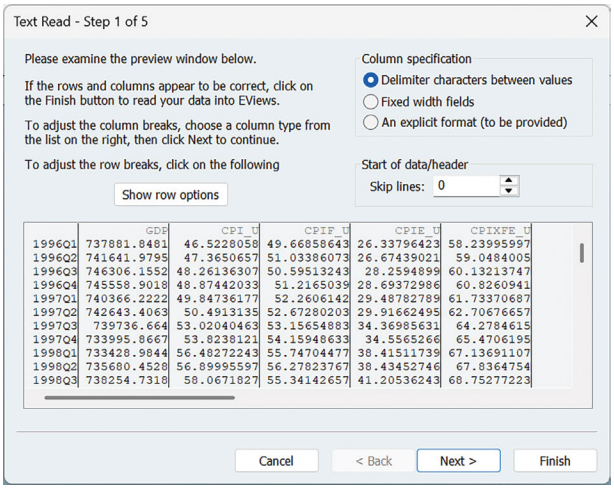


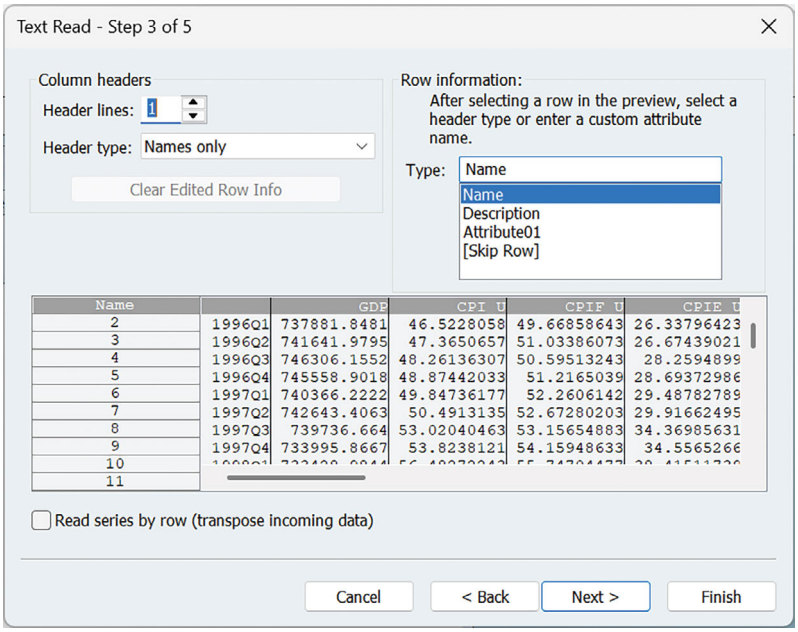
Figure 4. EViews Text Read Dialog Box (Step 1 of 5)



[12] The raw data file can also be in Microsoft Excel format. The steps presented would need to be modified somewhat to import the data in this case. Alternatively, the Excel file can be saved to a comma-delimited file using the "**File ➔ Save As...**" command in Microsoft Excel.

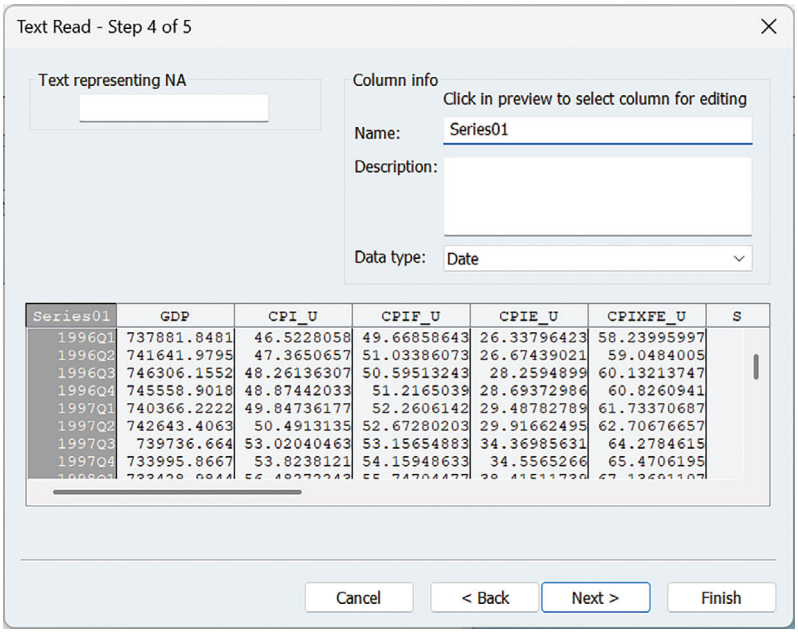
Clicking the button labeled "**Next >**" **twice** brings up the dialog box shown in Figure 5.[13]

Figure 5. EViews Text Read Dialog Box (Step 3 of 5)



Clicking the "**Next >**" button again produces the dialog box shown in Figure 6.

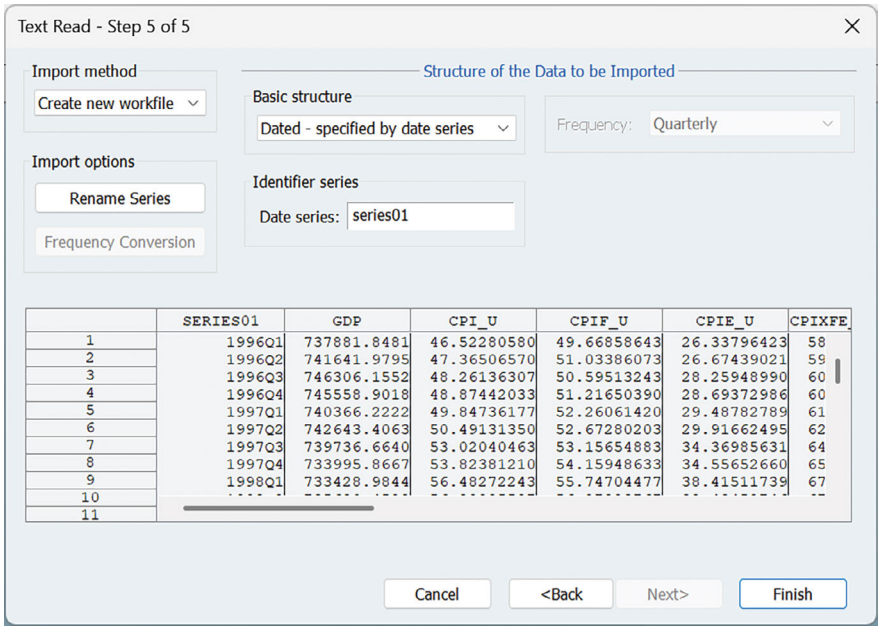
Figure 6. EViews Text Read Dialog Box (Step 4 of 5)



[13] The screen image for step 2 is not shown.

And clicking "**Next >**" once more presents the dialog box shown in Figure 7.

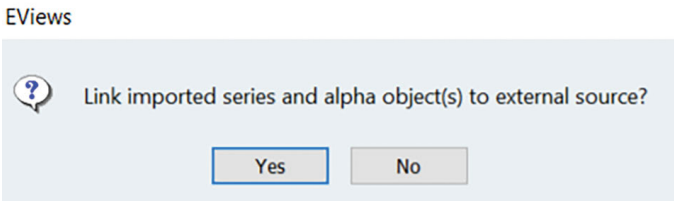
Figure 7. EViews Text Read Dialog Box (Step 5 of 5)



Last, clicking the button labeled "**Finish"** instructs EViews to import the data from **data.csv** into a page file called "**Data**" and save it to a new workfile called **data.wf1**. The frequency of the resulting page file is quarterly, and its range is 1996:1–2022:3 (as required).

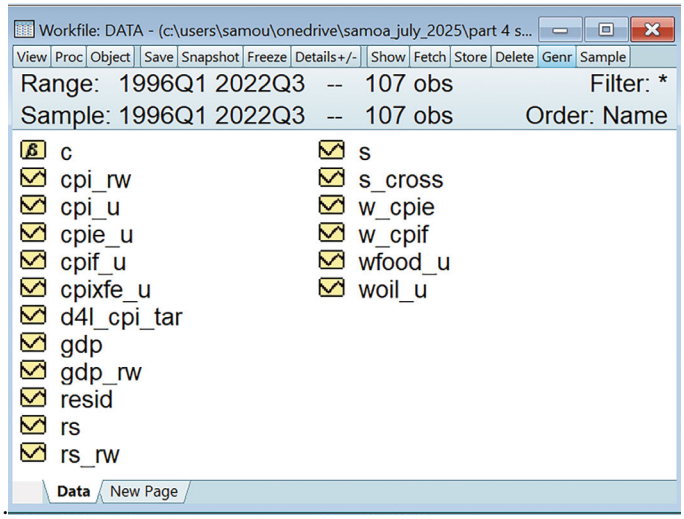
Note that before the foreign file is processed, a pop-up dialog box appears asking whether to "Link imported series and alpha object(s) to external source? (Figure 8)". We recommend you select "**No**".[14] The resulting page file called "**data**" is shown in Figure 9.

Figure 8. EViews "External Link" Dialog Box



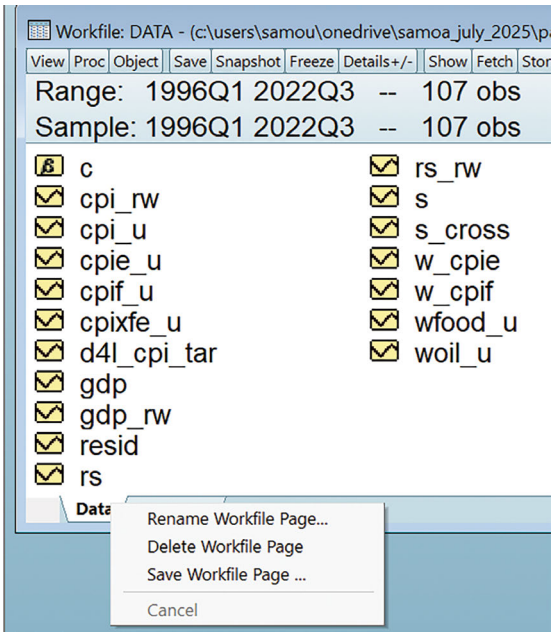
[14] If one clicks the "Yes" button, series imported to EViews will update automatically when updates occur in the foreign sources. Clicking on "No" means that the series in the workfile will be "copies" of the imported data and will not reflect any updates in the foreign sources.

Figure 9. EViews Workfile after DATA.CSV Has Been Imported



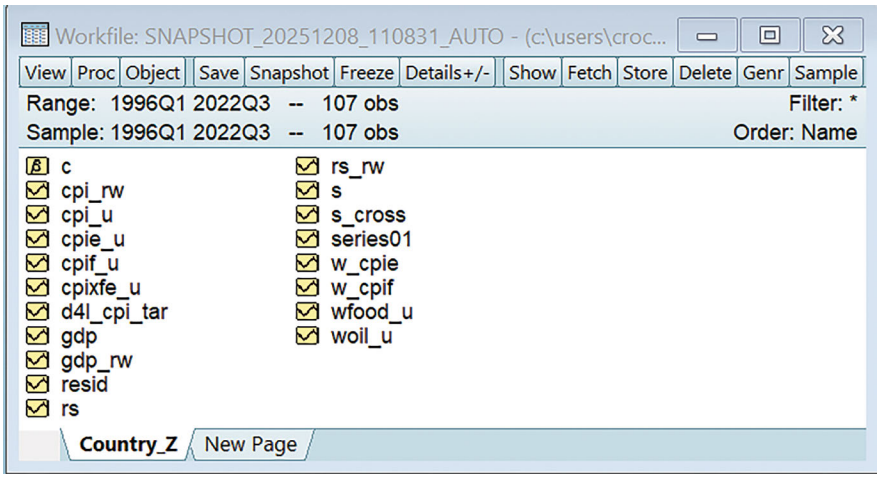
Click on the "**Save"** tab button of the workfile to save your work. Alternatively, click on "**File → Save As...**" to save the workfile to another name (for example, **qpm_data.wk1**). Note that page files can be easily renamed by clicking on the page file tab in the lower left-hand corner and then right-clicking with the mouse to bring up the "**Rename Workfile Page...**" dialog option (Figure 10).

Figure 10. Procedure for Renaming an EViews Page File



The EViews package for the QPM assumes that the data page file is called **Country_Z**. Please rename the newly created page file to **Country_Z** before proceeding to Step 3 (Figure 11).

Figure 11. DATA.CSV Saved in the Country_Z Page File

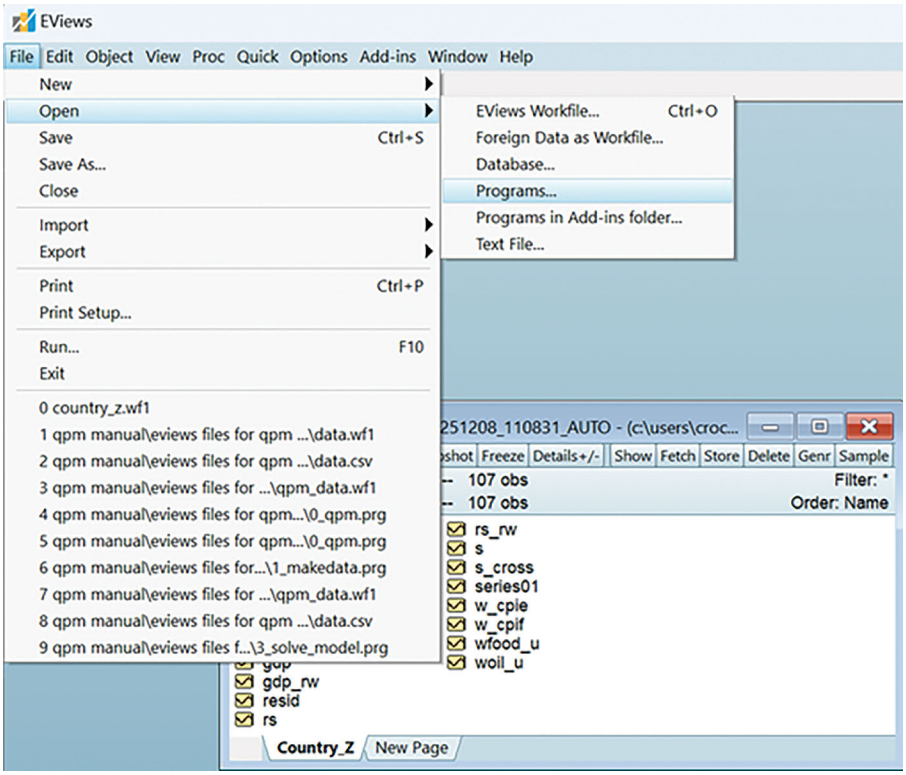


C. Step 3: Edit the Program File 0_qpm.prg

The next step in solving the QPM using EViews is to edit the **0_qpm.prg** program file so that it points to the page file that contains the raw data (in this case, **Country_Z**). At the same time, it is necessary to specify the baseline solution's start and end dates, based on the raw data in the **Country_Z** page file.

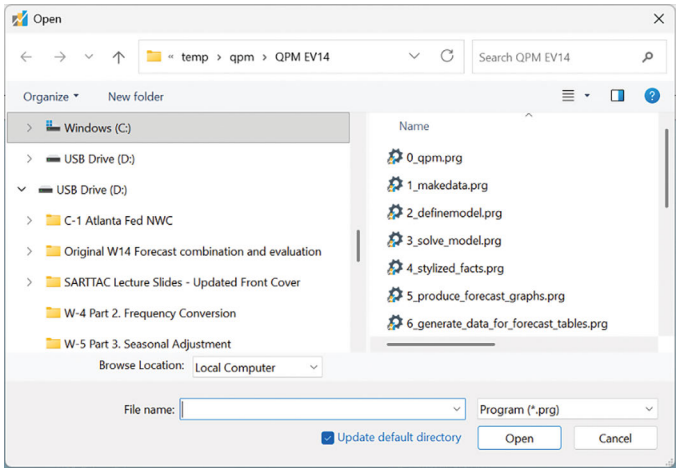
To open **0_qpm.prg** in EViews, click on "**File → Open → Programs...**" and select **0_qpm.prg** from the working directory that contains the QPM package (Figure 12).

Figure 12. Opening an EViews Program File from the File Menu



The following dialog box will appear, which is used to select **0_qpm.prg** (first file in the upper right-hand side of the dialog box [Figure 13]).[15]

Figure 13. EViews "Open File Explorer" Dialog Box



After **0_qpm.prg** is opened successfully, EViews will display the contents of the program file in a new window (Figure 14).

Figure 14. EViews Program File: 0_qpm.prg (Lines 1–19)

EViews

File Edit Object View Proc Quick Options Add-ins Window Help

Command

Program: 0_QPM - (c:\users\crochon\desktop\qpm manual\eviews files for qpm manual - version 14 - revise...

Run | Debug | Print | Save | SaveAs | Snapshot | Wrap+/- | LineNum+/- | Encrypt

```
1  include "src_hpf.prg"
2
3  'Program does all of its work in a newly created pagefile called %source_dir. The data in %source_dir should be imported
4  ' from the file called data.csv
5
6  'The program begins by making a copy of the source pagefile, which contains the latest data, naming the new pagefile
   whatever %target_dir (a string) is set to. Doing so means that the original (raw data) is never changed. All the results are
   written to newly created pagefiles.
7
8  %source_dir = "Country_Z" 'Source pagefile; data in this pagefile was first imported from data.csv. The page file name can
   be any valid string.
9
10 %target_dir = "temp_ev" 'Target page file for the QPM model/solution/outputs.
11
12 %imp_dir = "active_sn" 'Target page file for impulse response functions and graph files.
13
14 %scen_dir = "active_sn_results"  'Temporary storage for scenario results
15
16 %baseline = "cz"  'Baseline tag; this tag is added to the baseline solution variables generated by the EViews solver. Thus
   rgdp_cz for the forecast horizon will contain the baseline values for real GDP.
17
18 %alternative = ""  'Alternative scenario tag
```

Three key parameters in **0_qpm.prg** must be set before running the program. The first parameter, **%source_dir** (line 8), should be set to the name of the page file that contains the raw data for the QPM. The second

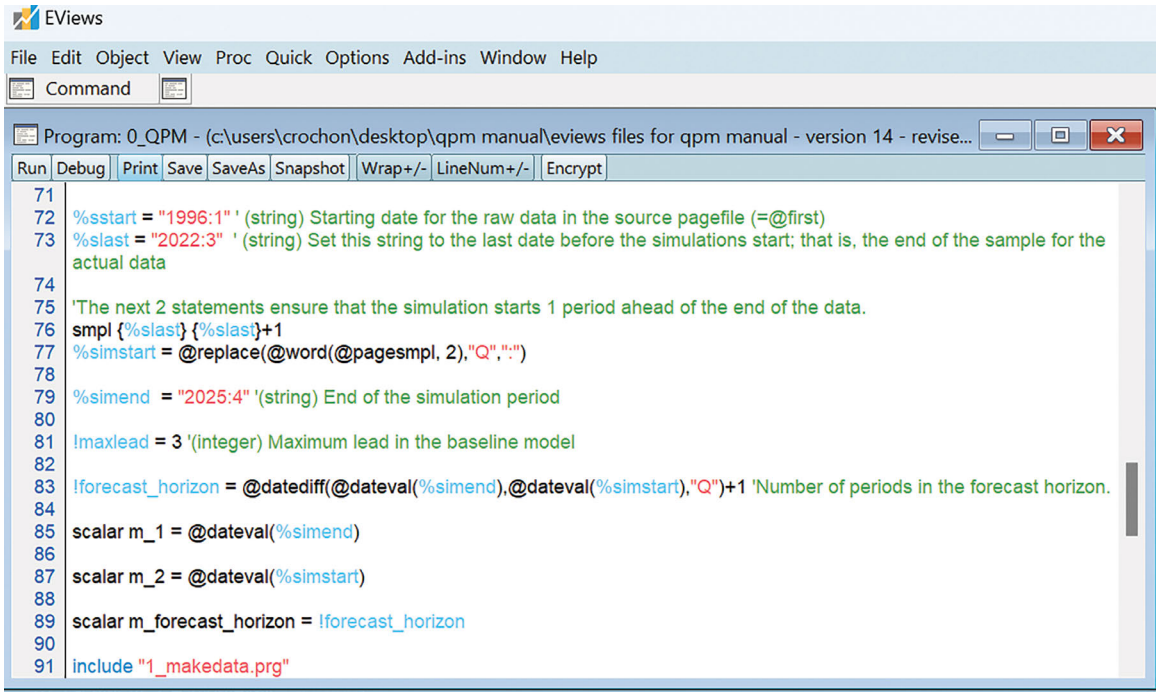
[15] Figure 13 is one such example. The format of the dialog box and its contents depends on the location of the QPM package on the user's computer, and its settings.

parameter, **%baseline** (line 16), sets the tag (or suffix) for the baseline solution. It cannot be more than three characters long. The last parameter is **%target_dir** (line 10). Its setting determines the name of the page file that will have the series containing the QPM solution. Note that the page file that **%target_dir** points to will always be initialized (that is, emptied) whenever **0_qpm.prg** is run.[16]

In the screenshot shown in Figure 14, the **%source_dir** parameter is set to "**Country_Z**", which corresponds to an actual page file in the workfile. Also, **%baseline** is set to "**cz**". Consequently, series containing the baseline solution of the QPM will have names of the form "**name_cz**", where "**name**" is replaced with the actual name of an endogenous variable. For example, the (log of the) nominal exchange rate in the QPM, which is endogenous, is called "**l_s**" in the QPM. The generated series containing the baseline solution will therefore be named "**l_s_cz**". Last, given the current setting of **%target_dir**, this variable will be saved in a page file called **temp_ev** in the open workfile (in this case, **qpm_data.wk1**).

The last step is to change, if necessary, the settings of **%sstart** (line 72 in Figure 15), **%slast** (line 73), **%simstart** (line 77), and **%simend** (line 79). The parameter **%sstart** should be set to the actual start date of the raw data (in this case, 1996:1). The **%slast** parameter should be set to the actual end date (that is, last observation) of the raw data (in this case, 2022:3). Note that the **%simstart** parameter in **0_qpm.prg** is set programmatically to the beginning of the simulation period, which is necessarily one period more than the end date of the raw data. Hence, for this case, it will be set to 2022:4. Last, the **%simend** parameter should be set to the end date of the simulation period. It determines the length of the simulation period and can be set to any number of periods beyond the start of the simulation period. In this case, **%simend** is set to 2025:4, and with these settings, the QPM will therefore be solved for 13 periods, from 2022:4 to 2025:4.

Figure 15. EViews Program File: 0_qpm.prg (Lines 71–91)



[16] This implies the existing version needs to be copied to another page file (or renamed) to preserve the results from previous runs of **0_qpm.prg**.

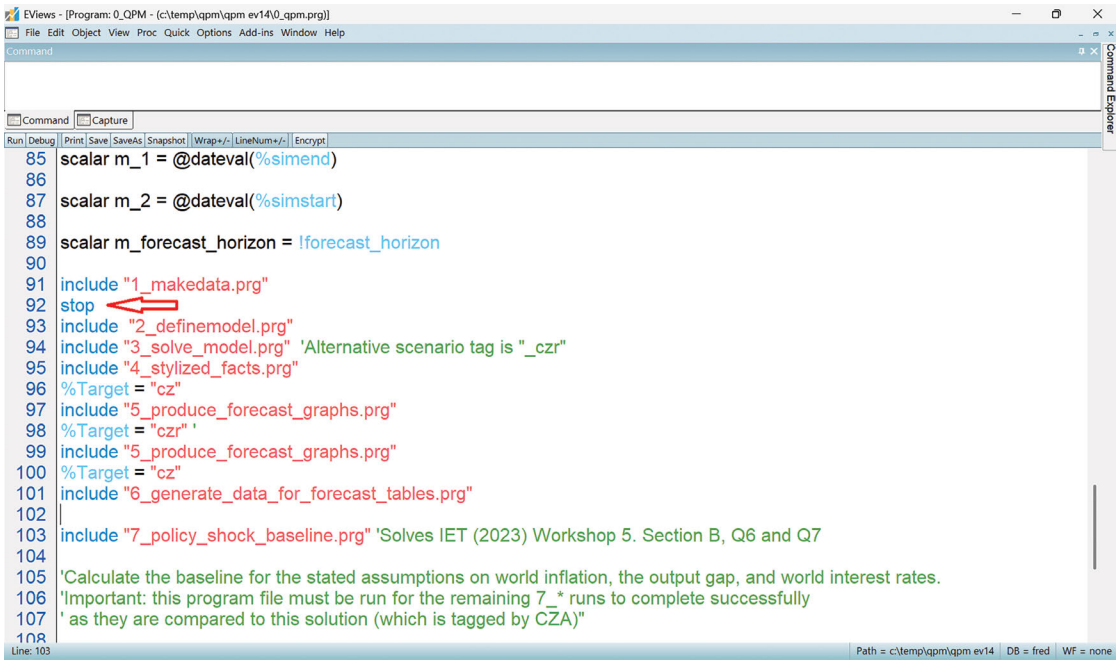
D. Step 4: Generate the Data for Solving the QPM

The QPM cannot be solved without first initializing all its endogenous and exogenous variables. This is the role of the program file **1_makedata.prg**, which is run from **0_qpm.prg** using an EViews **"include"** command.[17] Running **1_makedata.prg** from **0_qpm.prg** creates, in the page file that **%target_dir** points to, all the variables required to successfully solve the QPM using EViews.

For example, **1_makedata.prg** includes code to deseasonalize the raw data using the X12/X13 routine (as needed) and to calculate the potential "**_bar**" and "**_gap**" values using the Hodrick–Prescott filter (see lines 153–157). Given that the QPM has backward-looking elements (that is, lagged values), this step essentially provides the starting point (or an anchor) for the baseline solution.[18]

The following steps demonstrate the process of running **1_makedata.prg.** It also describes the resulting output(s). The first step is to open the program file **0_qpm.prg** and scroll to line 91. Place the cursor at the end of line 91 and press the **Enter** key on your keyboard to add a new blank line to the program file. Then add the **stop** command at this line, as shown in Figure 16. The EViews **stop** command will terminate the run at line 92, thereby preventing EViews from processing any commands beyond line 91. The correct setup for the **0_qpm.prg** file is shown in Figure 16 (see line 92, where a **stop** command has been positioned):

Figure 16. EViews Program File: 0_qpm.prg (Lines 85–107)



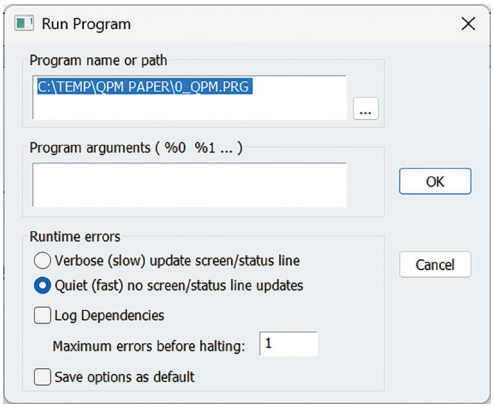
To run this program, first ensure that the QPM workfile created previously (for example, **qpm_data.wk1**) is open in the current workspace. If it is not open, invoke the "**File ➔ Open ➔ EViews Workfile...**" menu command. Then click on the **Run** tab in **0_qpm.prg** (just below the "**Command**" tab shown in Figure 16).

[17] It cannot be run directly as a stand-alone program because it depends on the settings of **%slast** and **%simstart**. These parameters are set in **0_qpm.prg**.

[18] There are several approaches to anchoring the within-sample values of the potential or gap variables in the QPM. Rather than using the Hodrick–Prescott filter, one can use the Kalman filter to estimate these variables, given the calibration and equations of the QPM. This approach is not implemented in the EViews package.

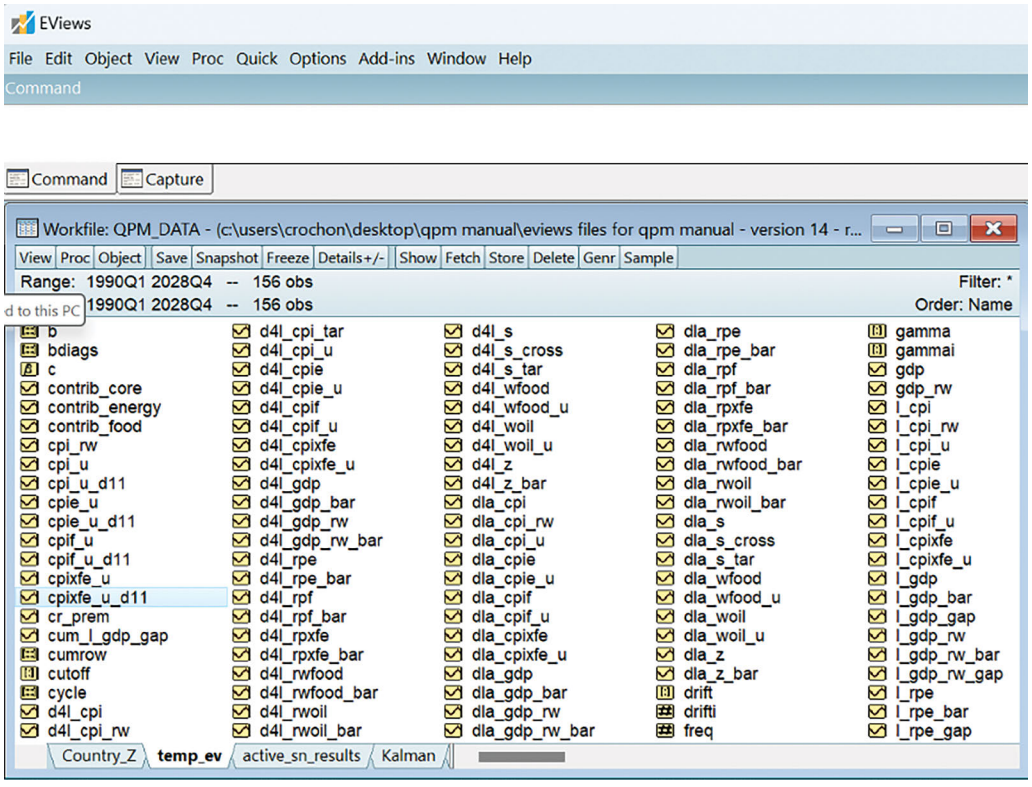
EViews will respond with the dialog box shown in Figure 17.[19]

Figure 17. Executing EViews Program: Run Dialog Box



Click OK to run the code in **0_qpm.prg** to line 91, including **1_makedata.prg**. The result is shown in Figure 18.

Figure 18. Page File "temp_ev" after Processing "1_makedata.prg"



Notice that the run has added a new page file called **temp_ev** and generated all the endogenous and exogenous series required to solve the QPM. Table 3 contains the naming scheme.[20]

[19] The location of 0_qpm.prg will likely differ from one user to another.

[20] The table documents only those variables that appear explicitly in the model specification. For example, variables that end with a "_u" suffix refer to non-seasonally adjusted variables but are not used as is (nor directly) in the QPM.

Table 3. Naming Scheme of the QPM

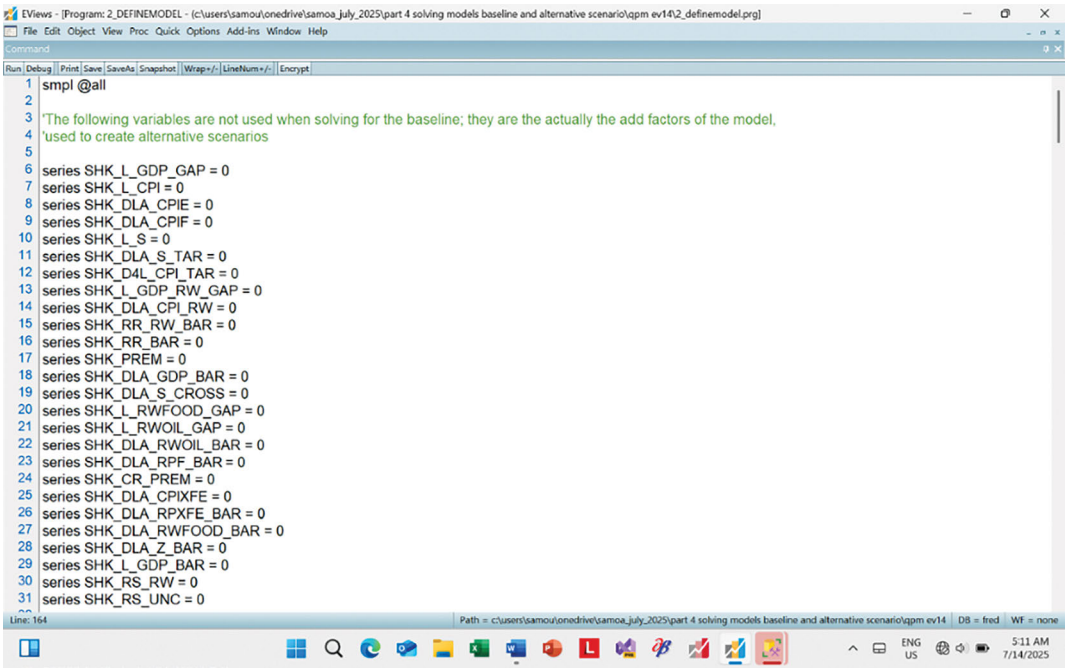
Prefix	Suffix	Definition	Description
l_x		$100 * \log(x)$	Natural logarithm of the data
d4l_x		$\log(x) - \log(x(-4))$	Annual growth rate, derived from a four-period difference of log(x)
dla_x		$4 * \log(x) - \log(x(-1))$	Annualized growth rate derived from the one-period difference of log(x)
wt_x		wt_x	Time-varying weight variable
wt4_x		$wt4_x$	Four-period lagged weight variable
ws_x		ws_x	End of period weight
	_bar	$l_{x_{bar}}$	Potential and smoothed value of the variable[21]
	_gap	$l_{x_{gap}} = l_x - l_{x_{bar}}$	Deviation of actual from potential
	_tar	$l_{x_{tar}}$	Target value of the series

E. Step 5: Create an EViews Model Object of the QPM

This step is completed by editing and running the program file **2_definemodel.prg** (from **0_qpm.prg**). This program creates a model object that consists of the equations or identities that define the QPM. The equations of the model should be structured and calibrated for the target country. These steps are explained in the following sections.

Open the file called **2_definemodel.prg** using the "**EViews File → Open → Programs...**" command. Doing so produces the screen image shown in Figure 19.

Figure 19. EViews Program File: 2_definemodel.prg (Lines 1–31)

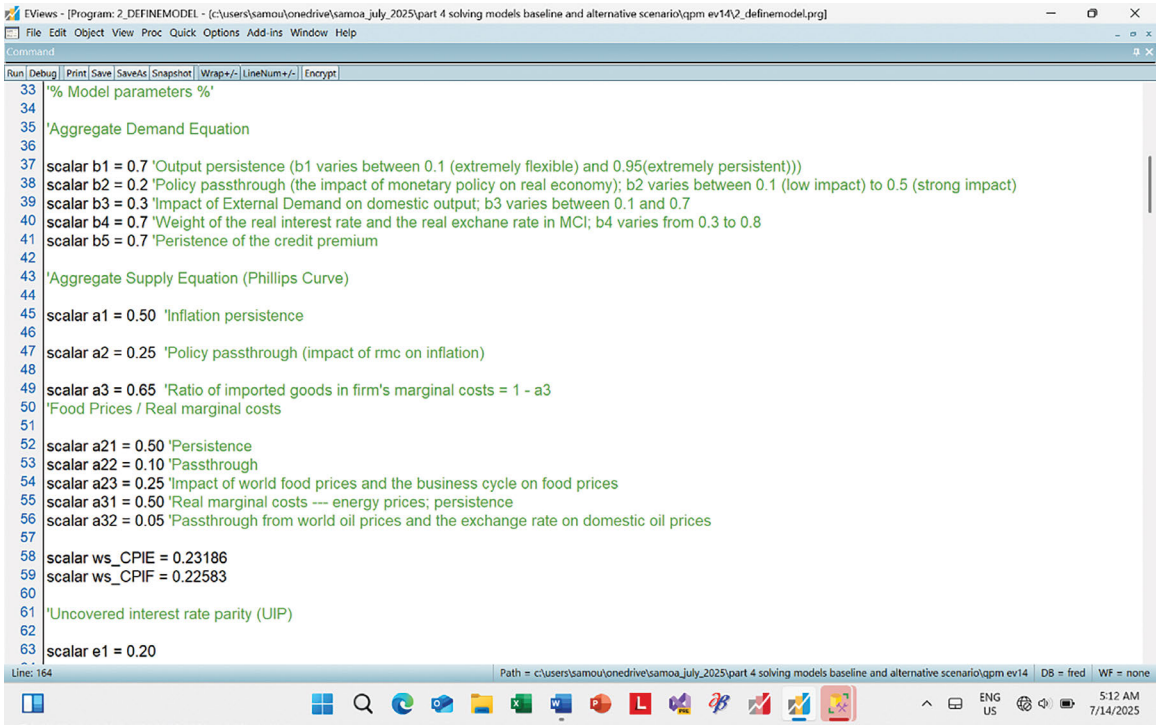


[21] Note that the definition is applied to a generic variable x.

Lines 6–31 of **2_definemodel.prg** define 26 shock variables and sets them all to zero. These variables typically remain at zero when solving for the **baseline** solution of the QPM. They are set to non-zero values to introduce shocks to specific endogenous variables under an **alternative** scenario. For example, setting the shock variable **SHK_L_GDP_GAP** to 1 for a single period introduces a one-time (or one-period) positive shock to the output gap. The difference between the solution of the model for GDP with this shock and the baseline solution, which does not have the shock, yields an estimate of the impulse response function of a shock to the output gap.

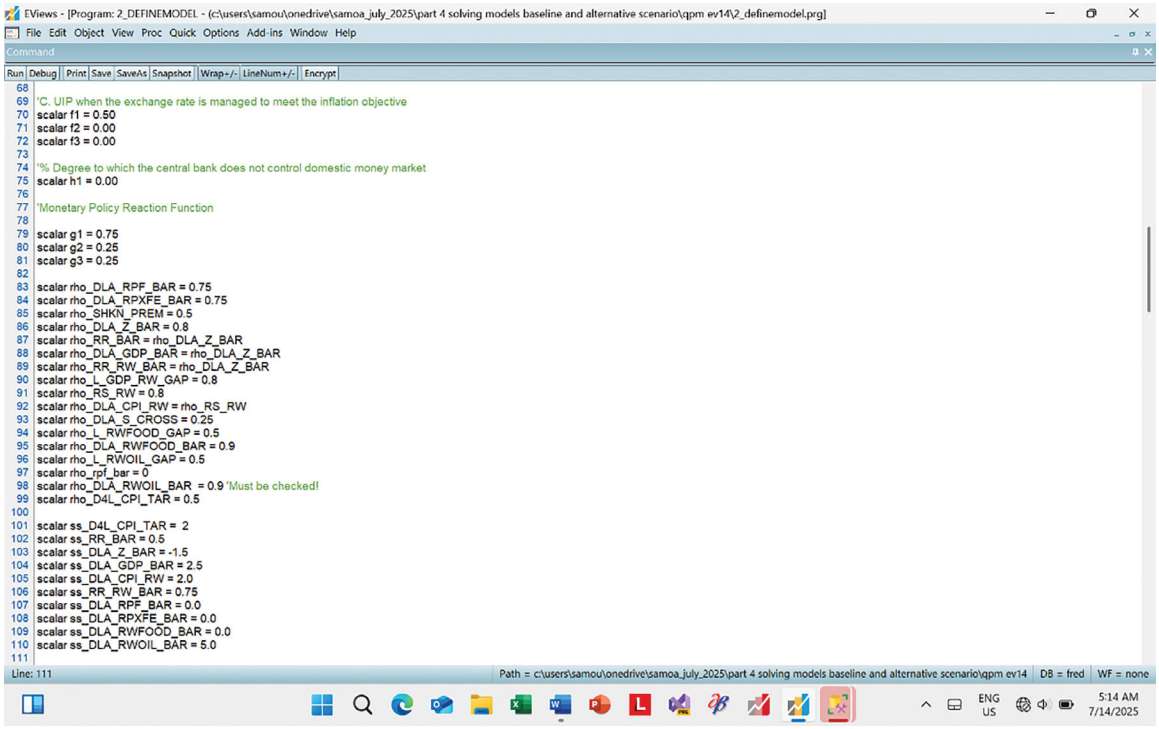
Scrolling down to line 33 of **2_definemodel.prg** (Figure 20) reveals the section of the file where the parameters of the QPM, which are scalars in the EViews page file, are assigned specific values to calibrate the QPM. All the parameters of the QPM (see Table 1) can be found in lines 37–110. Users must set these values to their preferred values, given the country of interest. The remaining lines in the program file (from lines 112 onward, though not shown in Figure 20) define the equations of the QPM. They are "append commands" that each add a single equation to a model object called **fpas_b**, which is saved to the specified **%target_dir** page file (in this case, **temp_ev**).[22]

Figure 20. EViews Program File: 2_definemodel.prg (Lines 33–63)



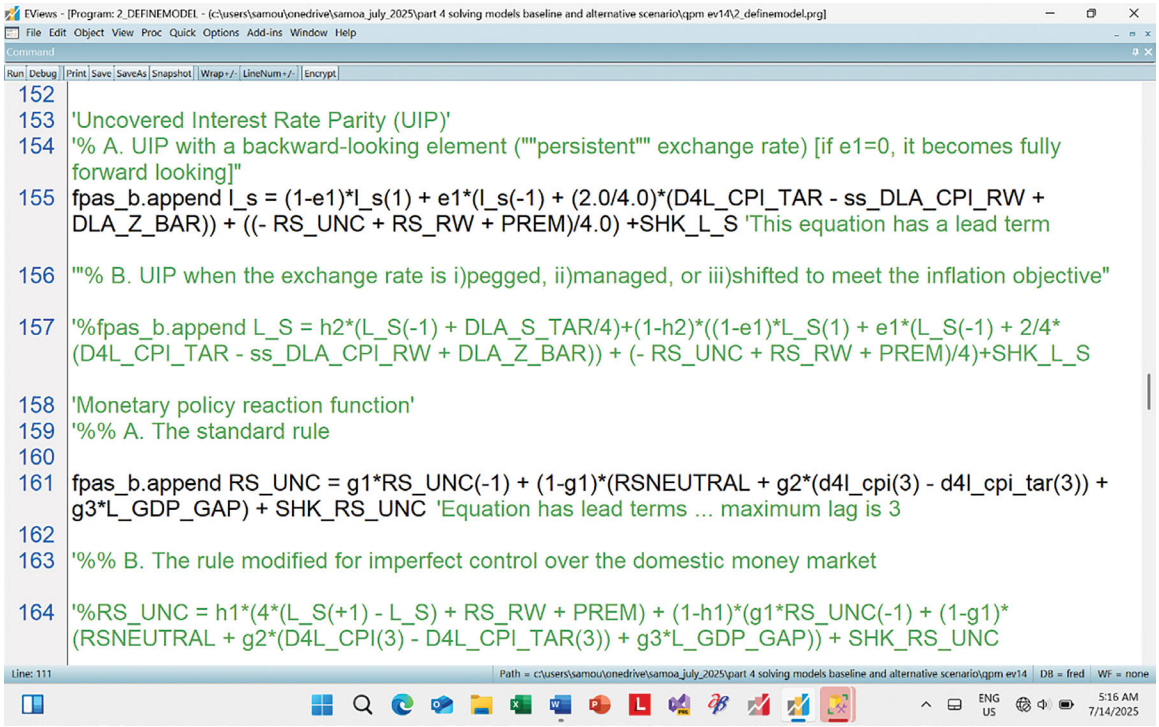
[22] The remainder of the file is partially shown in Figures 21 and 22. See Figure 22, line 155 for an example of an append command.

Figure 21. EViews Program File: 2_definemodel.prg (Lines 68–111)



```
68
69  'C. UIP when the exchange rate is managed to meet the inflation objective
70  scalar f1 = 0.50
71  scalar f2 = 0.00
72  scalar f3 = 0.00
73
74  '% Degree to which the central bank does not control domestic money market
75  scalar h1 = 0.00
76
77  'Monetary Policy Reaction Function
78
79  scalar g1 = 0.75
80  scalar g2 = 0.25
81  scalar g3 = 0.25
82
83  scalar rho_DLA_RPF_BAR = 0.75
84  scalar rho_DLA_RPXFE_BAR = 0.75
85  scalar rho_SHKN_PREM = 0.5
86  scalar rho_DLA_Z_BAR = 0.8
87  scalar rho_RR_BAR = rho_DLA_Z_BAR
88  scalar rho_DLA_GDP_BAR = rho_DLA_Z_BAR
89  scalar rho_RR_RW_BAR = rho_DLA_Z_BAR
90  scalar rho_L_GDP_RW_GAP = 0.8
91  scalar rho_RS_RW = 0.8
92  scalar rho_DLA_CPI_RW = rho_RS_RW
93  scalar rho_DLA_S_CROSS = 0.25
94  scalar rho_L_RWFOOD_GAP = 0.5
95  scalar rho_DLA_RWFOOD_BAR = 0.9
96  scalar rho_L_RWOIL_GAP = 0.5
97  scalar rho_rpf_bar = 0
98  scalar rho_DLA_RWOIL_BAR  = 0.9 'Must be checked!
99  scalar rho_D4L_CPI_TAR = 0.5
100
101 scalar ss_D4L_CPI_TAR =  2
102 scalar ss_RR_BAR = 0.5
103 scalar ss_DLA_Z_BAR = -1.5
104 scalar ss_DLA_GDP_BAR = 2.5
105 scalar ss_DLA_CPI_RW = 2.0
106 scalar ss_RR_RW_BAR = 0.75
107 scalar ss_DLA_RPF_BAR = 0.0
108 scalar ss_DLA_RPXFE_BAR = 0.0
109 scalar ss_DLA_RWFOOD_BAR = 0.0
110 scalar ss_DLA_RWOIL_BAR = 5.0
111
```

Figure 22. EViews Program File: 2_definemodel.prg (Lines 152–164)



```
152
153 'Uncovered Interest Rate Parity (UIP)'
154 '% A. UIP with a backward-looking element (""persistent"" exchange rate) [if e1=0, it becomes fully
    forward looking]"
155 fpas_b.append l_s = (1-e1)*l_s(1) + e1*(l_s(-1) + (2.0/4.0)*(D4L_CPI_TAR - ss_DLA_CPI_RW +
    DLA_Z_BAR)) + ((- RS_UNC + RS_RW + PREM)/4.0) +SHK_L_S 'This equation has a lead term

156 '"% B. UIP when the exchange rate is i)pegged, ii)managed, or iii)shifted to meet the inflation objective"

157 '%fpas_b.append L_S = h2*(L_S(-1) + DLA_S_TAR/4)+(1-h2)*((1-e1)*L_S(1) + e1*(L_S(-1) + 2/4*
    (D4L_CPI_TAR - ss_DLA_CPI_RW + DLA_Z_BAR)) + (- RS_UNC + RS_RW + PREM)/4)+SHK_L_S

158 'Monetary policy reaction function'
159 '%% A. The standard rule
160
161 fpas_b.append RS_UNC = g1*RS_UNC(-1) + (1-g1)*(RSNEUTRAL + g2*(d4l_cpi(3) - d4l_cpi_tar(3)) +
    g3*L_GDP_GAP) + SHK_RS_UNC 'Equation has lead terms ... maximum lag is 3
162
163 '%% B. The rule modified for imperfect control over the domestic money market

164 '%RS_UNC = h1*(4*(L_S(+1) - L_S) + RS_RW + PREM) + (1-h1)*(g1*RS_UNC(-1) + (1-g1)*
    (RSNEUTRAL + g2*(D4L_CPI(3) - D4L_CPI_TAR(3)) + g3*L_GDP_GAP)) + SHK_RS_UNC
```

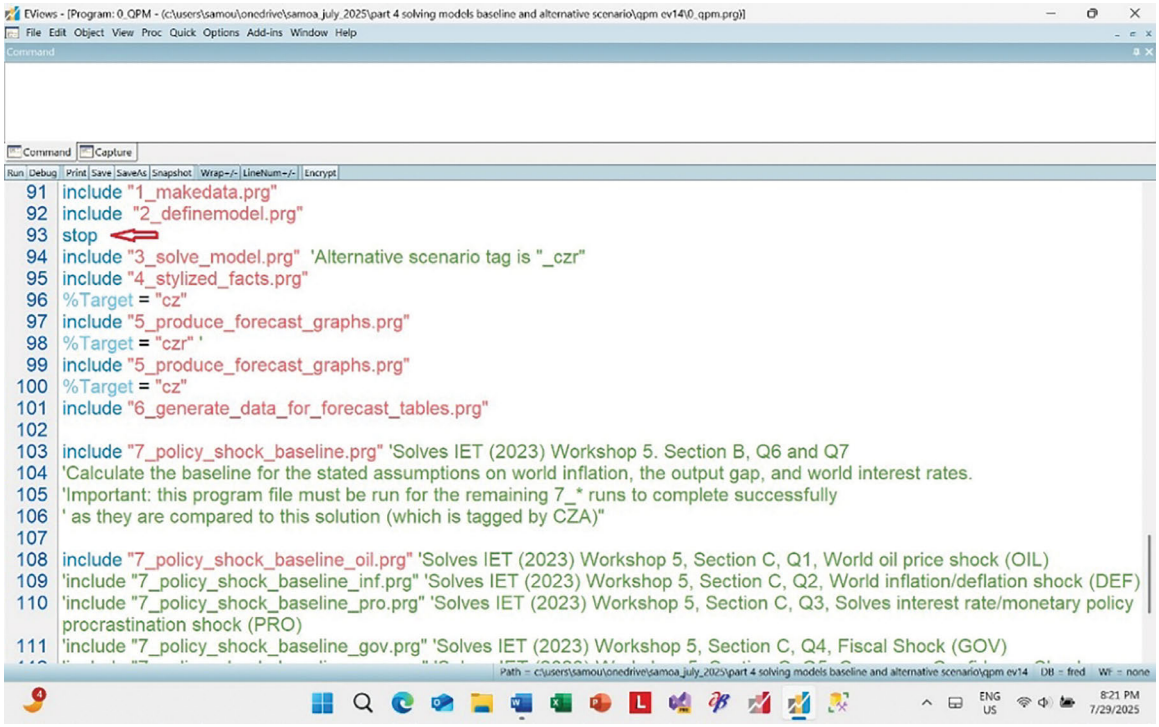
The default version of the **2_definemodel.prg** is for the canonical version of the QPM. It assumes the central bank has adopted inflation targeting and a UIP with a backward-looking component (depending on the setting of the parameter e_1 [see line 155]).[23]

If the central bank controls the exchange rate to a certain extent, line 155 (Figure 22) should be replaced with line 157 (which is a comment line in the default version of **2_definemodel.prg)**. The parameter h_2 in this equation should reflect the degree of control that the central bank has over the nominal exchange rate (pegged, managed, or shifted to meet the inflation objective). Higher values of h_2 imply greater control over the exchange rate.

The next adjustment relates to the monetary policy or interest rate adjustment rule that the central bank uses. The default version of this rule is shown in line 161. It assumes that the central bank has full control over domestic interest rates and adjusts them, with some persistence, as a function of the risk-free neutral rate, the gap between the inflation target and inflationary expectations, and the output gap. Of course, the equation may also be modified to reflect less of a forward-looking element for inflationary expectations (the default is three periods ahead).

Once these edits are completed, the program **2_definemodel.prg** will run from **0_qpm.prg**. First, edit the program **0_qpm.prg** and shift the line with the **stop** command so that it is now immediately after the line "**include 2_definemodel.prg**" (as shown in Figure 23).

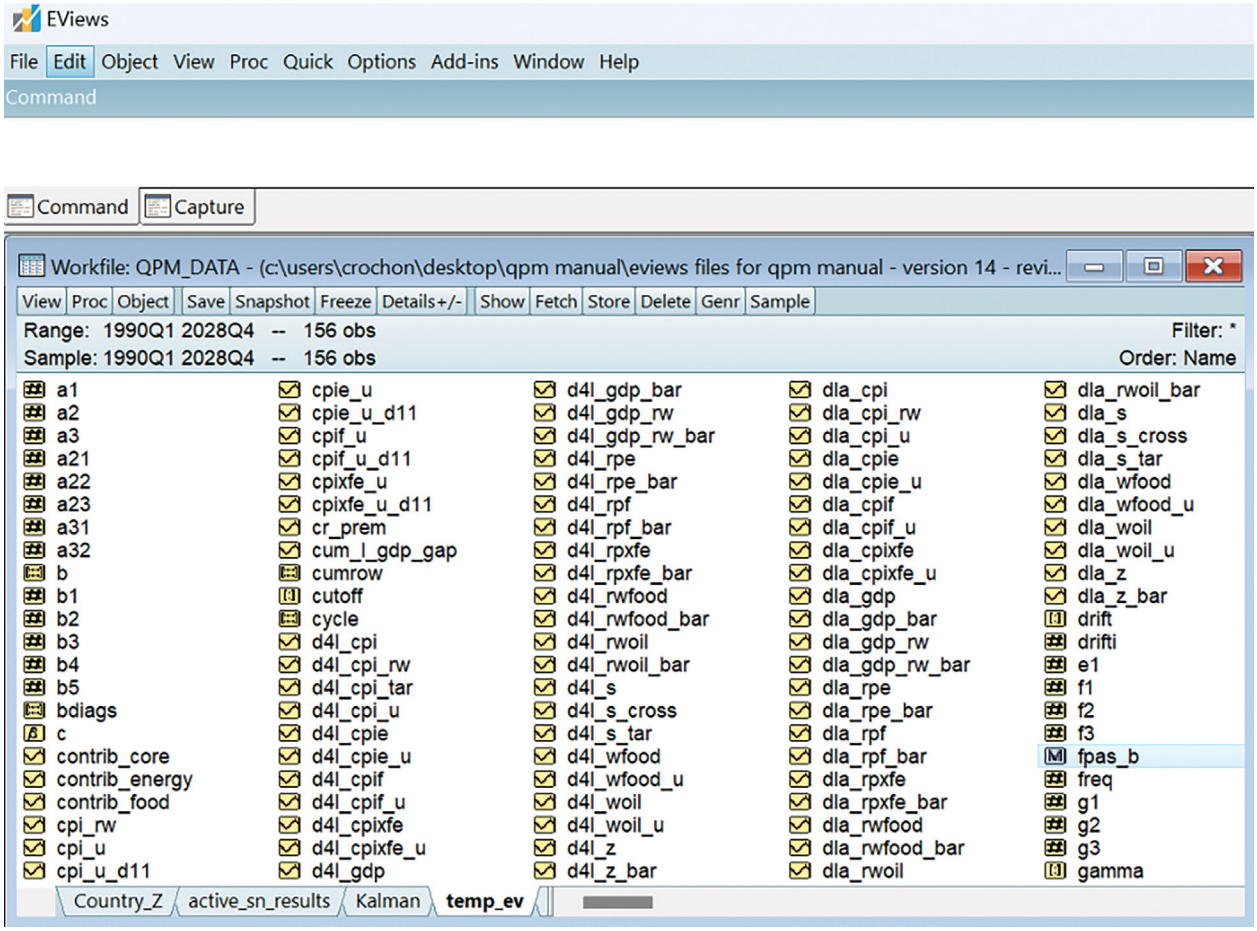
Figure 23. EViews Program File: 0_qpm.prg (Lines 91–111)



[23] The parameter e_1 ranges between 0 (completely forward looking) and 1 (completely backward looking).

After making these changes, run the program by clicking on the **Run** tab in the upper left-hand corner of the screen. The result will be a reconstructed **%target_dir** page file called **temp_ev** (given the setting of **%target_dir**) containing an EViews model object called **fpas_b** (Figure 24).

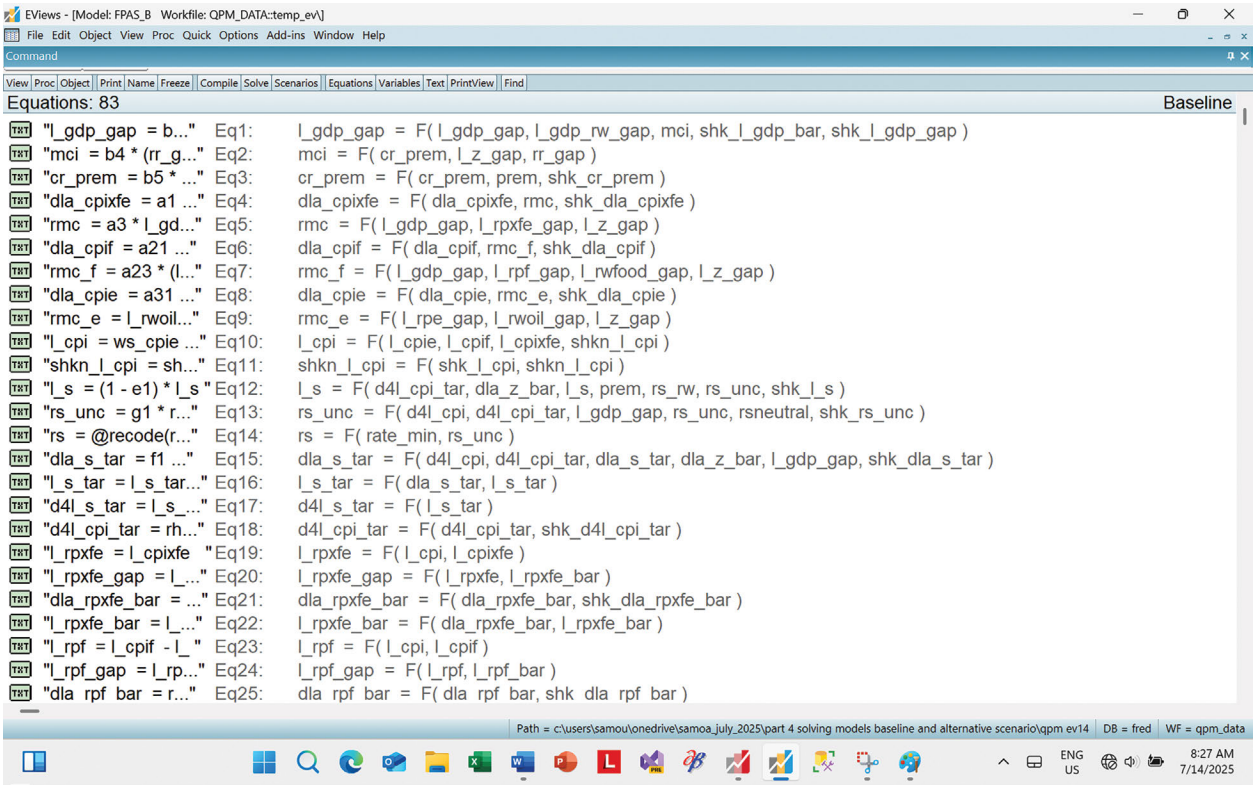
Figure 24. "temp_ev" after 2_definemodel.prg Is Processed



Double-clicking on the **fpas_b** model object shows the equations contained in the object (Figure 25).[24] Double-clicking on any equation in the **fpas_b** object shows the algebraic definition of the equation (Figure 26).

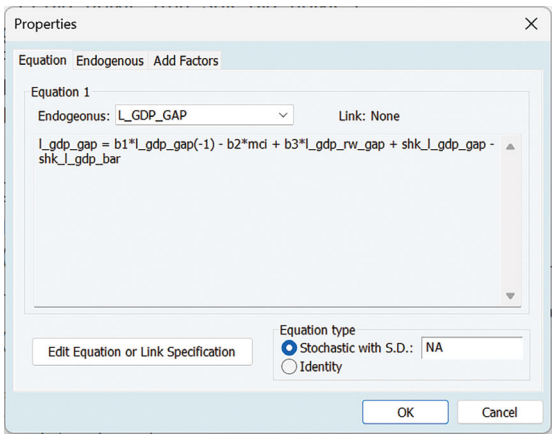
[24] The model object indicates that there are 83 equations in the QPM. Most of these equations are identities, added to automate the generation of derived variables from the baseline solution of the model.

Figure 25. QPM Equations in FPAS_B



For example, double-clicking on the **l_gdp_gap** equation (first line of **fpas_b**) shows the algebraic definition of the equation. Notice its dependence on three parameters (b_1, b_2, b_3), all of which need to be calibrated before the QPM can be solved.

Figure 26. L_GDP_GAP Equation in FPAS_B



The endogenous and exogenous variables of the QPM can be listed by clicking on the "**Variables**" tab (Figure 25). The resulting view indicates that the canonical version of the QPM has 83 endogenous and 27 exogenous variables (Figure 27).

Figure 27. Endogenous Variables in the FPAS_B QPM

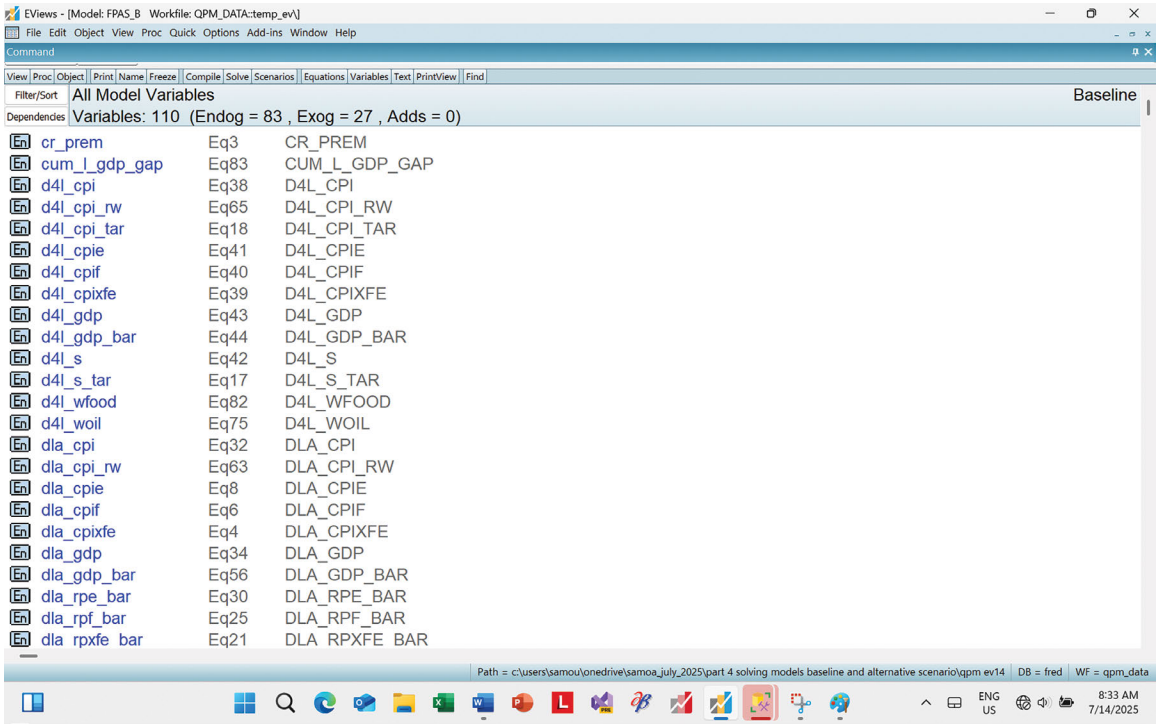
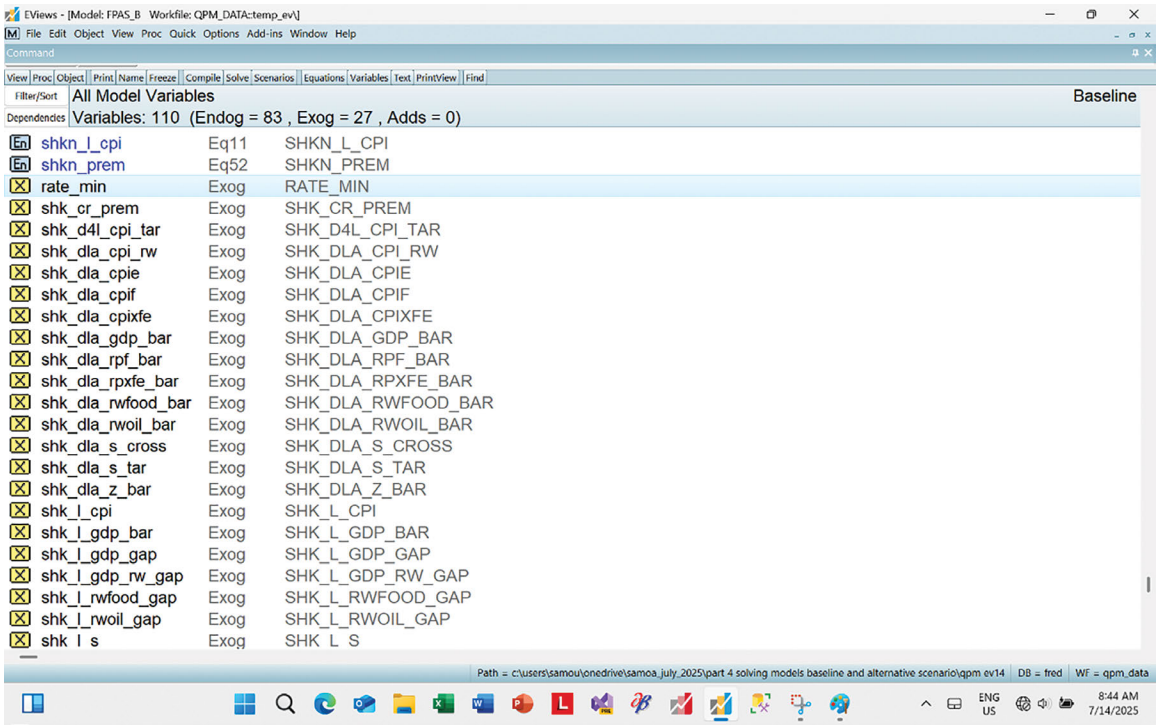


Figure 28 shows the exogenous variables of the QPM.

Figure 28. Exogenous Variables in the FPAS_B QPM

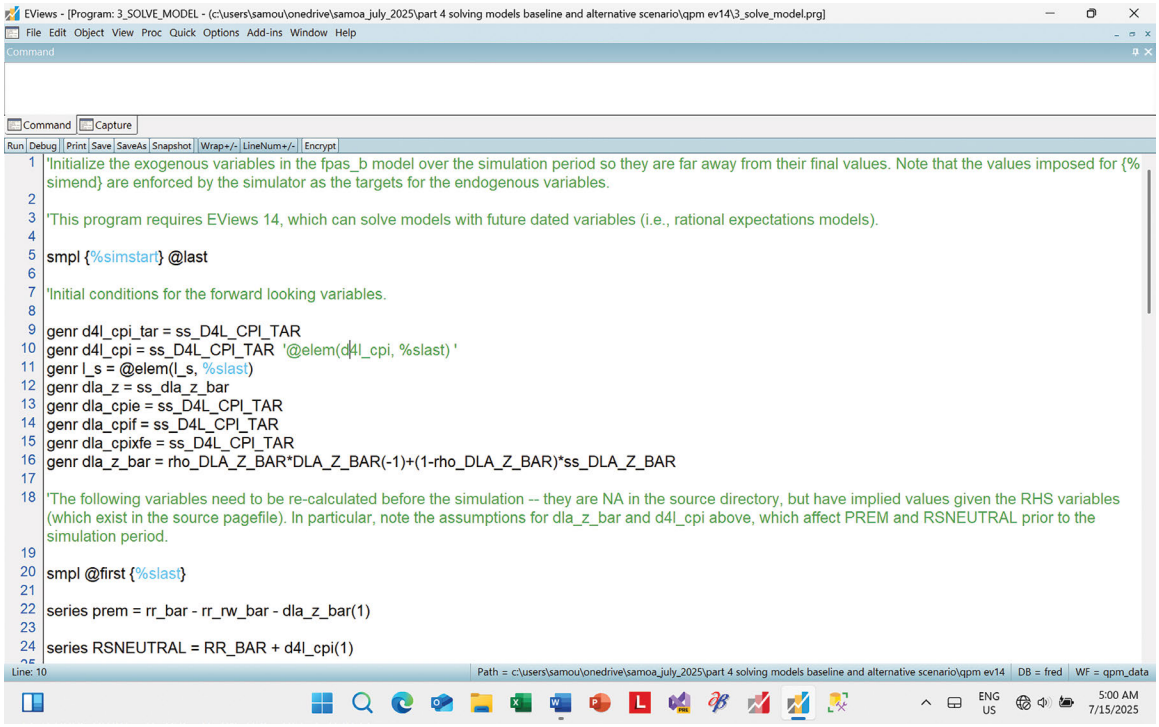


Observe that the only exogenous variables in the model are the structural error terms of the key endogenous variables. These variables begin with "**shk_**" and are typically set to zero for the baseline solution. Most of the 83 equations in the QPM are identities (56 in total). They were added to the QPM so that the EViews solver would also calculate and save to the **%target_dir** (or **temp_ev)** page file key series that are deterministic functions (for example, the 56 identities) of the baseline solution variables.

F. Step 6: Solve for the Baseline Solution

Solving for the baseline solution, given the calibration of the QPM and the available data, involves running the program **3_solve_model.prg**. Open this file using "**File ➔ Open ➔ Programs...**" to inspect its content (Figure 29).

Figure 29. 3_solve_model.prg (Lines 1–24)



Lines 9–24 initialize the values of variables with expectations terms in the QPM for the solution horizon (**%sstart** to the last period in the page file range). EViews will use these values to generate an initial solution.[25] The solution algorithm (E-QNewton) will then shift the initial values of the forward-looking variables toward the optimal solution and again solve the model conditional on the revised values (that is, solve for the next

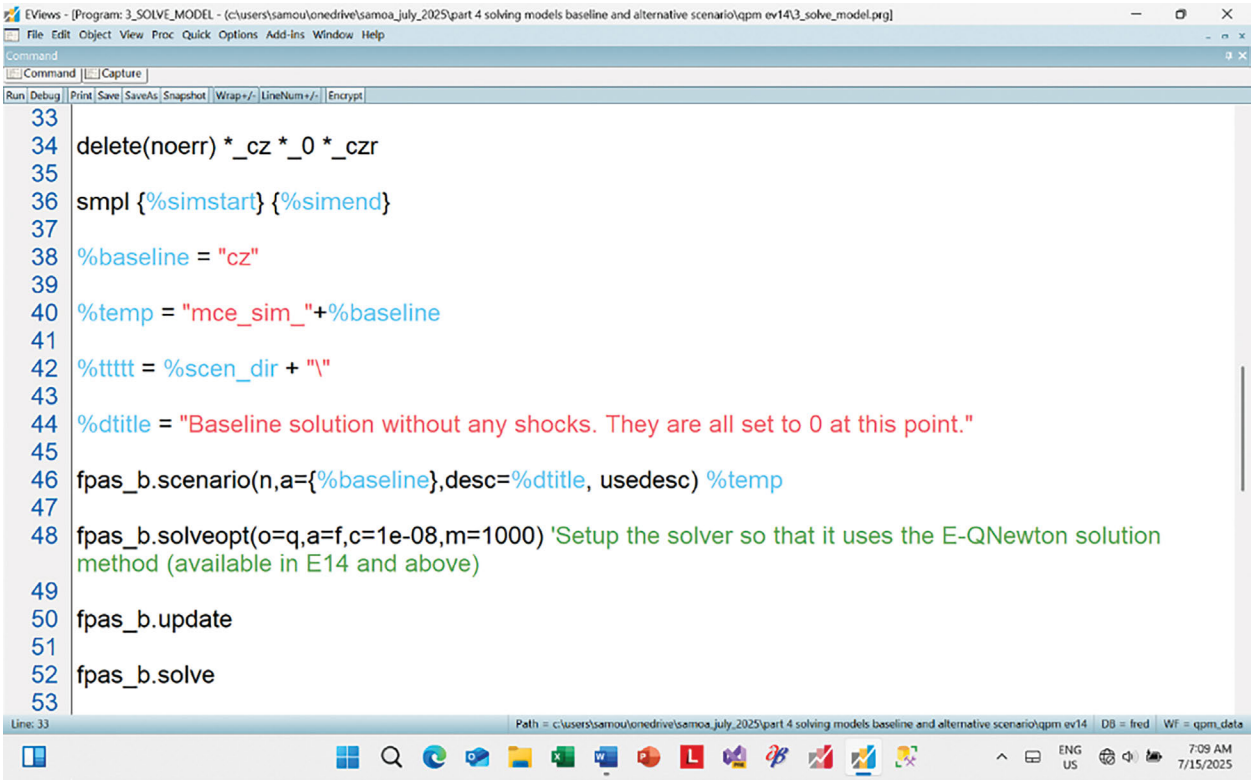
[25] The program sets most of these variables to their steady-state value (see Table 1).

iteration). This process continues until the algorithm converges—that is, it determines that further changes in the future-dated variables, given the current solution, are not possible or needed.

The last data preparation step (lines 30–32) before solving the model is to assign within-sample (that is, prior to the start of the simulation period) values to the series **rs_unc** (the nominal policy interest rate, percent per annum) and the series **cr_prem** (the credit risk premium). This step is necessary because the values of these variables before the start of the simulation period cannot have missing values. They can be derived from the actual (within-sample) data.

With these changes, the QPM can be solved successfully, given the current data setup and calibration. The commands to do so are shown in Figure 30.

Figure 30. 3_solve_model.prg (Lines 33–53)

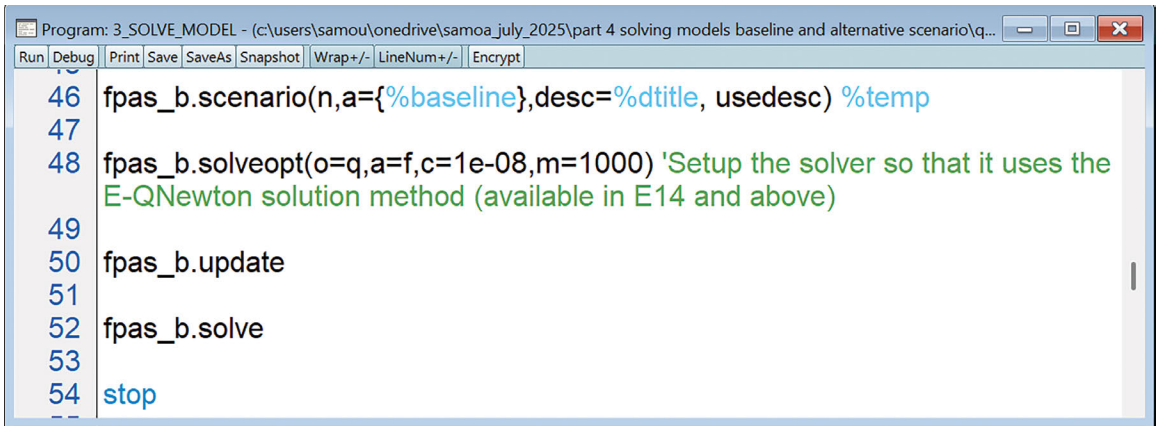


Recall that the parameter **%baseline** sets the suffix (string) attached to the names of the series containing the baseline solution. Thus, with **%baseline = "_cz"**, the solution for real GDP, which is called **l_gdp** in the working page file, will be saved in a series named **l_gdp_cz**. Lines 40–46 define additional strings to describe the simulation.[26] They can be changed as required. Lines 48–52 are the commands that solve the model, given the solve options added in line 48.

Last, add (temporarily) a **stop** command at line 53. This will prevent the remaining commands in the current program file from being executed (more on these commands in the following sections).

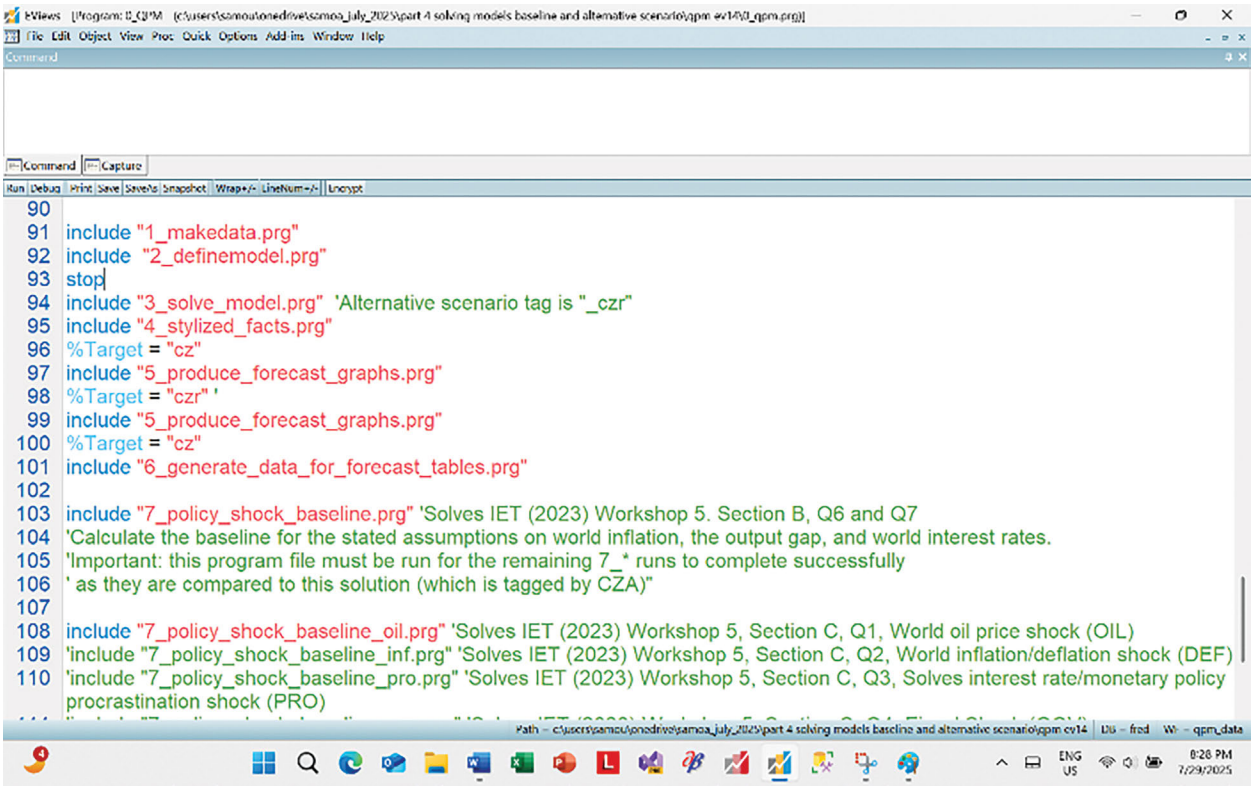
[26] For example, "**mce_sim_**" in the program is an abbreviation of "model-consistent expectations simulation." Its setting does not influence the solution of the model. See the EViews help file for complete explanations of the "`.scenario`", "`.solveopt`", and "`.solve`" commands.

Figure 31. 3_solve_model.prg (Lines 46–54)



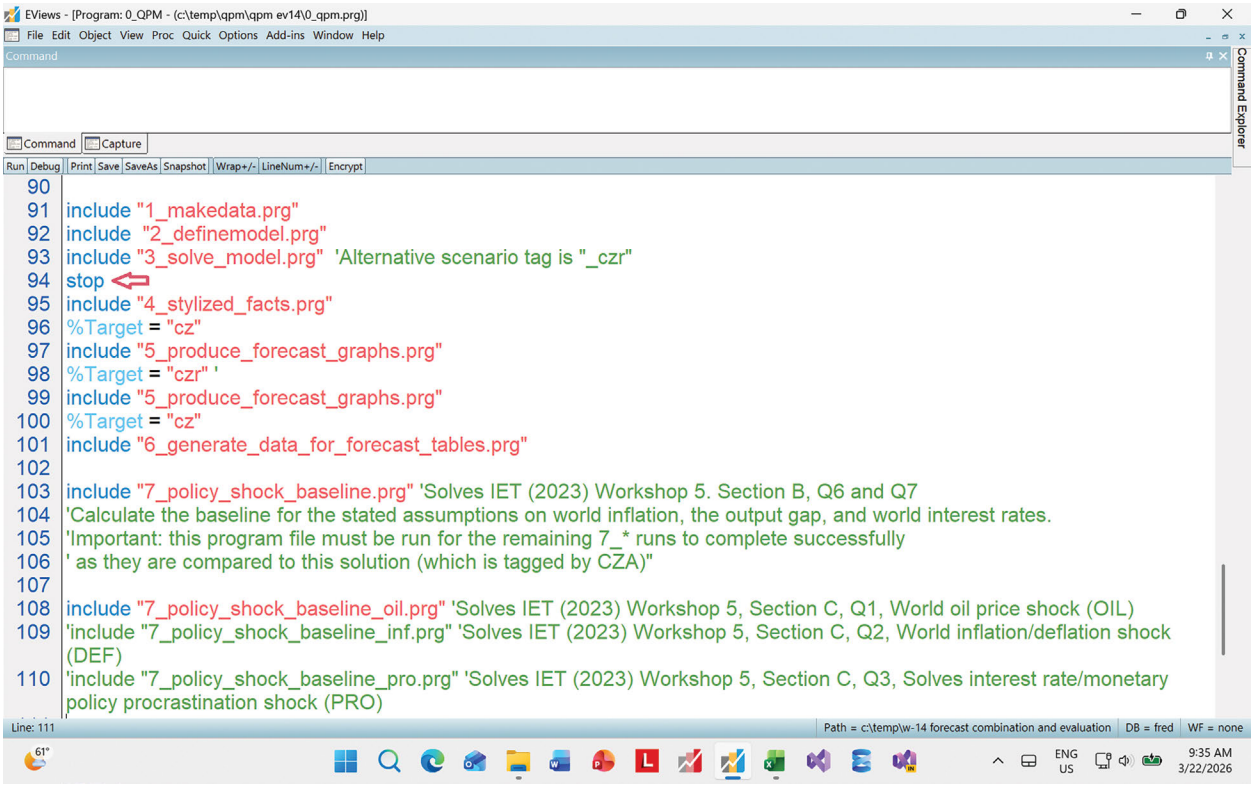
The model cannot be solved by running the **3_solve_model.prg** file directly. It must be run from the program file **0_qpm.prg**. Open this file using "**File → Open → Programs...**" (Figure 32).

Figure 32. 0_qpm.prg (Lines 90–110)



Edit this program so that the **stop** command on line 93 is now after line 93 ("**include 3_solve_model.prg**") (Figure 33).

Figure 33. 0_qpm.prg with a "stop" Command at Line 94



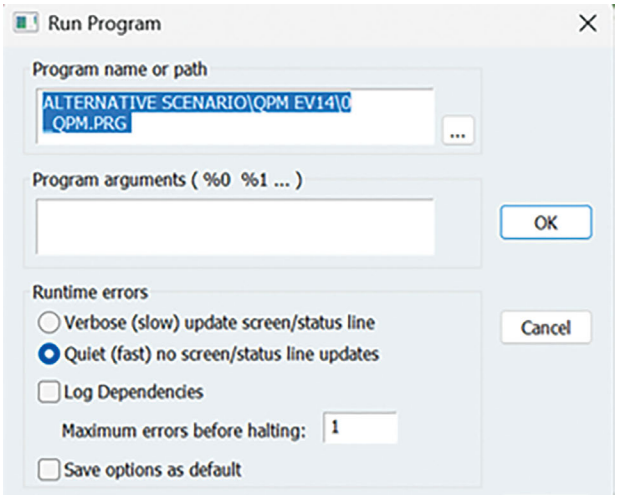
Doing so will ensure that the program file **3_solve_model.prg** will be processed every time **0_qpm.prg** is run.[27]

With this change, and the **stop** command in **3_solve_model.prg**, the program will process **1_makedata.prg**, **2_definemodel.prg**, and (partially) **3_solve_model.prg**, after which it will terminate.

Clicking the **Run** tab, as before, brings up the dialog box shown in Figure 34. Press the **OK** button to solve the model.

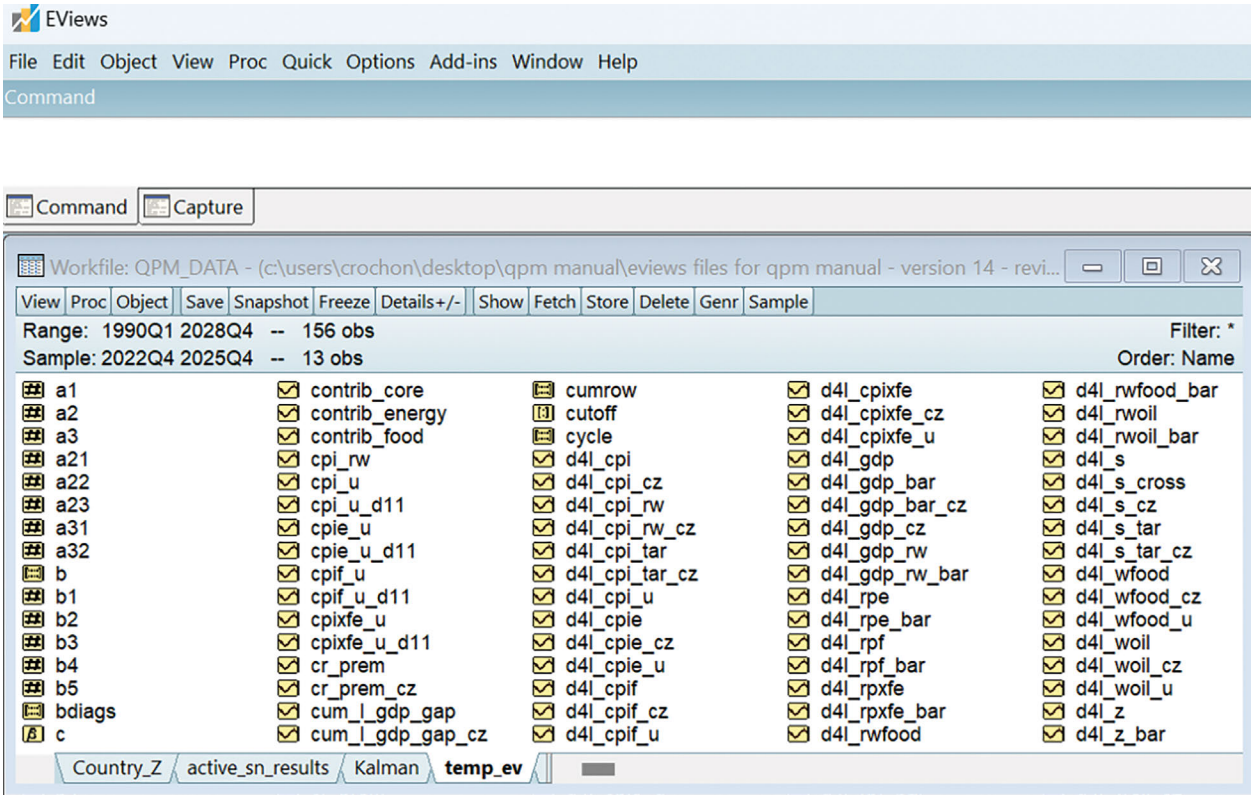
[27] Of course, given the **stop** command that is present in the program file **3_solve_model.prg** at line 54 in Figure 31, the new **stop** command in **0_qpm.prg** at line 94 will never be executed, making it unnecessary.

Figure 34. EViews "Run Program" Dialog Box



Given the settings, the solution variables are tagged with the string "**_cz**" and saved in the page file called **temp_ev**. Note that one series is created for each of the 83 endogenous variables in the model. Partial contents of the **temp_ev** page file are shown in Figure 35.

Figure 35. Page File "temp_ev" after Solving the QPM

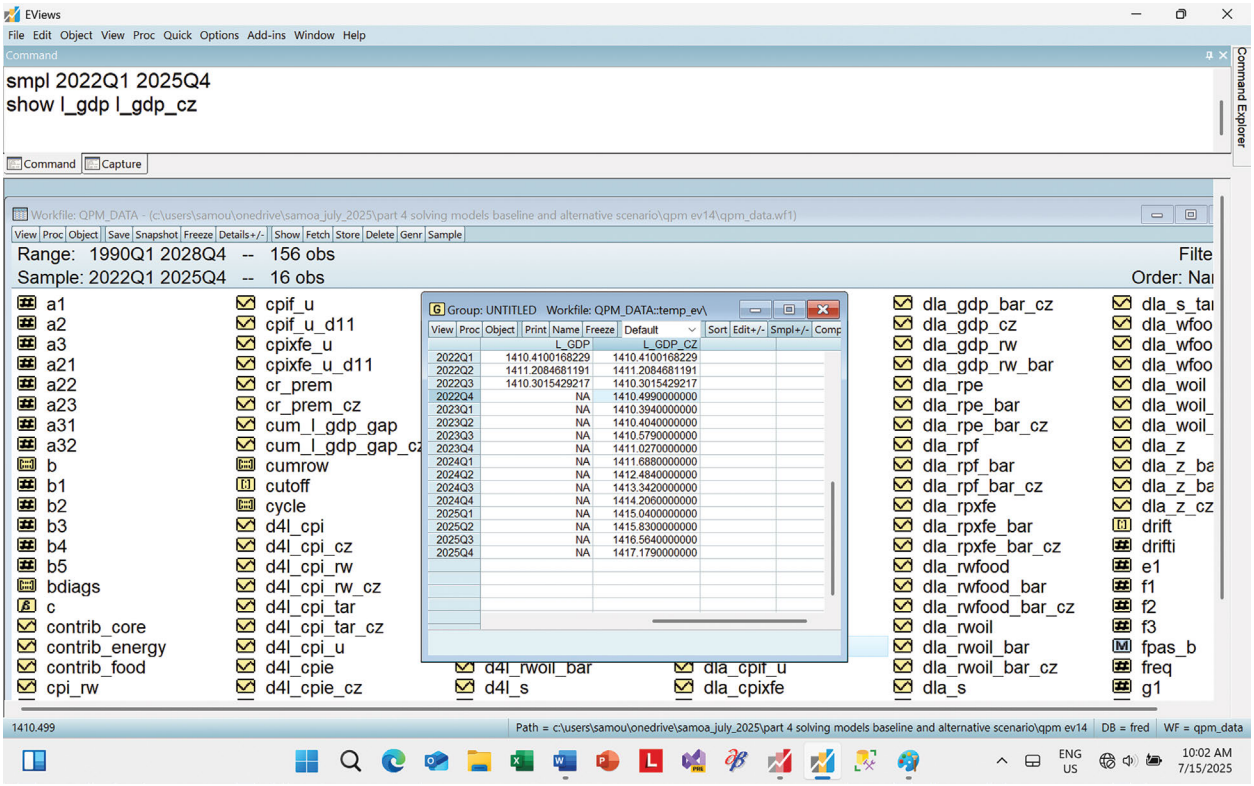


To examine the solution or forecast for (100 times the logarithm) of real GDP (named **l_gdp** in the QPM), for example, issue the following EViews commands:

```
smpl 2022:1 2025:4
show l_gdp l_gdp_cz
```

in the upper command area. The result will be the spreadsheet view shown in Figure 36 (the background is a directory view of the contents of the **temp_ev** page file).

Figure 36. Baseline Solution for L_GDP

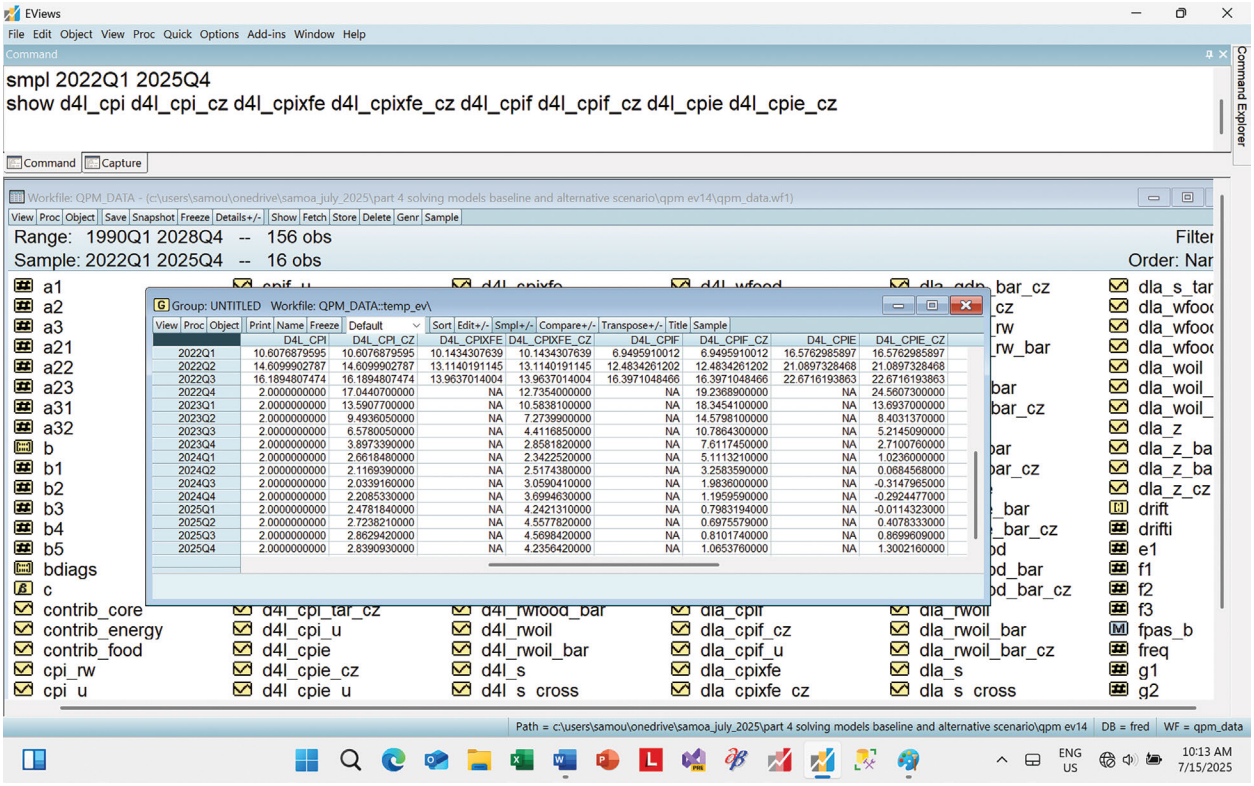


Note that the baseline solution for the simulation horizon (2022:4–2025:4) is stored in the variable called **l_gdp_cz**. Likewise, the baseline solution for overall inflation and its three components (core, **d4l_cpixfe**, food, **d4l_cpif**, and energy, **d4l_cpie**) can be viewed as a group using the following EViews **show** command:

```
show d4l_cpi d4l_cpi_cz d4l_cpixfe d4l_cpixfe_cz d4l_cpif d4l_cpif_cz d4l_cpie d4l_cpie_cz
```

Executing this command produces the following spreadsheet view (Figure 37):

Figure 37. Baseline Solution for D4L_CPI, D4L_CPIXFE, D4L_CPIF, D4L_CPIE

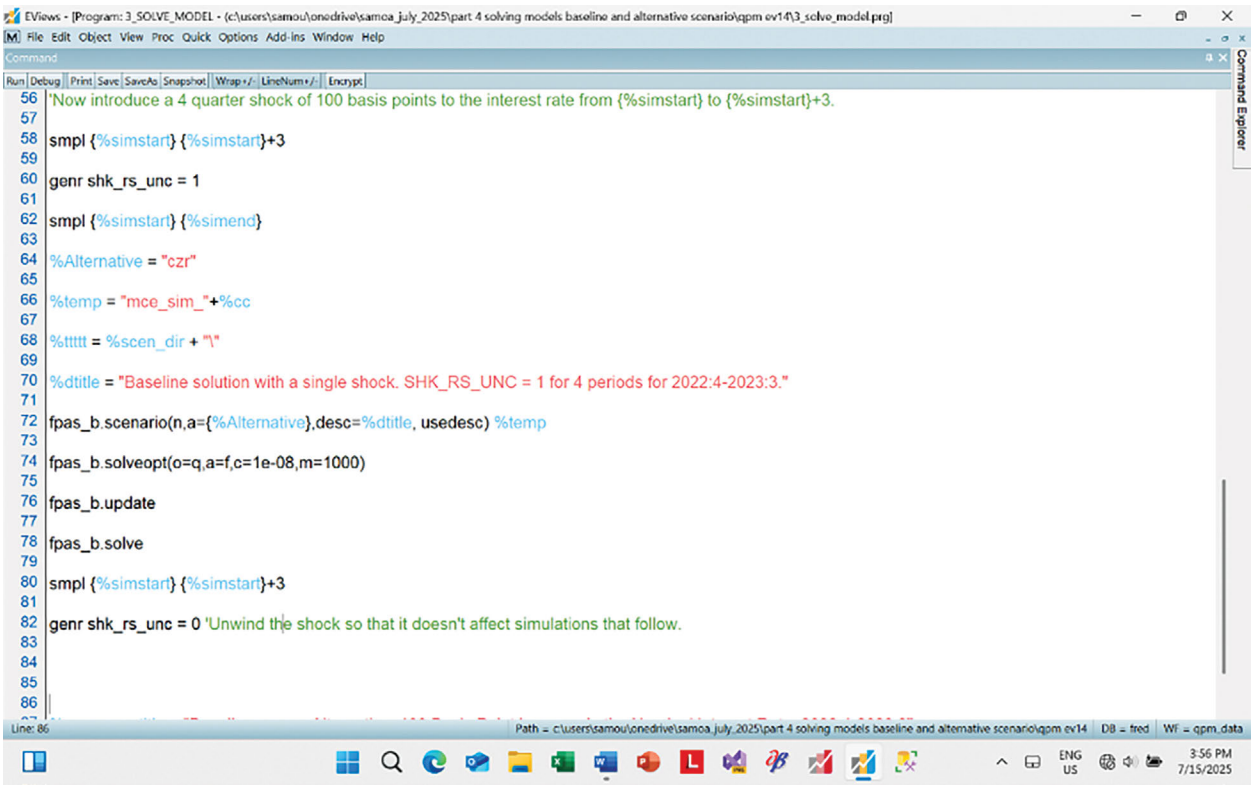


G. Step 7: Create and Solve Alternative Scenarios

An alternative scenario introduces a shock to the baseline settings by changing the setting of one or more of the "**shk_**" (exogenous shock) variables to a non-zero value. The non-zero setting may be for a single period, a contiguous range of periods, or several non-adjacent periods.

For example, suppose that the central bank plans to introduce a four-period 100 basis point increase in the interest rate starting in 2022:4, the first period of the forecast horizon. Lines 56–82 in **3_solve_model.prg** show how to solve the QPM with this proposed "shock" to the baseline (see Figure 38).

Figure 38. 3_solve_model.prg (Lines 56–86)



In lines 58–62, the **shk_rs_unc** variable is modified to introduce a 100 basis-point shock to the central bank policy rate during 2022:4–2023:3. The model is solved under this assumption using the commands shown in lines 64–78.

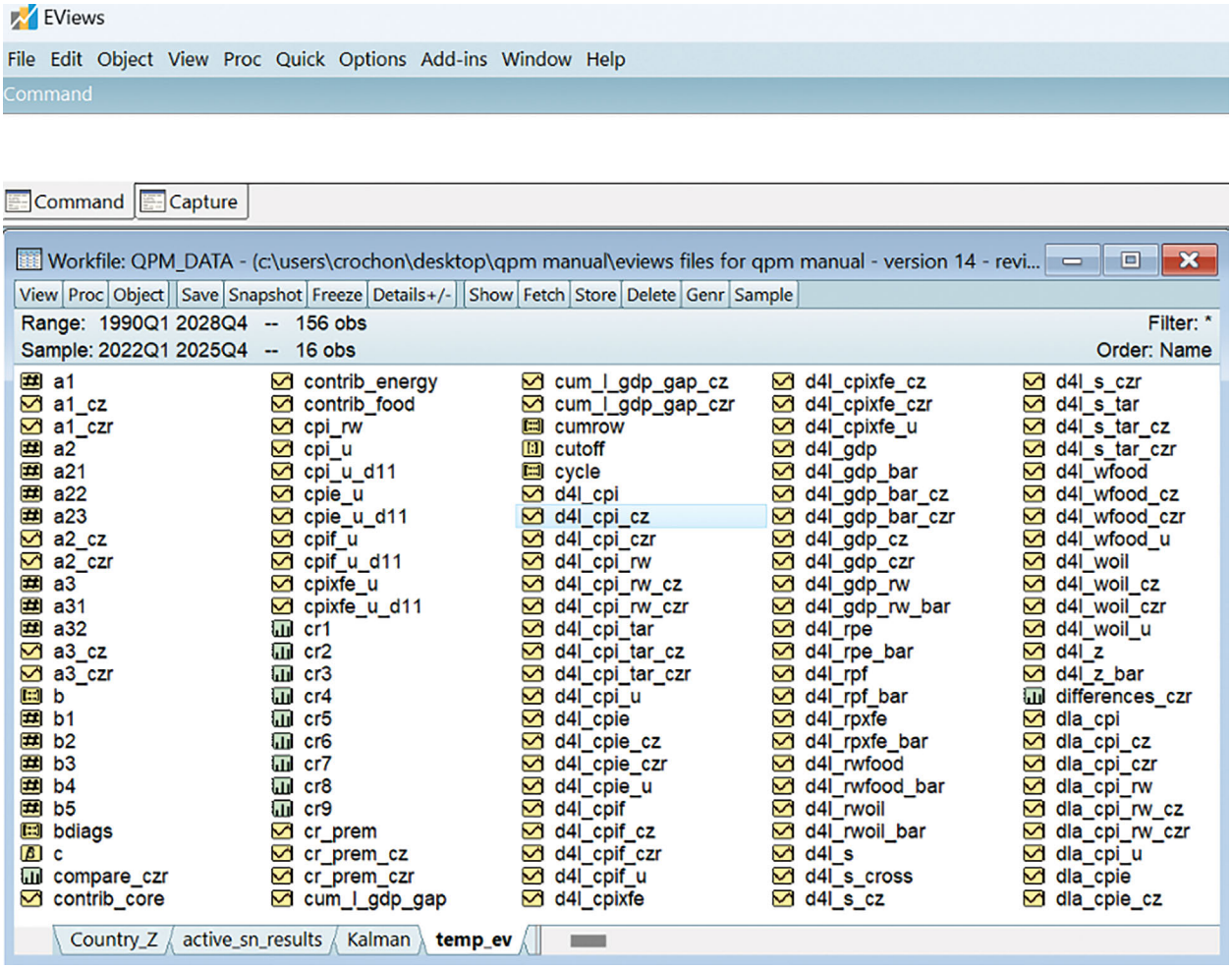
The resulting solution is often referred to as an "alternative scenario" in EViews, and, given the changed setting for the **%Alternative** parameter as "**czr**" in line 64 and its use in line 72 to adjust the default scenario settings, the solution will be stored in series that are tagged by a "**_czr**" suffix. Comparing any series tagged with a "**_czr**" suffix to the same variable with a "**_cz**" suffix (that is, the baseline solution without the shock) will reveal the effect of the proposed policy change on the baseline forecast.

Note that once the model is solved under the alternative scenario, it is imperative to return the shock variable to zero. This will ensure that the shock is nullified and will not affect subsequent simulations (Figure 38, lines 80–82).[28]

[28] This example assumes that only a single shock affects the baseline. More complex alternative scenarios, involving multiple shocks over different time periods, are also possible. See the program files beginning with "7_" for examples of alternative scenarios involving multiple shocks.

To solve the model with the proposed shock, return to the program **0_qpm.prg**[29] and click on the **Run** tab and then click the **OK** button. Doing so re-solves the model and creates the "**_cz**" (baseline solution) and "**_czr**" (the alternative scenario solution). Figure 39 shows the state of the **temp_ev** page file once the run is completed.

Figure 39. "temp_ev" after "czr" (100 Basis Point Shock)



Notice that for each endogenous variable of the QPM, there are now three series: the original series (with no suffix and only missing [NA] values in the forecast horizon); a series with a "**_cz**" suffix, which has the baseline solution without the shock; and a series with a "**_czr**" suffix, which is the solution of the QPM with the shock embedded in the **shk_rs_unc** variable.

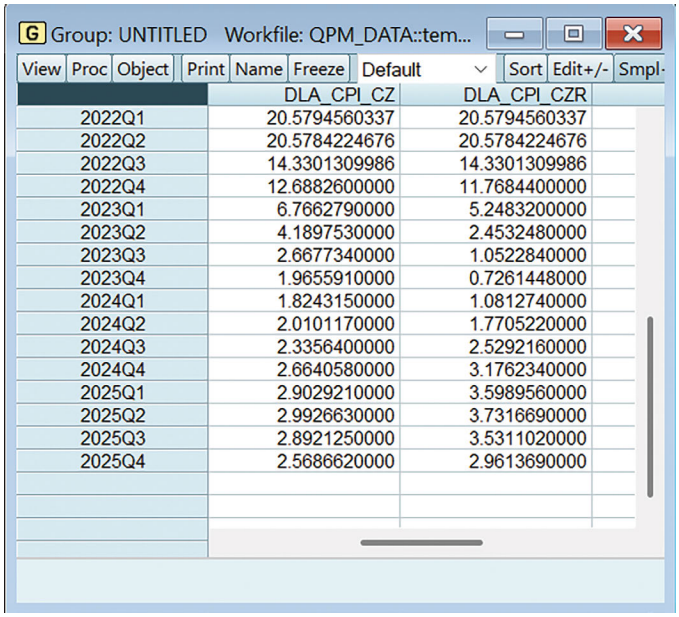
The significance of the effect of the proposed four-period shock to the policy rate on inflation (**dla_cpi,** annualized quarterly inflation rate) can be examined by issuing the following EViews commands:

```
smpl 2022:1 2025:4
show dla_cpi_cz dla_cpi_czr
```

[29] The **stop** command that was added to **3_solve_model.prg** in the previous step must be removed before rerunning the solver. Otherwise, EViews will not produce the results for the alternative scenario.

The result is shown in Figure 40.

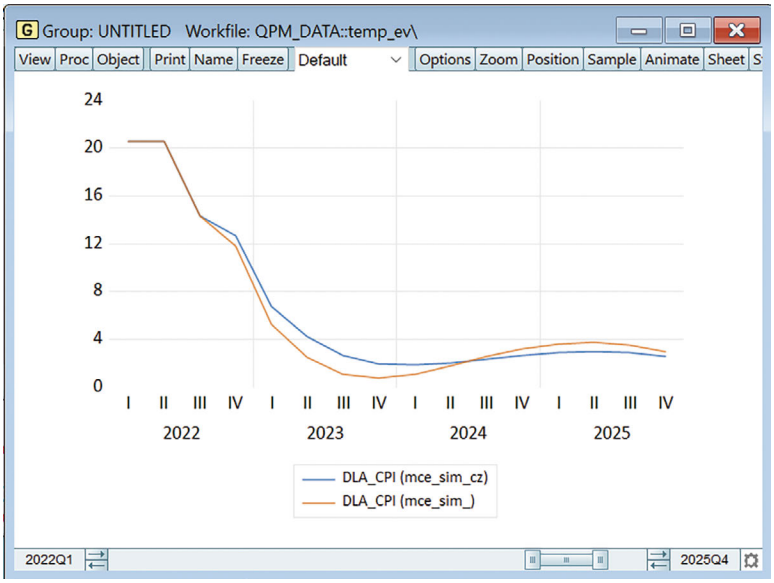
Figure 40. Spreadsheet View: DLA_CPI_CZ Versus DLA_CPI_CZR



	DLA_CPI_CZ	DLA_CPI_CZR
2022Q1	20.5794560337	20.5794560337
2022Q2	20.5784224676	20.5784224676
2022Q3	14.3301309986	14.3301309986
2022Q4	12.6882600000	11.7684400000
2023Q1	6.7662790000	5.2483200000
2023Q2	4.1897530000	2.4532480000
2023Q3	2.6677340000	1.0522840000
2023Q4	1.9655910000	0.7261448000
2024Q1	1.8243150000	1.0812740000
2024Q2	2.0101170000	1.7705220000
2024Q3	2.3356400000	2.5292160000
2024Q4	2.6640580000	3.1762340000
2025Q1	2.9029210000	3.5989560000
2025Q2	2.9926630000	3.7316690000
2025Q3	2.8921250000	3.5311020000
2025Q4	2.5686620000	2.9613690000

Click on "**View → Graph**" to plot the series on the same graph for the period 2022:1–2025:4 (Figure 41).

Figure 41. DLA_CPI_CZ Versus DLA_CPI_CZR

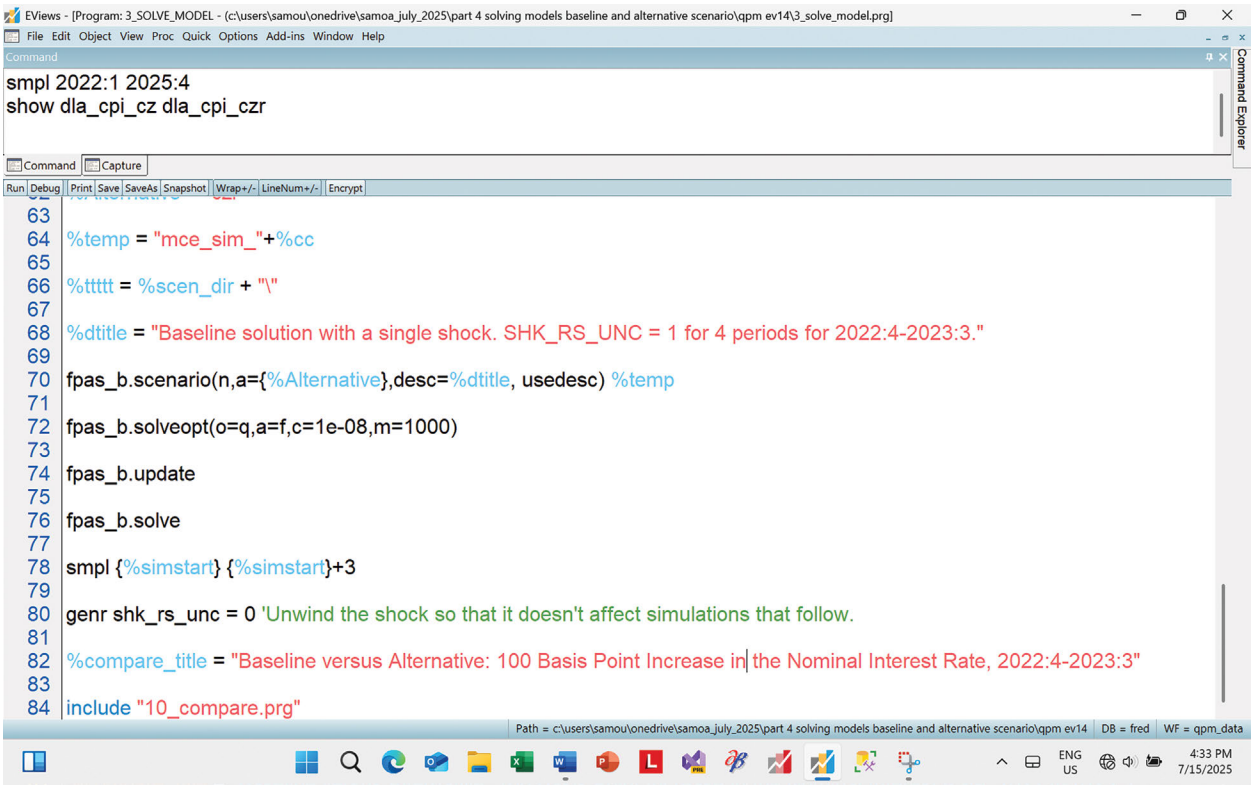


As expected, the proposed increase in the policy rate reduces inflation with a time lag.

Last, running **10_compare.prg** after an alternative scenario is generated will produce useful tables and graphs that compare the baseline solution with the alternative. The program uses the current settings for the **%baseline** and **%alternative** string variables, respectively, to determine the series in the **%target_dir** page file (**temp_ev**) that contain the baseline results and those that contain the alternative scenario results.

Lines 82–84 in the program file **3_solve_model.prg** demonstrate the use of **10_compare.prg** (see Figure 42). In this example, the **%baseline** parameter is set to "**cz**"; the **%alternative** parameter is set to "**czr**".

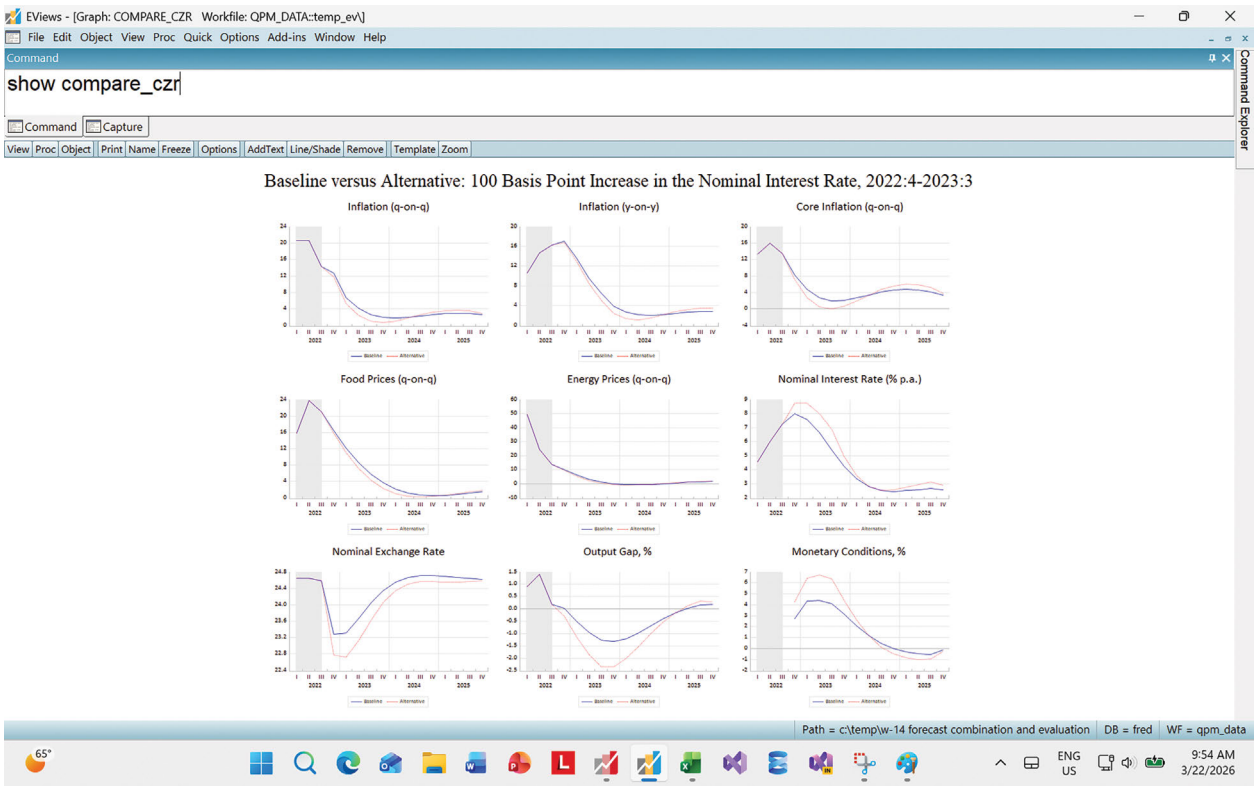
Figure 42. 3_solve_model.prg (Lines 63–84)



Running the code with **10_compare.prg** on line 84 produces two useful graph objects: **COMPARE_CZR** and **DIFFERENCES_CZR**. Double-click on these objects (or use the EViews "show" command) to inspect these graphs.

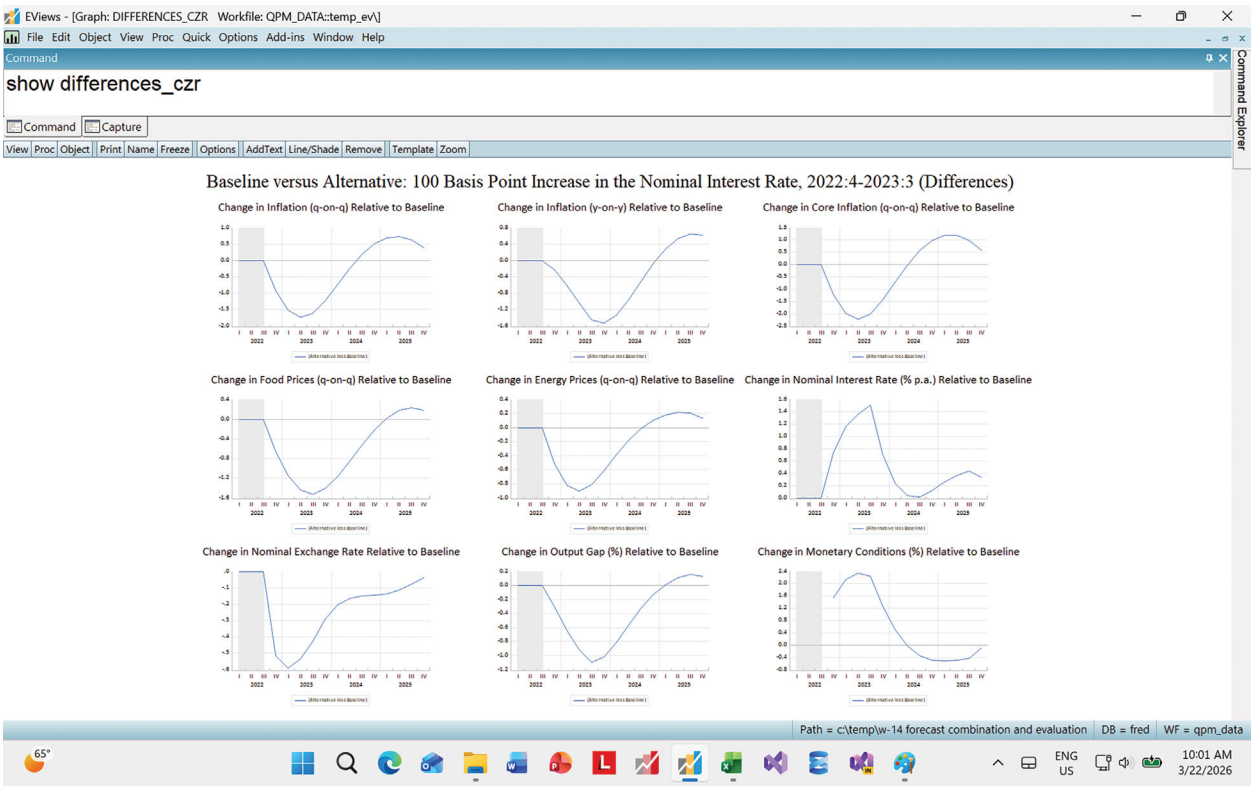
The **COMPARE_CZR** graph object (Figure 43) plots the baseline (**blue line**) against the alternative (**red line**) for nine key endogenous variables in the QPM (inflation [q-on-q], inflation [y-on-y], core inflation, food prices, energy prices, the nominal interest rate, the nominal exchange rate [increases imply a depreciation], the output gap, and the monetary conditions index). As expected, relative to the baseline solution, an increase in the policy rate reduces inflation, appreciates the nominal exchange rate, increases the monetary conditions index, and makes the output gap more negative. The effect of the interest rate increase depends on the current calibration.

Figure 43. EViews Group Object: COMPARE_CZR



The **DIFFERENCES_CZR** graph object (Figure 44) plots the difference between the alternative and the baseline solutions (that is, in this case, the function [**x_czr – x_cz**], where "**x**" is substituted by the name of a specific endogenous variable). Although this graph is a useful summary measure or indicator of the differences between the alternative and the baseline scenarios, it can provide a misleading indication of the significance of these differences because they may be negligible in absolute terms. Always consider the scale used on the vertical axis before assessing the significance of the absolute difference between the alternative scenario and the baseline.

Figure 44. EViews Group Object: DIFFERENCES_CZR



Steps 1–7 are the minimum required steps to solve the QPM using EViews. To recap, solving the QPM requires modifications to the program files **0_qpm.prg**, **1_makedata.prg**, **2_definemodel.prg**, and **3_solve_model.prg** so that

- the QPM is calibrated for the target economy;
- the endogenous variables of the QPM are initialized using **1_makedata.prg**; and
- initial conditions are also specified for the future-dated variables so that the EViews solver can generate the initial solution of the model, and iterations occur until the variables converge to the rational expectations solution.

EViews provides three methods for solving models with future-dated variables: the Fair-Taylor, E-Newton, and E-QNewton (used in this manual, as it is more robust than the other methods). The EViews help manual provides detailed information on these methods.

III. Useful Programs in the EViews QPM Package

The EViews package for solving the QPM includes additional programs (with a prefix greater than "3_") that provide useful representations of the actual data (that is, useful stylized facts), the baseline solution, and solutions involving alternative scenarios. The package also has examples of more complex scenarios, both for the baseline and the alternative (see files with a "**7_**" prefix). The next sections describe each of these programs in turn.

A. Utility Program #1: 4_stylized_facts.prg

This program produces seven graph objects named **stylized_facts_p#** that summarize the stylized facts embedded in the raw data.[30] The objects are saved in the same page file as the solution variables (that is, **%target_dir** = "**temp_ev**"). Table 4 lists the graph objects produced by **4_stylized_facts.prg**.

Table 4. Graphs Generated by 4_stylized_facts.prg

Graph Name	Content	EViews Command
stylized_facts_p1	Nominal variables (inflation, exchange rate, foreign inflation)	show stylized_facts_p1
stylized_facts_p2	CPI subcomponents (core, food, and energy)	show stylized_facts_p2
stylized_facts_p3	Real variables and trends (real GDP, potential output)	show stylized_facts_p3
stylized_facts_p4	Output gaps	show stylized_facts_p4
stylized_facts_p5	Relative prices of domestic core, food, and energy prices to foreign prices	show stylized_facts_p5
stylized_facts_p6	Foreign variables (real GDP, interest rate, output gap)	show stylized_facts_p6
stylized_facts_p7	Foreign variables (oil price inflation, world food price inflation, relative oil, and food price inflation)	show stylized_facts_p7

Note: CPI = consumer price index.

Examples of the stylized graphs produced using the **Country Z** data set are shown in Figures 45–51.

[30] These graphs are based on those produced using IRIS/MATLAB for the "Monetary Policy Analysis and Forecasting" course offered by the IMF's Institute for Capacity Development.

Figure 45. Example of stylized_facts_p1

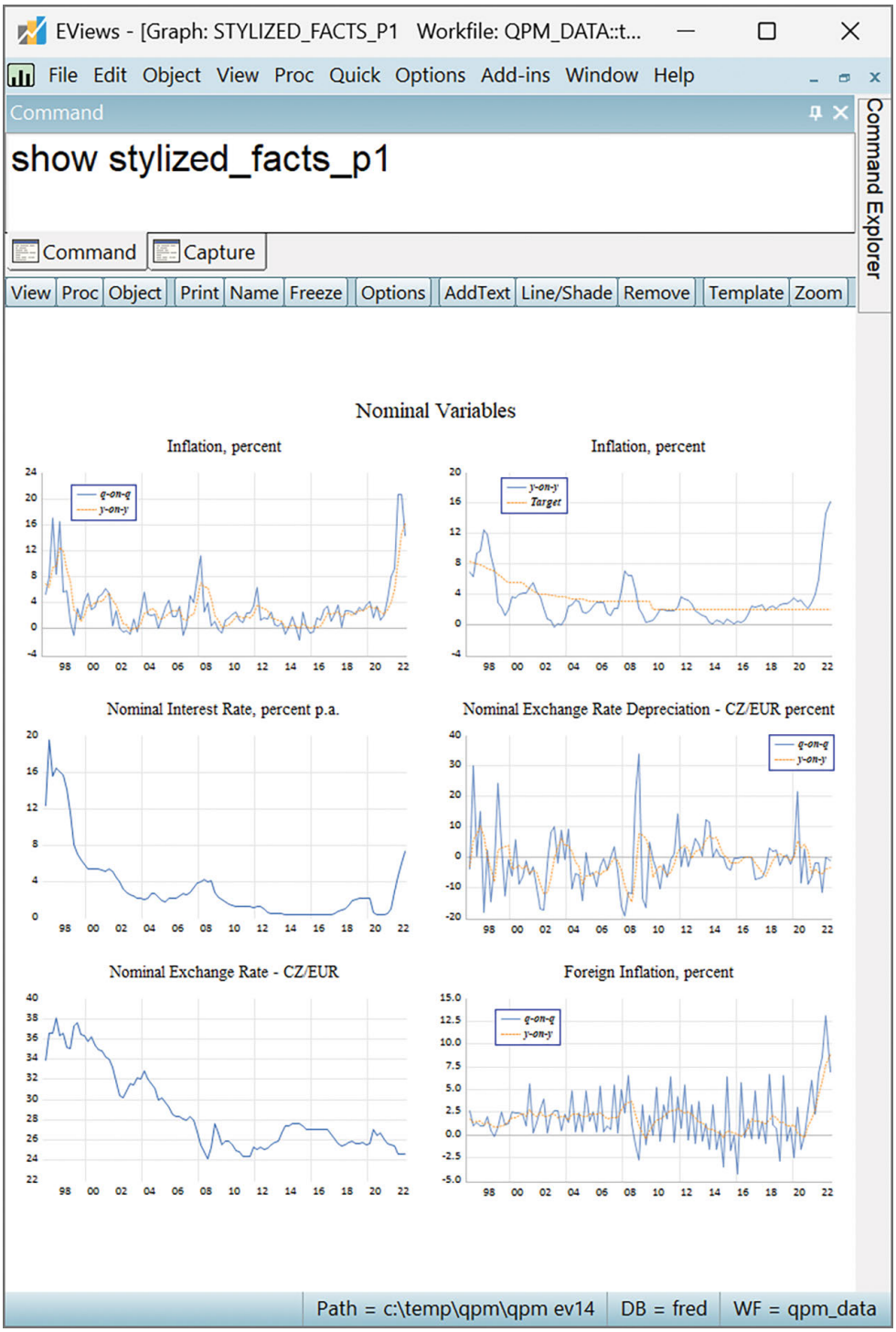


Figure 46. Example of stylized_facts_p2

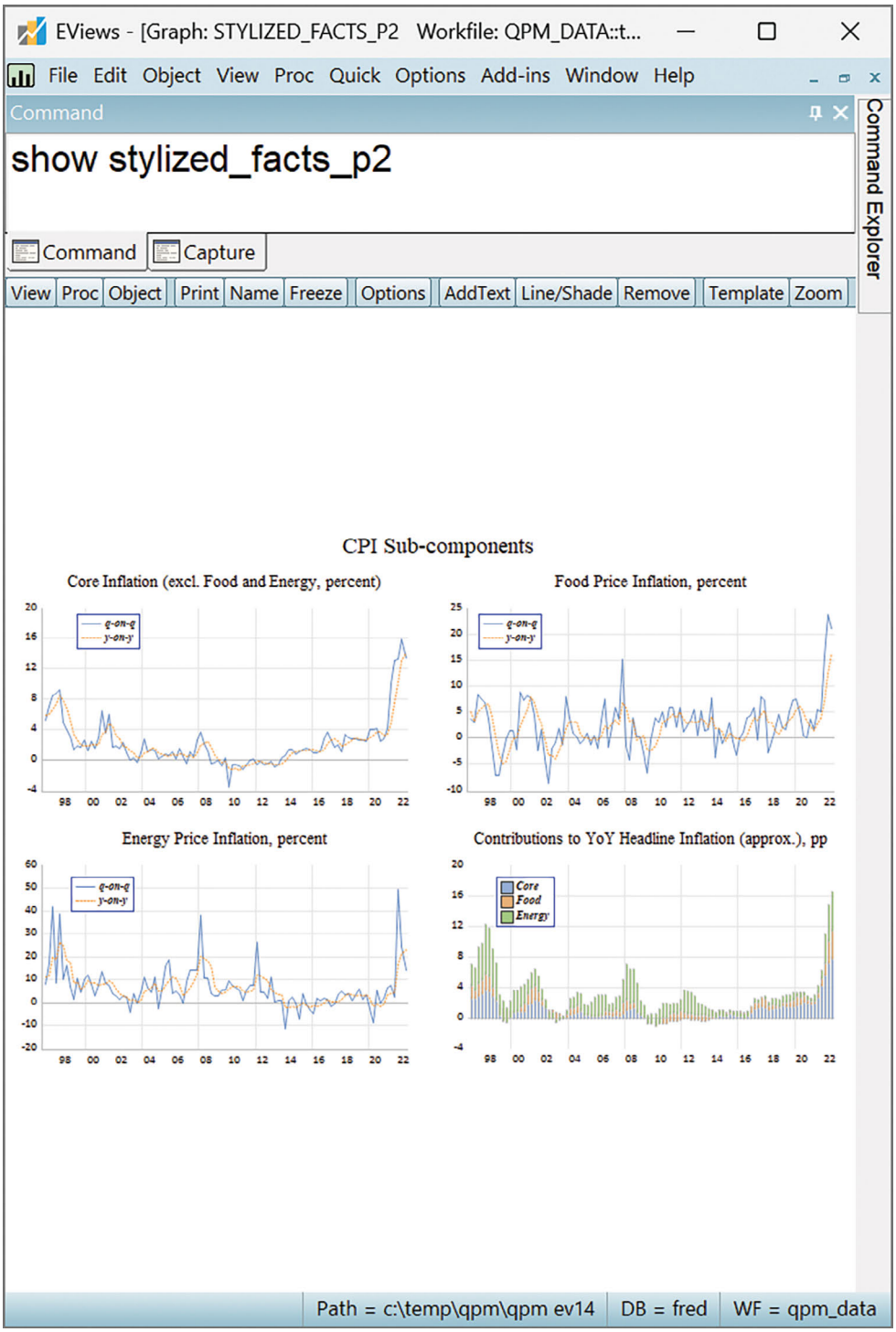


Figure 47. Example of stylized_facts_p3

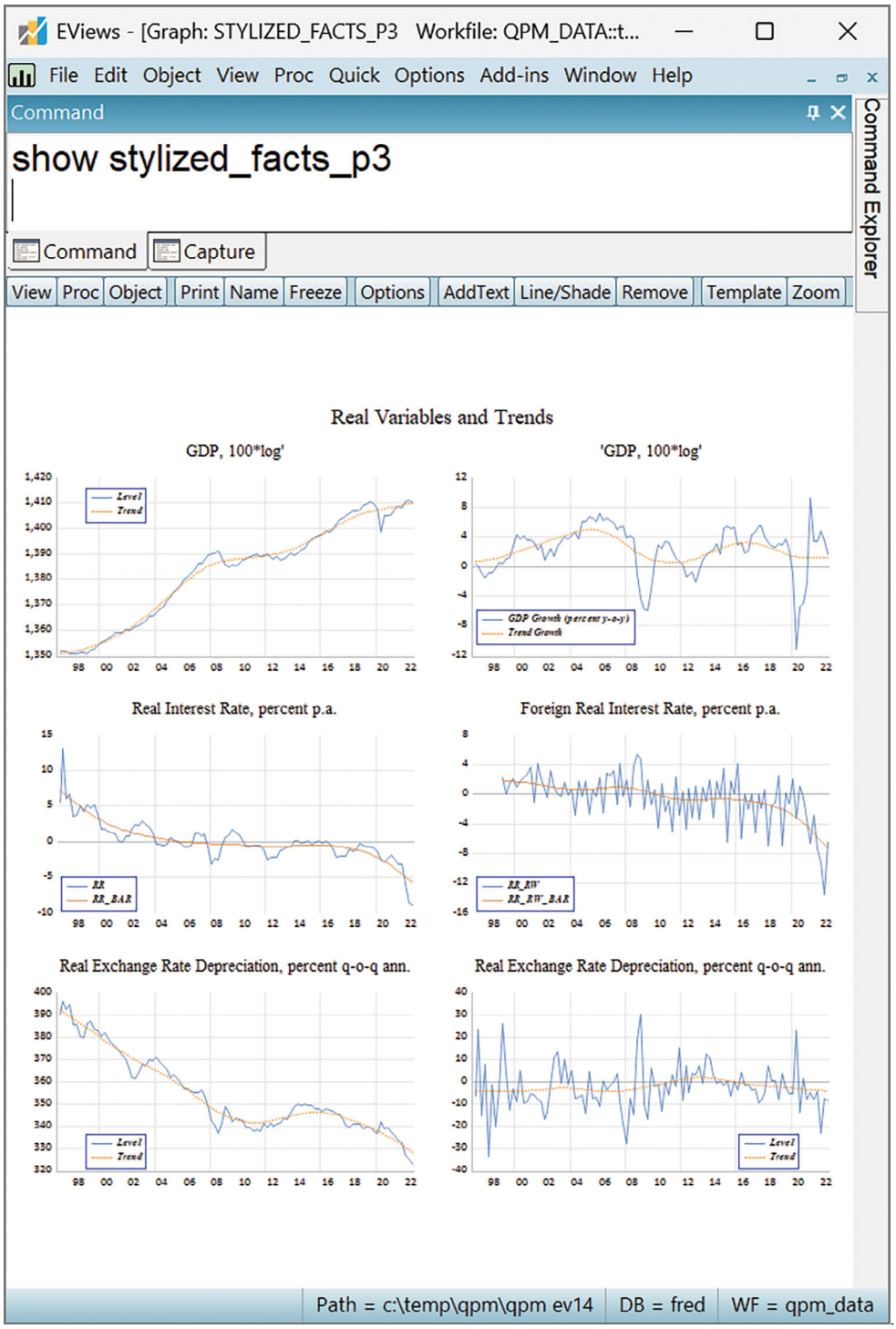


Figure 48. Example of stylized_facts_p4

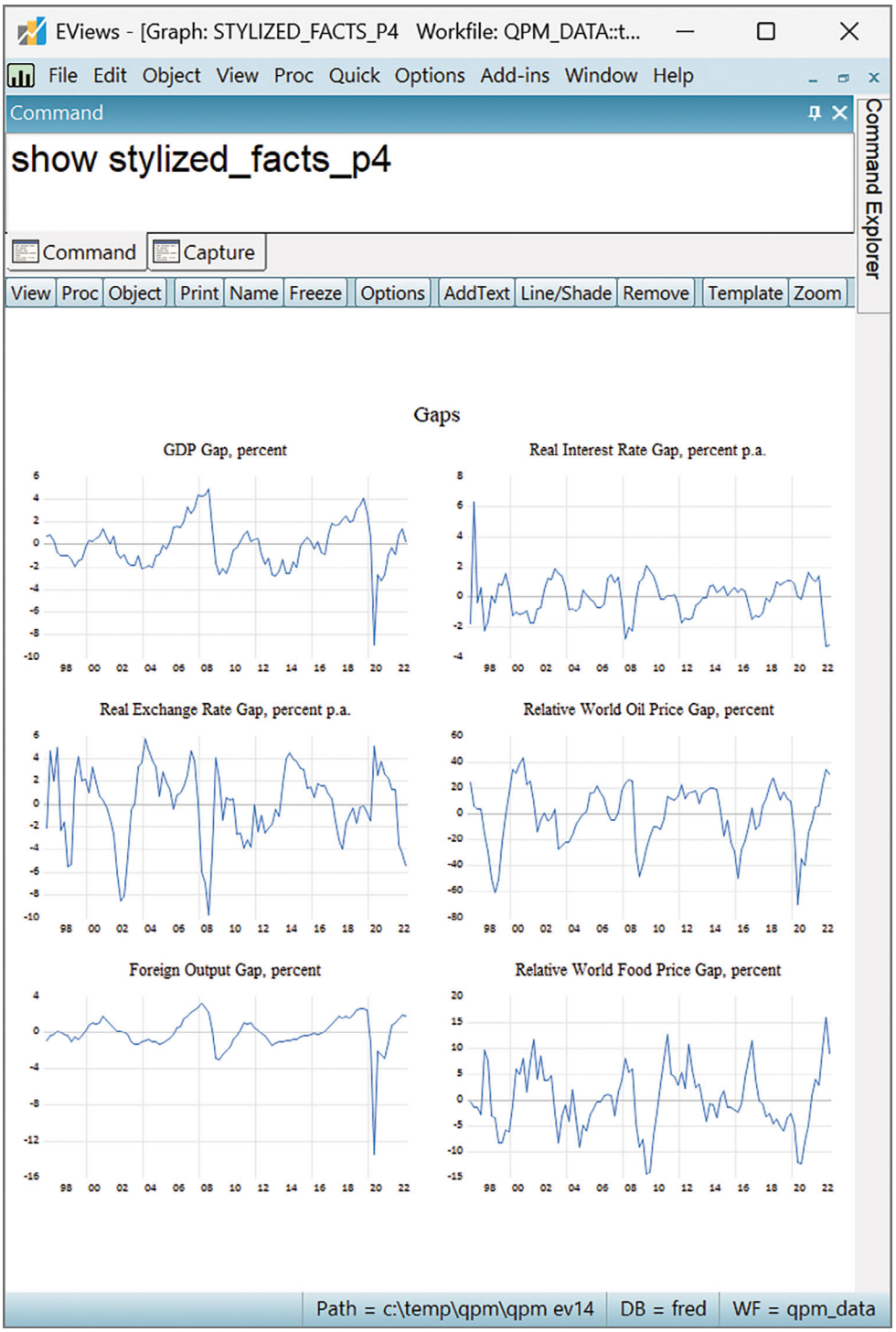


Figure 49. Example of stylized_facts_p5

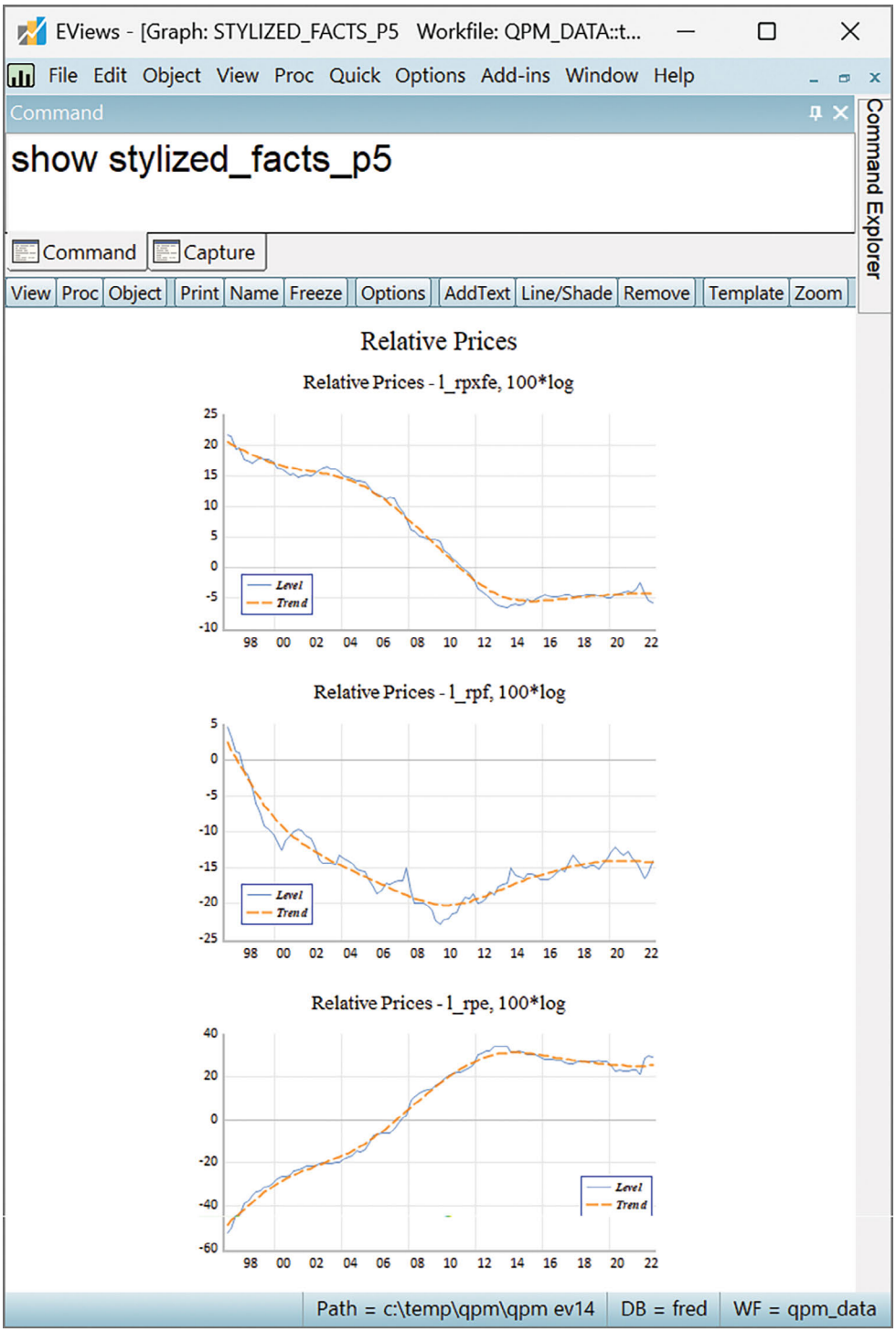
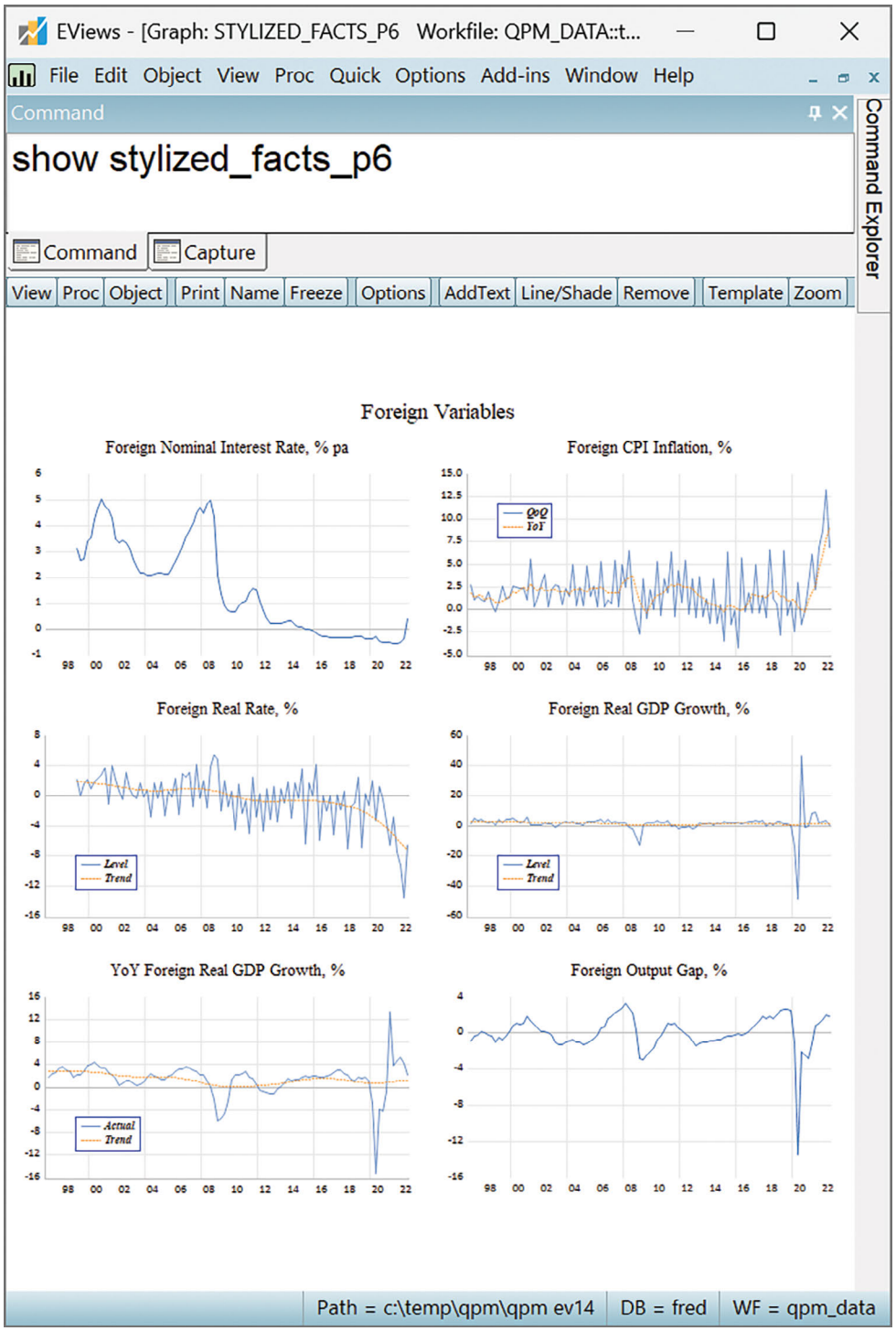
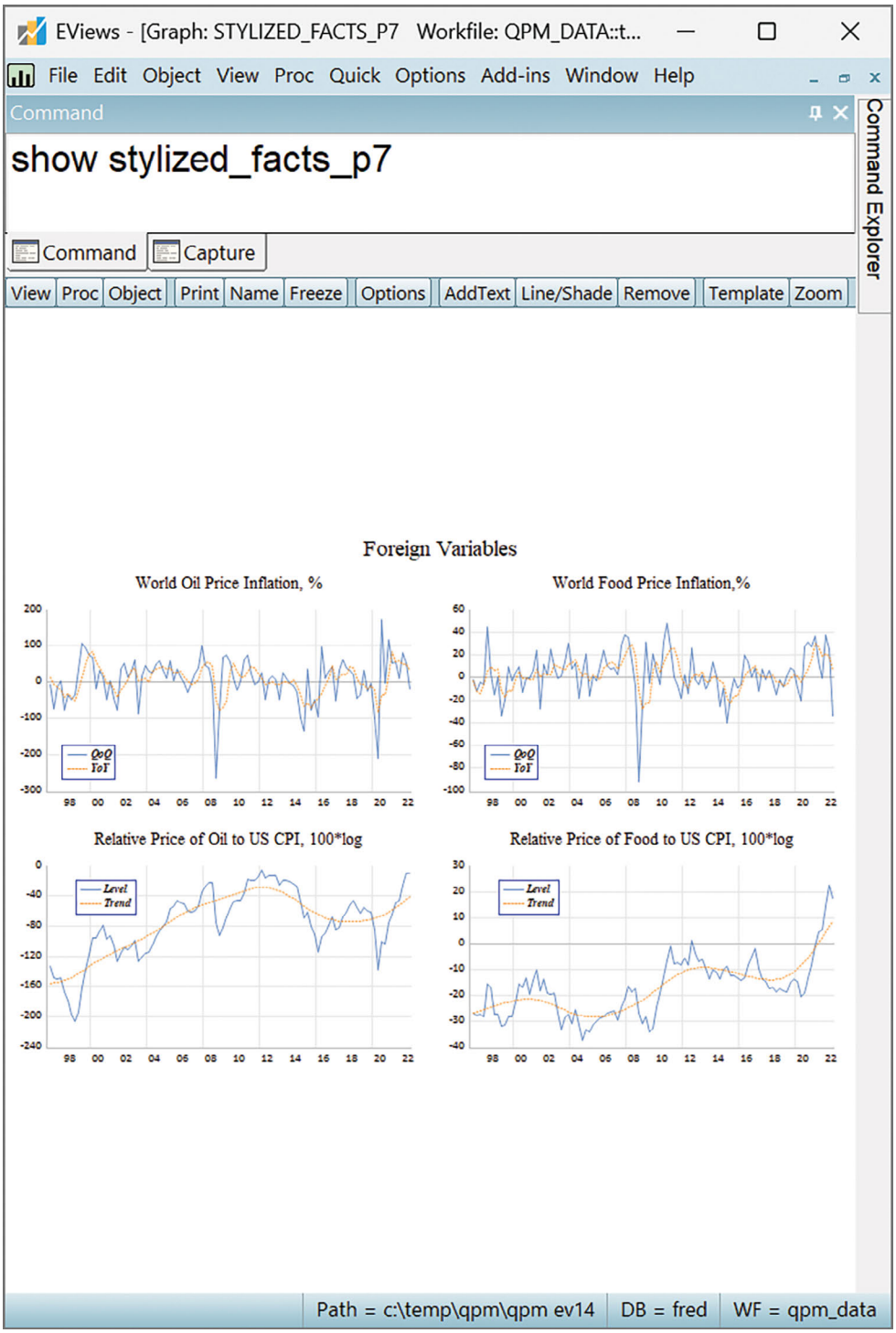


Figure 50. Example of stylized_facts_p6



Note: CPI = consumer price index

Figure 51. Example of stylized_facts_p7



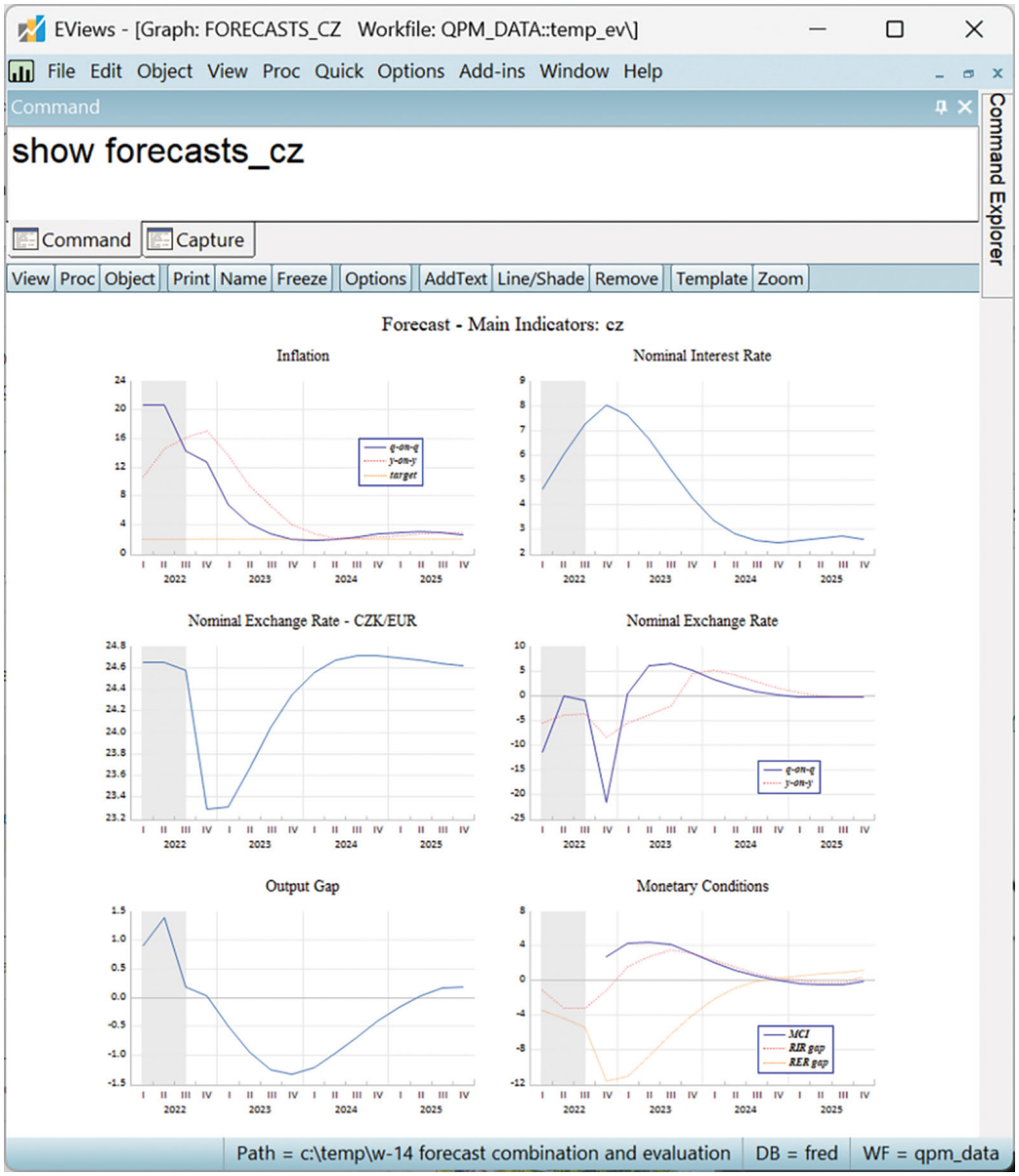
Note: CPI = consumer price index.

B. Utility Program #2: 5_produce_forecast_graphs.prg

This program creates a single graph object called **forecasts_{%Target}**, where the string "**{%Target}**" is replaced by the current tag of the solved scenario (as set by the user). The **%Target** string must be set to a previously solved scenario before running **5_produce_forecasts_graphs.prg**.

For example, we previously tagged the baseline solution using "**cz**". Setting **%Target** = "**cz**" and then running **5_produce_forecasts_graphs.prg** creates the graph shown in Figure 52, which displays the behavior of six key endogenous variables during the forecast horizon.

Figure 52. EViews Graph: FORECASTS_CZ



The graph object is saved in the **%target_dir** = "**temp_ev**" page file and can be shown from within EViews by issuing the following command:

```
show forecasts_cz
```

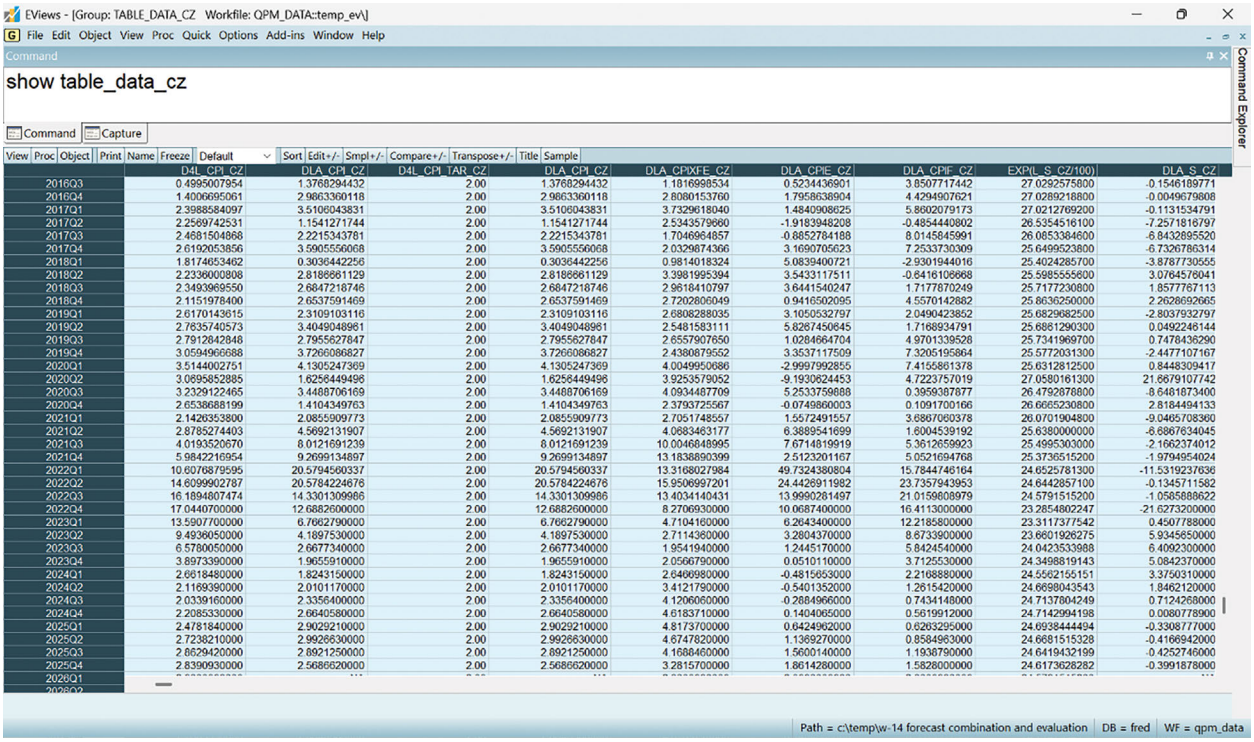
in the EViews command window.

C. Utility Program #3: 6_generate_data_for_forecast_tables.prg

The QPM package for EViews contains an Excel template spreadsheet named **QPM_Output.xlsx**. Once correctly populated, which requires a standard copy-paste operation from an EViews series view, **QPM_Output.xlsx** provides useful summary tables for any QPM solution produced by the EViews solver.

The program **6_generate_data_for_forecast_tables.prg** organizes all the series required by the Excel template (see the worksheet called **Data** in **QPM_Output.xlsx**) into an EViews group. The group object is saved in the **%target_dir** = "**temp_ev**" page file under the name **table_data_{%Target}**, where the string **{%Target}** is replaced with the current setting of the **%Target** string. Thus, if **%Target** = "**cz**", the group object is saved using the name **table_data_cz** and can be shown using the EViews command "show table_data_cz" (Figure 53).

Figure 53. EViews Spreadsheet Object: TABLE_DATA_CZ

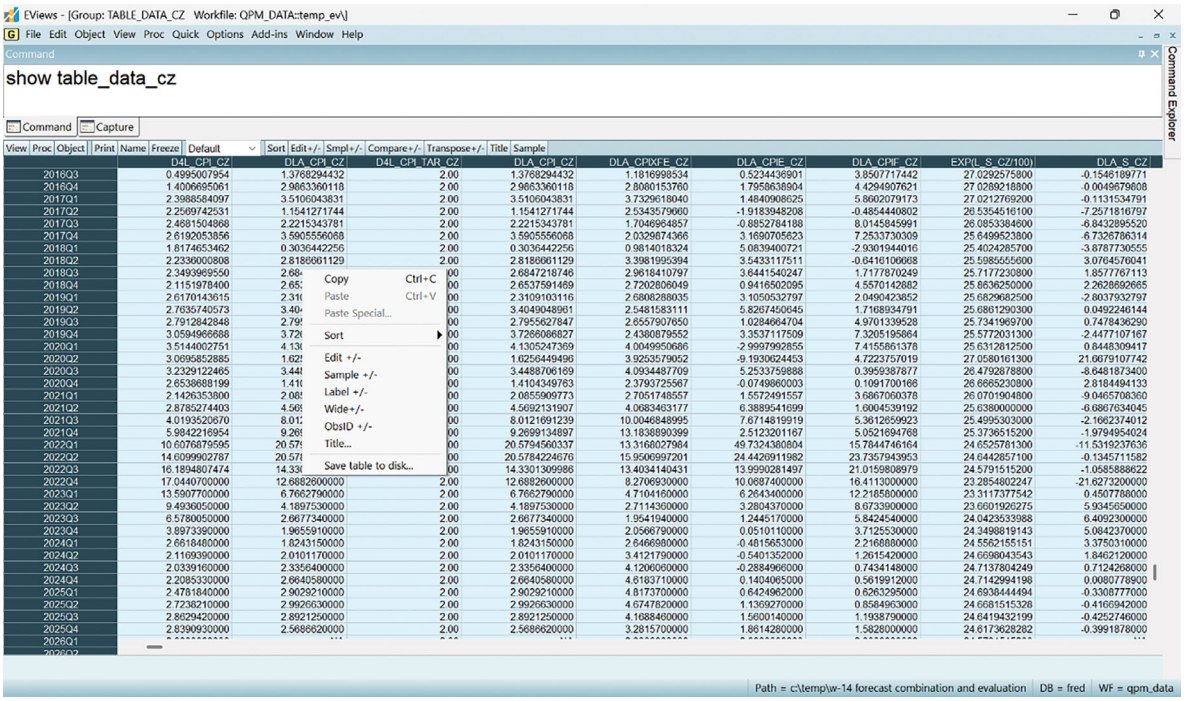


	D4L_CPI_CZ	DLA_CPI_CZ	D4L_CPI_TAR_CZ	DLA_CPI_CZ	DLA_CPIXFE_CZ	DLA_CPIE_CZ	DLA_CPIF_CZ	EXP(L_S_CZ/100)	DLA_S_CZ
2016Q3	0.4995007954	1.3768294432	2.00	1.3768294432	1.1816998534	0.5234436901	3.8507717442	27.0292575800	-0.1546189771
2016Q4	1.4006695061	2.9863360118	2.00	2.9863360118	2.8080153760	1.7958638904	4.4294907621	27.0289218800	-0.0049679808
2017Q1	2.3988584097	3.5106043831	2.00	3.5106043831	3.7329618040	1.4840908625	5.8602079173	27.0212769200	-0.1131534791
2017Q2	2.2569742531	1.1541271744	2.00	1.1541271744	2.5343579660	-1.9183948208	-0.4854440802	26.5354516100	-7.2571816797
2017Q3	2.4681504868	2.2215343781	2.00	2.2215343781	1.7046964857	-0.8852784188	8.0145845991	26.0853384600	-6.8432695520
2017Q4	2.6192053856	3.5905556068	2.00	3.5905556068	2.0329874366	3.1690705623	7.2533730309	25.6499523800	-6.7326786314
2018Q1	1.8174653462	0.3036442256	2.00	0.3036442256	0.9814018324	5.0839400721	-2.9301944016	25.4024285700	-3.8787730555
2018Q2	2.2336000808	2.8186861129	2.00	2.8186861129	3.3981995394	3.5433117511	-0.6416108668	25.5985555600	3.0764576041
2018Q3	2.3493969550	2.6847218746	2.00	2.6847218746	2.9618410797	3.6441540247	1.7177870249	25.7177230800	1.8577767113
2018Q4	2.1151978400	2.6537591469	2.00	2.6537591469	2.7202806049	0.9416502095	4.5570142882	25.8630250000	2.2028692665
2019Q1	2.6170143615	2.3109103116	2.00	2.3109103116	2.6808288035	3.1050532797	2.0490423852	25.6829682500	-2.8037932797
2019Q2	2.7635740573	3.4049048961	2.00	3.4049048961	2.5481583111	5.8267450645	1.7168934791	25.6861290300	0.0492246144
2019Q3	2.7912842848	2.7955627847	2.00	2.7955627847	2.6557907650	1.0284664704	4.9701339528	25.7341969700	0.7478436290
2019Q4	3.0594966688	3.7266086827	2.00	3.7266086827	2.4380879552	3.3537117509	7.3205195864	25.5772031300	-2.4477107167
2020Q1	3.5144002751	4.1305247369	2.00	4.1305247369	4.0049950686	-2.9997992855	7.4155861378	25.6312812500	0.8448309417
2020Q2	3.0695852885	1.6256449496	2.00	1.6256449496	3.9253579052	-9.1930624453	4.7223757019	27.0580161300	21.8679107742
2020Q3	3.2329122465	3.4488706169	2.00	3.4488706169	4.0934487709	5.2533759888	0.3959387877	26.4792878800	-8.6481873400
2020Q4	2.6538688199	1.4104349763	2.00	1.4104349763	2.3793725567	-0.0749860003	0.1091700166	26.6665230800	2.8184494133
2021Q1	2.1420353800	2.0855909773	2.00	2.0855909773	2.7051748557	1.5572491557	3.6867060378	26.0701904800	-9.0465708360
2021Q2	2.8785274403	4.5692131907	2.00	4.5692131907	4.0883463177	6.3889541699	1.6004539192	25.6380000000	-8.6867634045
2021Q3	4.0193520670	8.0121691239	2.00	8.0121691239	10.0046848995	7.6714819919	5.3612659923	25.4995303000	-2.1662374012
2021Q4	5.9842216954	9.2699134897	2.00	9.2699134897	13.1838890399	2.5123201167	5.0521694768	25.3736515200	-1.9794954024
2022Q1	10.6076879595	20.5794560337	2.00	20.5794560337	13.3168027984	49.7324380804	15.7844746164	24.6525781300	-11.5319237636
2022Q2	14.6099902787	20.5784224676	2.00	20.5784224676	15.9506997201	24.4428911982	23.7357943953	24.6442857100	-0.1345711582
2022Q3	16.1894807474	14.3301309986	2.00	14.3301309986	13.4034140431	13.9990281497	21.0159808979	24.5791515200	-1.0585888622
2022Q4	17.0440700000	12.6882600000	2.00	12.6882600000	8.2706930000	10.0687400000	16.4113000000	23.2854802247	-21.6273200000
2023Q1	13.5907700000	6.7662790000	2.00	6.7662790000	4.7104160000	6.2643400000	12.2185800000	23.3117377542	0.4507788000
2023Q2	9.4936050000	4.1897530000	2.00	4.1897530000	2.7114360000	3.2804370000	8.6733900000	23.6601926275	5.9345650000
2023Q3	6.5780050000	2.6677340000	2.00	2.6677340000	1.9541940000	1.2445170000	5.8424540000	24.0423533988	6.4092300000
2023Q4	3.8973390000	1.9655910000	2.00	1.9655910000	2.0566790000	0.0510110000	3.7125530000	24.3498819143	5.0842370000
2024Q1	2.6618480000	1.8243150000	2.00	1.8243150000	2.6466980000	-0.4815653000	2.2168880000	24.5562155151	3.3750310000
2024Q2	2.1169390000	2.0101170000	2.00	2.0101170000	3.4121790000	-0.5401352000	1.2615420000	24.6698043543	1.8462120000
2024Q3	2.0339160000	2.3356400000	2.00	2.3356400000	4.1206060000	-0.2884966000	0.7434148000	24.7137804249	0.7124268000
2024Q4	2.2085330000	2.6640580000	2.00	2.6640580000	4.6183710000	0.1404065000	0.5619912000	24.7142994198	0.0080778900
2025Q1	2.4781840000	2.9029210000	2.00	2.9029210000	4.8173700000	0.6424962000	0.6263295000	24.6938444494	-0.3308777000
2025Q2	2.7238210000	2.9926630000	2.00	2.9926630000	4.6747820000	1.1369270000	0.8584963000	24.6681515328	-0.4166942000
2025Q3	2.8629420000	2.8921250000	2.00	2.8921250000	4.1688460000	1.5600140000	1.1938790000	24.6419432199	-0.4252746000
2025Q4	2.8390930000	2.5686620000	2.00	2.5686620000	3.2815700000	1.8614280000	1.5828000000	24.6173628282	-0.3991878000
2026Q1									

Clicking on the upper cell in the first column selects all the series and associated data. Then right-click to copy the selected cells to the clipboard (Figure 54).

Once copied to the clipboard, the solution data are easily copied to the correct location in Excel.

Figure 54. Copying TABLE_DATA_CZ to Windows Clipboard and Excel



To do so, open the **QPM_Output.xlsx** spreadsheet using Microsoft Excel. Click on the **Data** worksheet. Select the **R1C1** cell in the upper left-hand corner of the worksheet view, then right-click and select "**Paste Special...**" (Figure 55) followed by "**Text**" (as shown in Figure 56).

Figure 55. Pasting Graph Object "TABLE_DATA_CZ" to Excel

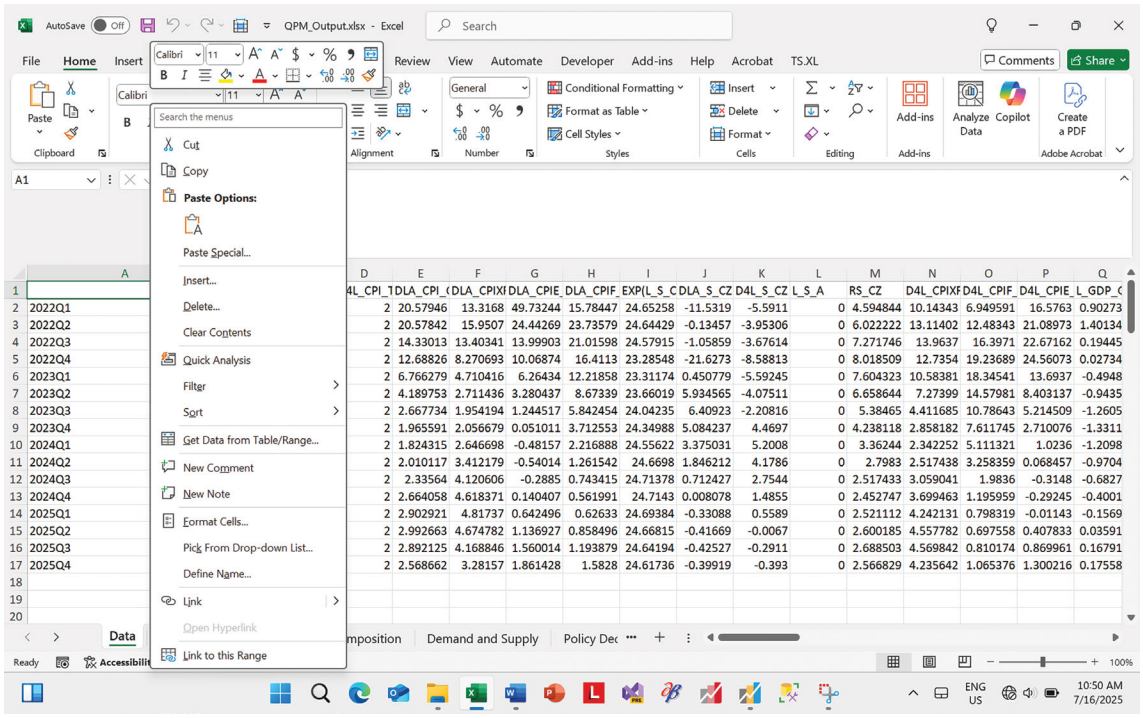
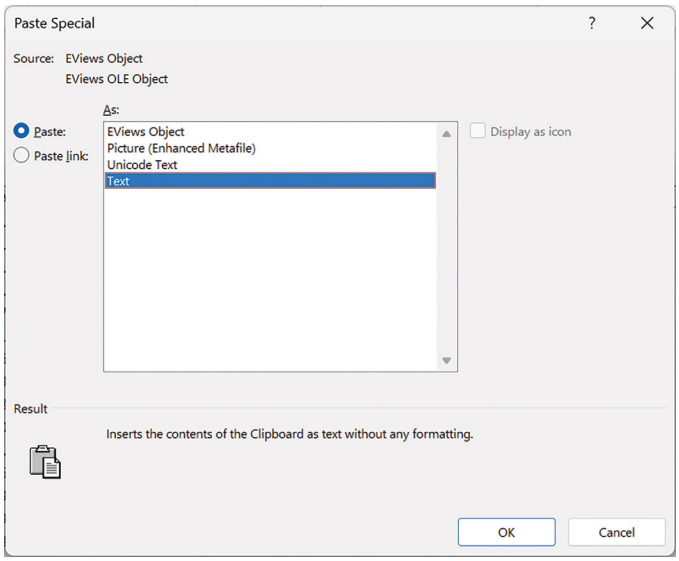


Figure 56. Excel "Paste Special" Dialog Box



Following these steps will copy the data in the group object to the correct worksheet cells. The tables in the other worksheets of the workbook, which point to specific cells in the **Data** worksheet, will then be automatically updated.

The Excel spreadsheet contains six worksheets, each with a table that summarizes key attributes of the scenario of interest (typically the baseline or alternative scenario) and the main contributors to the solution values. For example, the **Main Indicators** worksheet provides a tabular view of the main endogenous variables in the QPM (CPI, exchange rates, inflation, the real economy, and monetary conditions) for the period 2022:1–2025:4 (see Figure 57 for a partial view of the table). The first three observations (2022:1–2022:3) are actual values derived from **data.csv**.

Figure 57. Table of Main Indicators: Country Z, 2022:1–2023:2

		2022:1	2022:2	2022:3	2022:4	2023:1	2023:2
CPI	% (y-o-y)	10.6	14.6	16.2	17.0	13.6	9.5
	% (q-o-q)	20.6	20.6	14.3	12.7	6.8	4.2
Target	%	2.0	2.0	2.0	2.0	2.0	2.0
Exchange Rate	C_Z/EUR	24.7	24.6	24.6	23.3	23.3	23.7
	% (y-o-y)	-5.6	-4.0	-3.7	-8.6	-5.6	-4.1
GDP	% (y-o-y)	4.8	3.5	1.7	2.3	0.0	-0.8
Interest Rate	% p.a.	4.6	6.0	7.3	8.0	7.6	6.7
Inflation							
CPI	% (y-o-y)	10.6	14.6	16.2	17.0	13.6	9.5
Core Inflation	% (y-o-y)	10.1	13.1	14.0	12.7	10.6	7.3
Food Prices	% (y-o-y)	6.9	12.5	16.4	19.2	18.3	14.6
Energy Prices	% (y-o-y)	16.6	21.1	22.7	24.6	13.7	8.4
Real Economy							
Output Gap	%	0.9	1.4	0.2	0.0	-0.5	-0.9
GDP	% (q-o-q)	8.6	3.2	-3.6	0.8	-0.4	0.0
Potential GDP	% (q-o-q)	1.2	1.2	1.2	1.3	1.4	1.5
Potential GDP	% (y-o-y)	1.2	1.2	1.2	1.5	1.7	1.8
Monetary Conditions							
Monetary Conditions	%	…	…	…	2.7	4.3	4.4
Real Interest Rate Gap	p.p.	-1.1	-3.3	-3.2	-1.1	1.6	2.8
Credit Premium	p.p.	0.0	0.2	0.4	0.0	-0.2	-0.3
Real Exchange Rate Gap	%	-3.6	-4.4	-5.4	-11.6	-11.1	-8.8

The **Inflation Decomposition** worksheet shows overall core, food, and energy inflation for the period 2022:1–2025:4 (as shown in Figure 58, but for a shorter period of 2022:1–2023:2). It also breaks down the overall change of their forecast values (2022:4–2025:4) into the various contributions of their determinants. For example, core inflation is projected to hit 8.3 percent in 2022:4. Persistence (lagged inflation) accounts for 6.7 percentage points, whereas expectations of future inflation contribute 2.4 percentage points. Last, there is a slight reduction in overall core coming from lower imported real marginal costs (0.8 percentage points).

Similar decomposition tables may be found in the worksheets named **Demand and Supply**, **Policy Decomposition**, and **Foreign Variables**.

D. Utility Program #4: 8_model_properties.prg

The purpose of **8_model_properties.prg** is to generate impulse response functions of the main endogenous variables in the QPM for different values of specific parameters (for example, b_1 in the aggregate demand equation). A careful inspection of these impulse response functions may prompt the user to modify the QPM calibration.

Figure 59 shows a typical graph from **8_model_properties.prg** for a 100 basis point shock to the policy rate (implemented by increasing **SHK_RS_UNC** by 1 for a single period).[31] Note that each impulse response in a single graph (for example, inflation) uses five different combinations of b_1 and b_2.[32]

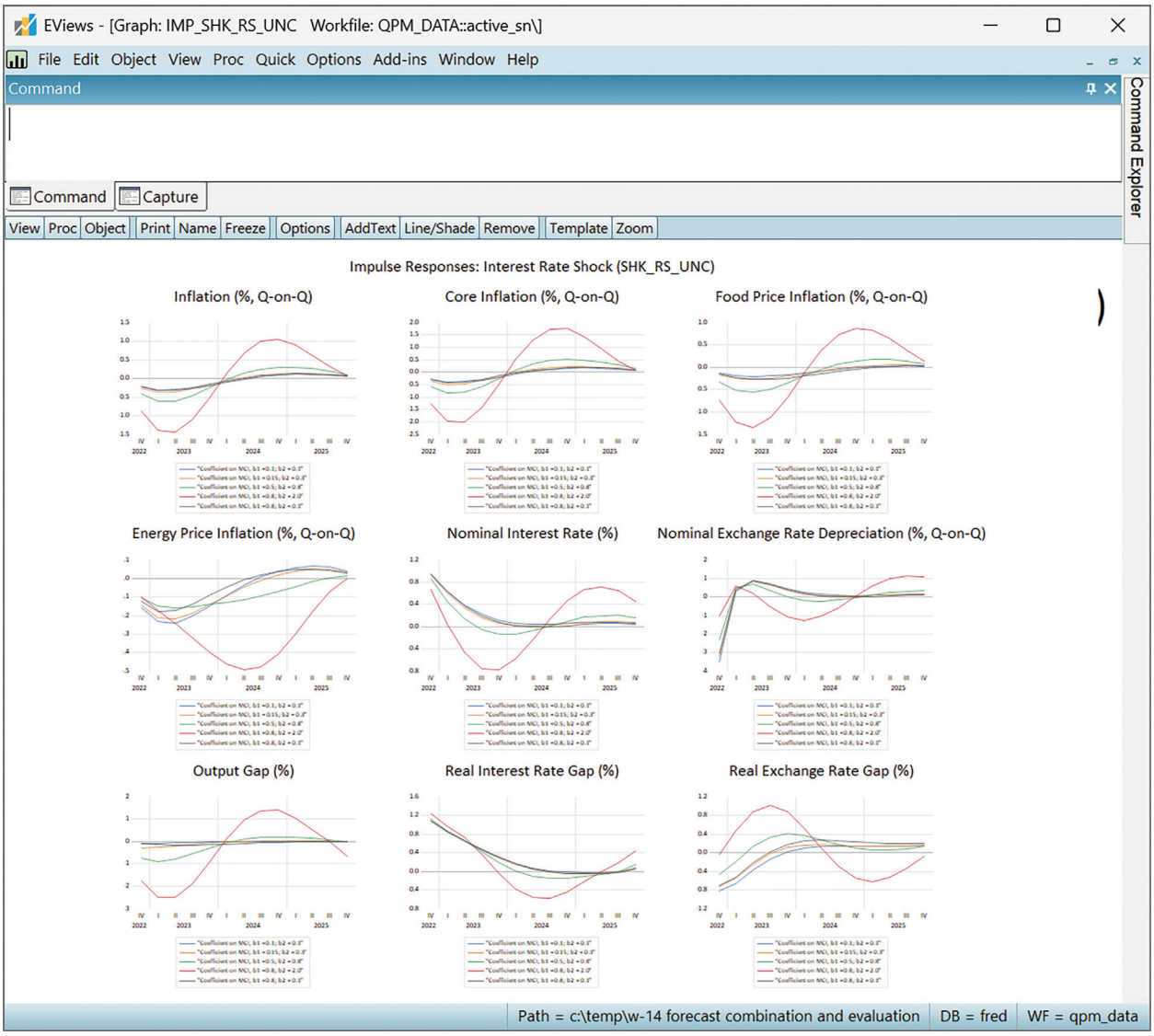
[31] Note that the program derives impulse response functions for multiple shocks, separately (namely, to core inflation [SHK_DLA_CPIXFE], the output gap [SHK_L_GDP_GAP], the nominal exchange rate [SHK_L_S], the nominal policy rate [SHK_RS_UNC], food inflation [SHK_DLA_CPIF], and energy price inflation [SHK_DLA_CPIE]), and produces graphs for nine key endogenous variables. The results for the SHK_RS_UNC shock are shown in Figure 59. Similar graphs can be obtained for the other shocks.

[32] More can be added by editing the program file.

Figure 58. Forecast–Inflation Decomposition: Country Z, 2022:1-2023:2

		2022:1	2022:2	2022:3	2022:4	2023:1	2023:2
Contributions							
CPI	% (q-o-q)	20.6	20.6	14.3	12.7	6.8	4.2
Core Inflation	p.p.	7.2	8.7	7.3	4.5	2.6	1.5
Food Prices	p.p.	3.6	5.4	4.7	3.7	2.8	2.0
Energy Prices	p.p.	11.5	5.7	3.2	2.3	1.5	0.8
Core Inflation							
Core Inflation	%	13.3	16.0	13.4	8.3	4.7	2.7
Lag	p.p.	6.6	6.7	8.0	6.7	4.1	2.4
Expectations	p.p.	…	…	…	2.4	1.4	1.0
RMC	p.p.	…	…	…	-0.8	-0.8	-0.6
RMC - Domestic	p.p.	0.1	0.2	0.0	0.0	-0.1	-0.2
RMC - Imported	p.p.	-0.3	-0.3	-0.3	-0.8	-0.7	-0.5
Shock	p.p.	…	…	…	0.0	0.0	0.0
Food Prices							
Food Prices	%	15.8	23.7	21.0	16.4	12.2	8.7
Lag	p.p.	2.5	7.9	11.9	10.5	8.2	6.1
Expectations	p.p.	…	…	…	6.1	4.3	2.9
Relative Food Prices	p.p.	0.2	0.4	0.2	0.1	0.1	0.0
RER and Rel. Price	p.p.	0.0	-0.1	-0.1	-0.3	-0.3	-0.3
Business Cycle	p.p.	0.1	0.1	0.0	0.0	0.0	-0.1
Shock	p.p.	…	…	…	0.0	0.0	0.0
Energy Prices							
Energy Prices	%	49.7	24.4	14.0	10.1	6.3	3.3
Lag	p.p.	1.3	24.9	12.2	7.0	5.0	3.1
Expectations	p.p.	…	…	…	3.1	1.6	0.6
Relative Oil Price	p.p.	1.1	1.7	1.5	0.8	0.4	0.2
RER and Relative Price	p.p.	-0.4	-0.4	-0.5	-0.8	-0.8	-0.7
Shock	p.p.	…	…	…	0.0	0.0	0.0

Figure 59. Impulse Responses for Different Values of b_1 and b_2



The specific values for b_1 and b_2 can be examined more easily by selecting any graph using the mouse, right-clicking and then invoking "View Selected Graphs" (Figures 60 and 61).

Figure 60. Selecting a Single Graph from an EViews Multiple Graph Object

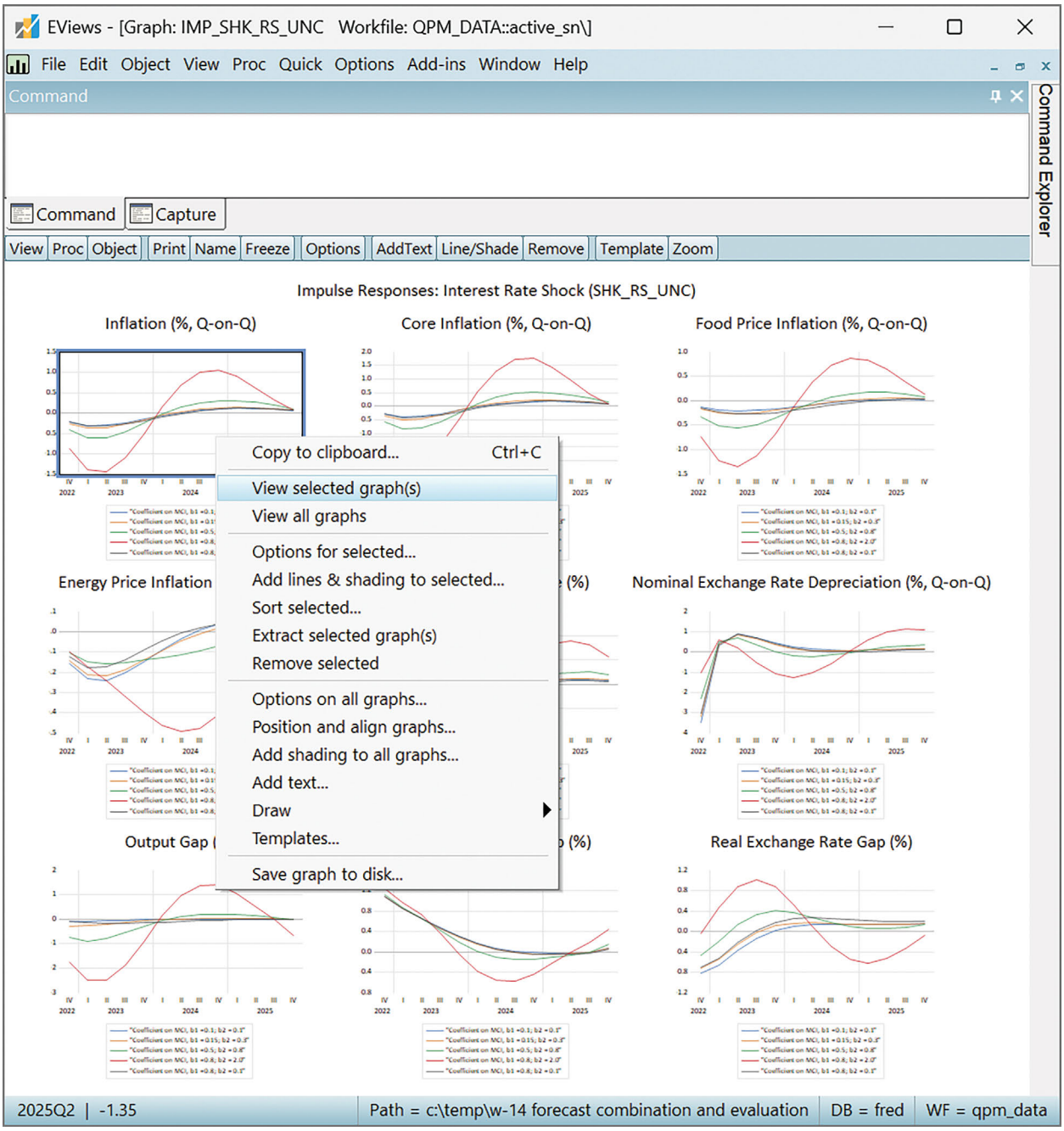
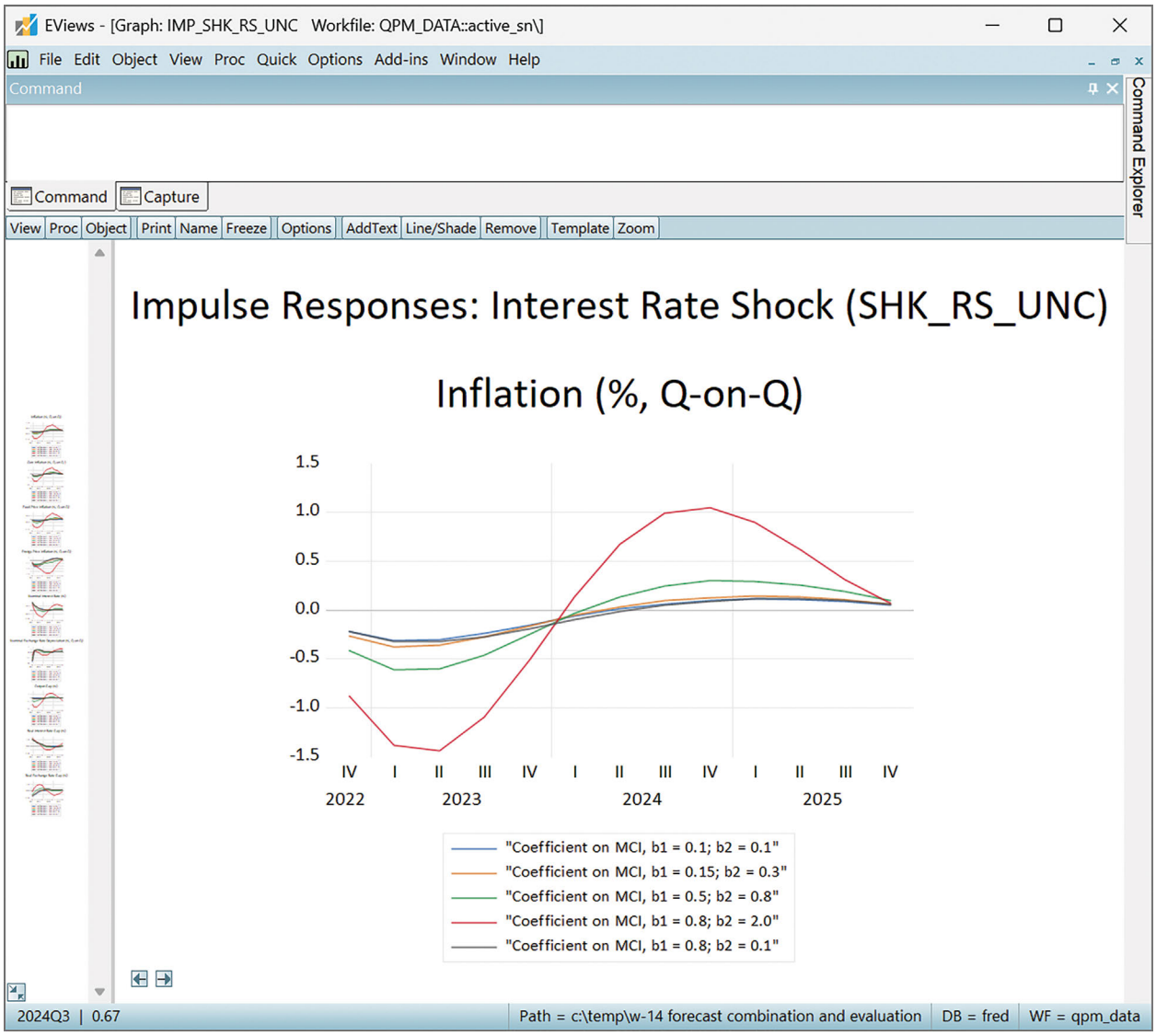


Figure 61. Impulse Responses for Different Values of b_1 and b_2



IV. Constructing Complex QPM Baselines Using EViews

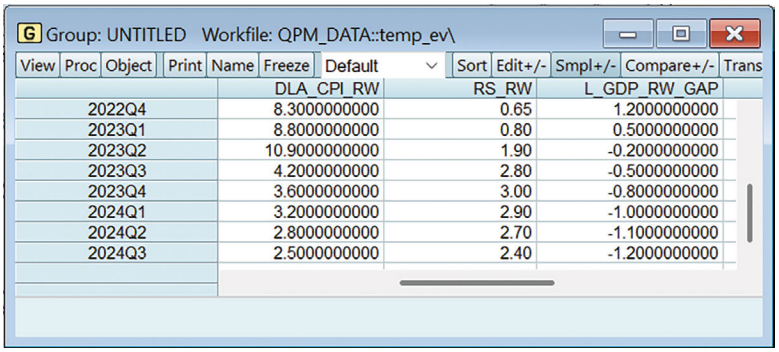
Central banks often specify complex baselines that involve (1) more than one shock spanning non-adjacent periods and (2) fixing the path of key endogenous variables for a specific subperiod of the forecast horizon. EViews can solve models with such constraints.

The EViews QPM package has seven program files that solve the QPM under complex assumptions. These programs all have names that begin with "**7_**". We review three of these programs in the following sections.

A. Example #1: 7_policy_shock_baseline.prg

This program solves the canonical version of the QPM under the constraint that foreign inflation (**DLA_CPI_RW**), foreign interest rates (**RS_RW**), and the foreign output gap (**L_GDP_RW_GAP**) have the following values during the first eight quarters of the forecast horizon (that is, 2022:4–2024:3; see Figure 62).

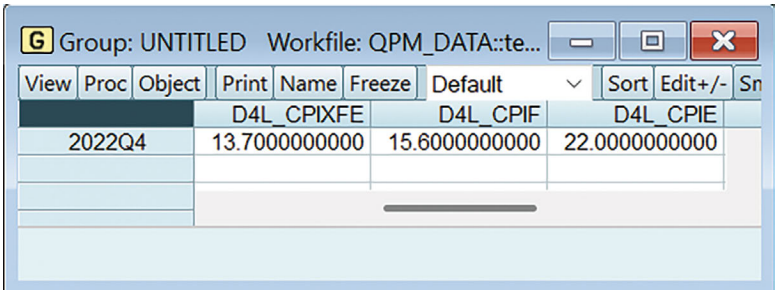
Figure 62. Spreadsheet View of Foreign Inflation, the Foreign Interest Rate and the Foreign Output Gap



	DLA_CPI_RW	RS_RW	L_GDP_RW_GAP
2022Q4	8.3000000000	0.65	1.2000000000
2023Q1	8.8000000000	0.80	0.5000000000
2023Q2	10.9000000000	1.90	-0.2000000000
2023Q3	4.2000000000	2.80	-0.5000000000
2023Q4	3.6000000000	3.00	-0.8000000000
2024Q1	3.2000000000	2.90	-1.0000000000
2024Q2	2.8000000000	2.70	-1.1000000000
2024Q3	2.5000000000	2.40	-1.2000000000

It also constrains the values of domestic core inflation (**D4L_CPIXFX**), domestic food inflation (**D4L_CPIF**), and domestic energy price inflation (**D4L_CPIE**) for 2022:4 (that is, the first period of the forecast horizon). Their values are set at 13.7 percent (core), 15.6 percent (food), and 22.0 percent (energy), as shown in Figure 63.

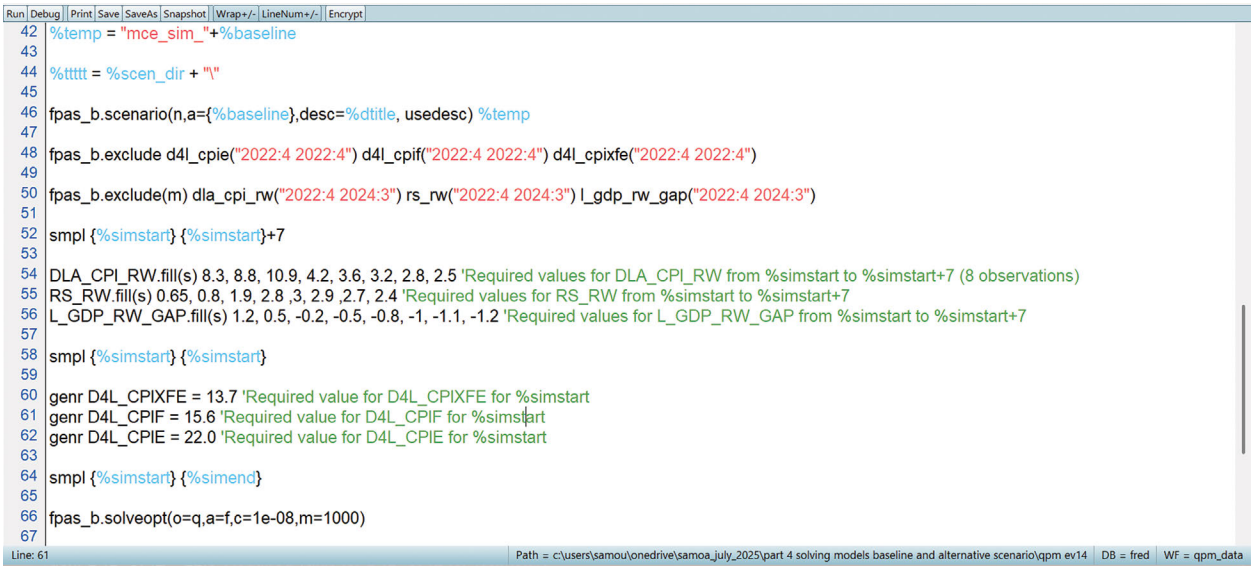
Figure 63. Core (D4L_CPIXFE), Food (D4L_CPIF), and Energy (D4L_CPIE) Inflation, 2022Q4



	D4L_CPIXFE	D4L_CPIF	D4L_CPIE
2022Q4	13.7000000000	15.6000000000	22.0000000000

One can impose these constraints on the QPM using the "**EXCLUDE**" option available in the EViews solver. The code for doing so is in **7_policy_shock_baseline.prg** at lines 42–62 and is shown in Figure 64.

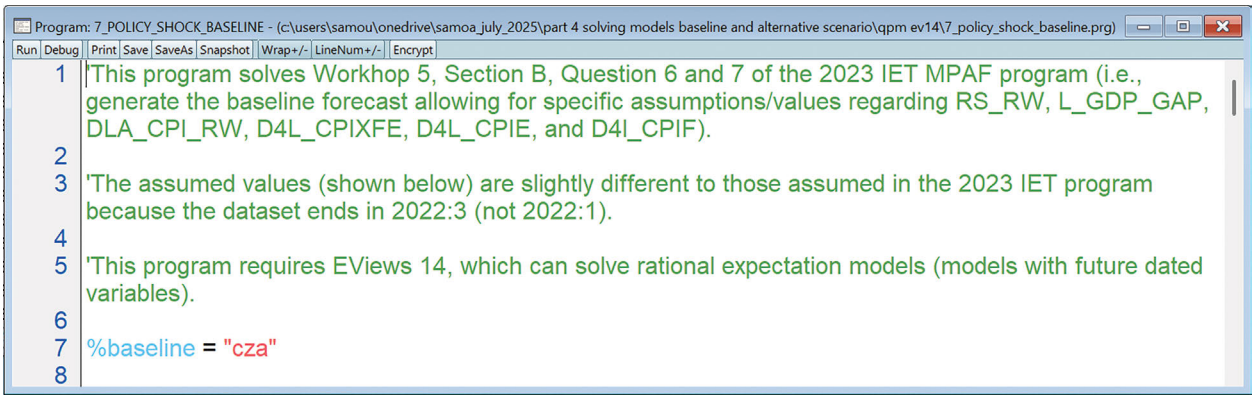
Figure 64. 7_policy_shock_baseline.prg (Lines 42–67)



Lines 48–52 demonstrate how to use the **exclude** option of the EViews solver to constrain the solution of the model to specific values. The endogenous variables mentioned in the exclude list will not be changed by the EViews solver for the sample range specified in the argument. For example, the **exclude** option on **fpas_b** (see line 48) instructs the solver to exclude **dl4_cpie** (energy), **d4l_cpif** (food), and **d4l_cpixfe** (core) for 2022:4 when solving the model. The code on line 50 excludes foreign inflation (**dla_cpi_rw**), the foreign (nominal) interest rate (**rs_rw**), and the foreign output gap (**l_gdp_rw_gap**) for 2022:4–2024:3 (as required) when solving the model. The solver will use the values provided for these variables in the actual series (see lines 54–56 and 60–62, which add the required values to the foreign variables for 2022:4–2023:3 and to the domestic inflation series for 2022:4).

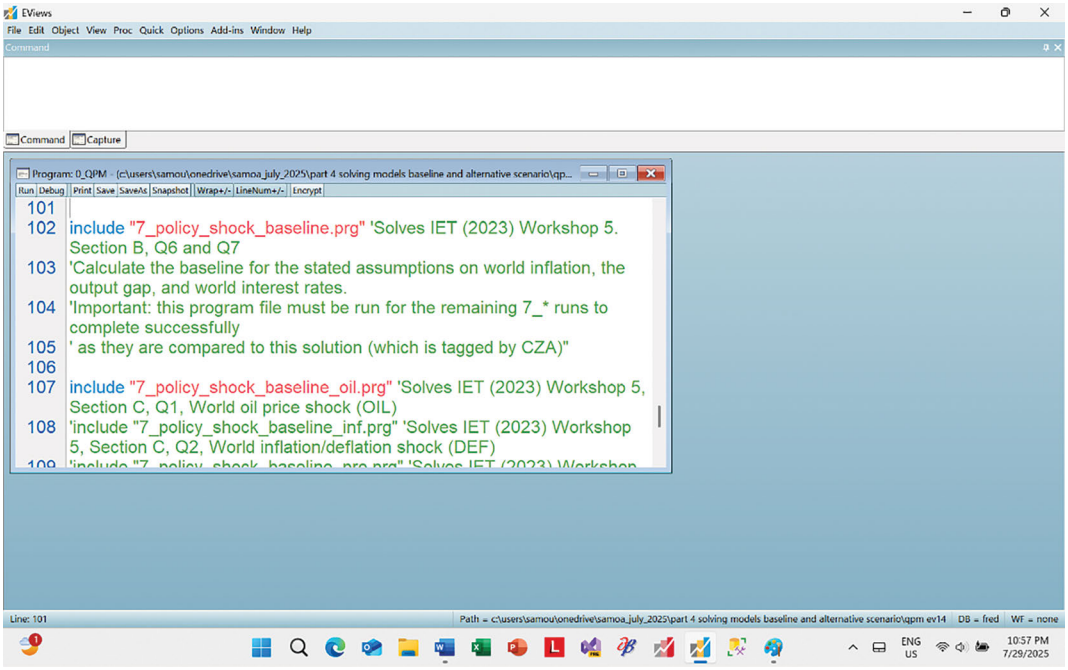
The baseline solution will be tagged using "**_cza**" (see line 7; shown in Figure 65).

Figure 65. 7_policy_shock_baseline.prg (Lines 1–7)



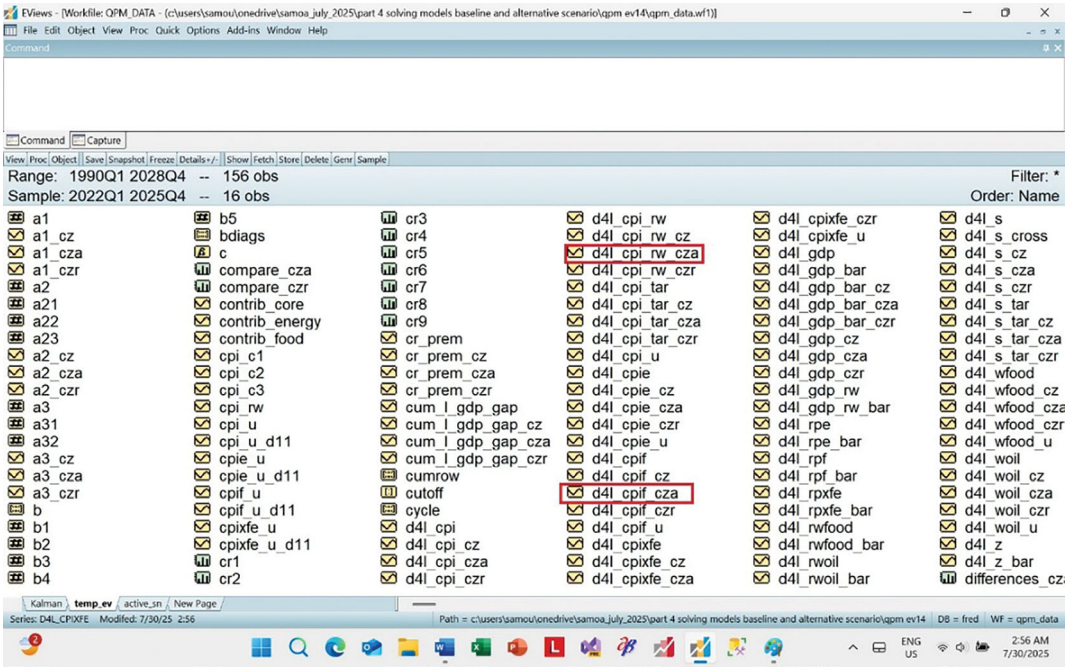
The model is solved, as always, by including **7_policy_shock_baseline.prg** in the driver program file **0_qpm.prg** (see line 102, Figure 66).

Figure 66. 0_qpm.prg (Lines 101–108)



Click on the **Run** tab to solve the model. The result is a page file with several series objects (the endogenous variables of the QPM) tagged with "**_cza**" (Figure 67).

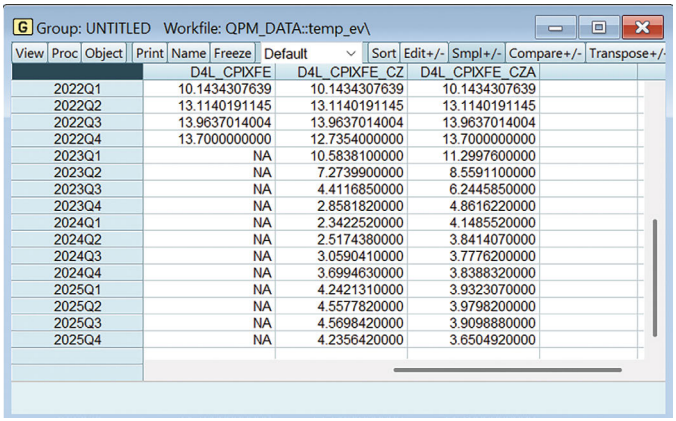
Figure 67. Pagefile "temp_ev" with Constrained "_CZA" Solution



It is instructive to compare the constrained solution tagged with "**_cza**" to the unconstrained solution, which was calculated as part of this run and tagged using "**_cz**".

In the case of core inflation (**d4l_cpixfe**), see Figure 68.

Figure 68. Forecast Values for Core Inflation (D4L_CPIXFE)

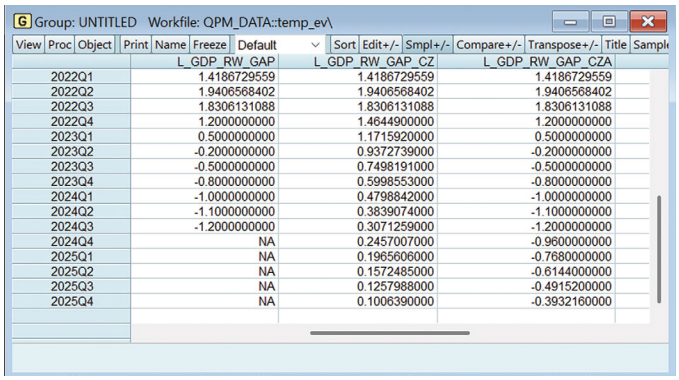

Group: UNTITLED Workfile: QPM_DATA::temp_ev\

View | Proc | Object | Print | Name | Freeze | Default | Sort | Edit+/- | Smpl+/- | Compare+/- | Transpose+/-

	D4L_CPIXFE	D4L_CPIXFE_CZ	D4L_CPIXFE_CZA
2022Q1	10.1434307639	10.1434307639	10.1434307639
2022Q2	13.1140191145	13.1140191145	13.1140191145
2022Q3	13.9637014004	13.9637014004	13.9637014004
2022Q4	13.7000000000	12.7354000000	13.7000000000
2023Q1	NA	10.5838100000	11.2997600000
2023Q2	NA	7.2739900000	8.5591100000
2023Q3	NA	4.4116850000	6.2445850000
2023Q4	NA	2.8581820000	4.8616220000
2024Q1	NA	2.3422520000	4.1485520000
2024Q2	NA	2.5174380000	3.8414070000
2024Q3	NA	3.0590410000	3.7776200000
2024Q4	NA	3.6994630000	3.8388320000
2025Q1	NA	4.2421310000	3.9323070000
2025Q2	NA	4.5577820000	3.9798200000
2025Q3	NA	4.5698420000	3.9098880000
2025Q4	NA	4.2356420000	3.6504920000

Notice that the "**_cza**" solution for core inflation in 2022:4 is 13.7 percent (as required, given line 60 in **7_policy_shock_baseline.prg**) and that without the exclude option, the solution for core inflation is 12.73 percent (see the series **d4l_cpixfe_cz** for 2022:4). Moreover, for the foreign output gap (**l_gdp_rw_gap**), see Figure 69.[33]

Figure 69. Forecast Values for Foreign Output Gap (L_GDP_RW_GAP)


Group: UNTITLED Workfile: QPM_DATA::temp_ev\

View | Proc | Object | Print | Name | Freeze | Default | Sort | Edit+/- | Smpl+/- | Compare+/- | Transpose+/- | Title | Sampl

	L_GDP_RW_GAP	L_GDP_RW_GAP_CZ	L_GDP_RW_GAP_CZA
2022Q1	1.4186729559	1.4186729559	1.4186729559
2022Q2	1.9406568402	1.9406568402	1.9406568402
2022Q3	1.8306131088	1.8306131088	1.8306131088
2022Q4	1.2000000000	1.4644900000	1.2000000000
2023Q1	0.5000000000	1.1715920000	0.5000000000
2023Q2	-0.2000000000	0.9372739000	-0.2000000000
2023Q3	-0.5000000000	0.7498191000	-0.5000000000
2023Q4	-0.8000000000	0.5998553000	-0.8000000000
2024Q1	-1.0000000000	0.4798842000	-1.0000000000
2024Q2	-1.1000000000	0.3839074000	-1.1000000000
2024Q3	-1.2000000000	0.3071259000	-1.2000000000
2024Q4	NA	0.2457007000	-0.9600000000
2025Q1	NA	0.1965606000	-0.7680000000
2025Q2	NA	0.1572485000	-0.6144000000
2025Q3	NA	0.1257988000	-0.4915200000
2025Q4	NA	0.1006390000	-0.3932160000

As required, the values for the foreign output gap during 2022:4–2024:3 have been constrained to the desired values (see line 56 of **7_policy_shock_baseline.prg)** in the "**_cza**" solution. This is not the case for the "**_cz**" solution, which does not have any **exclude** options.

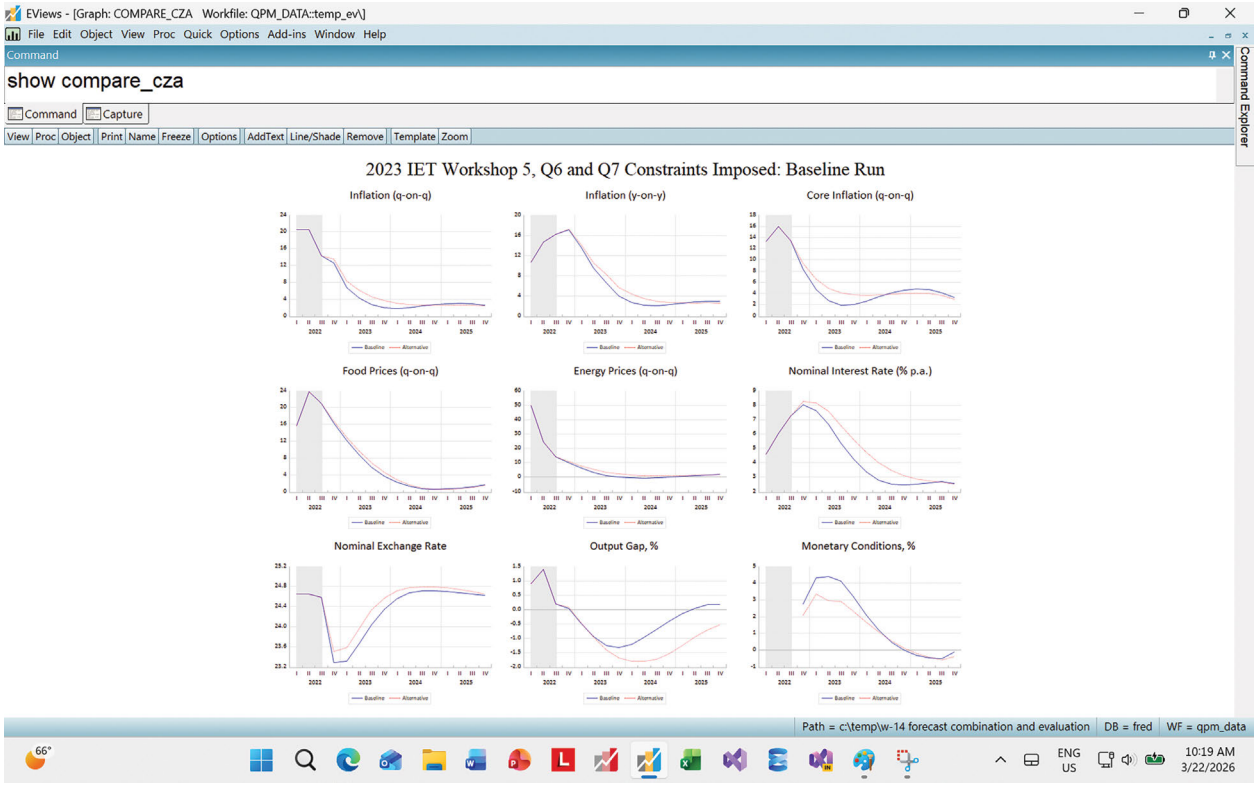
[33] This view is obtained by issuing the commands :

```
smpl 2022Q1 2025Q4
l_gdp_rw_gap l_gdp_rw_gap_cz l_gdp_rw_gap_cza
```

in the EViews command area.

Last, running **10_compare.prg** with the **%Baseline** parameter set to "**cz**" and the **%Alternative** parameter set to "**cza**" yields Figure 70. It displays the effect of the constrained variables on nine key endogenous variables of the QPM during the forecast horizon.[34]

Figure 70. Alternative ("CZA") Versus Baseline ("CZ") Projection

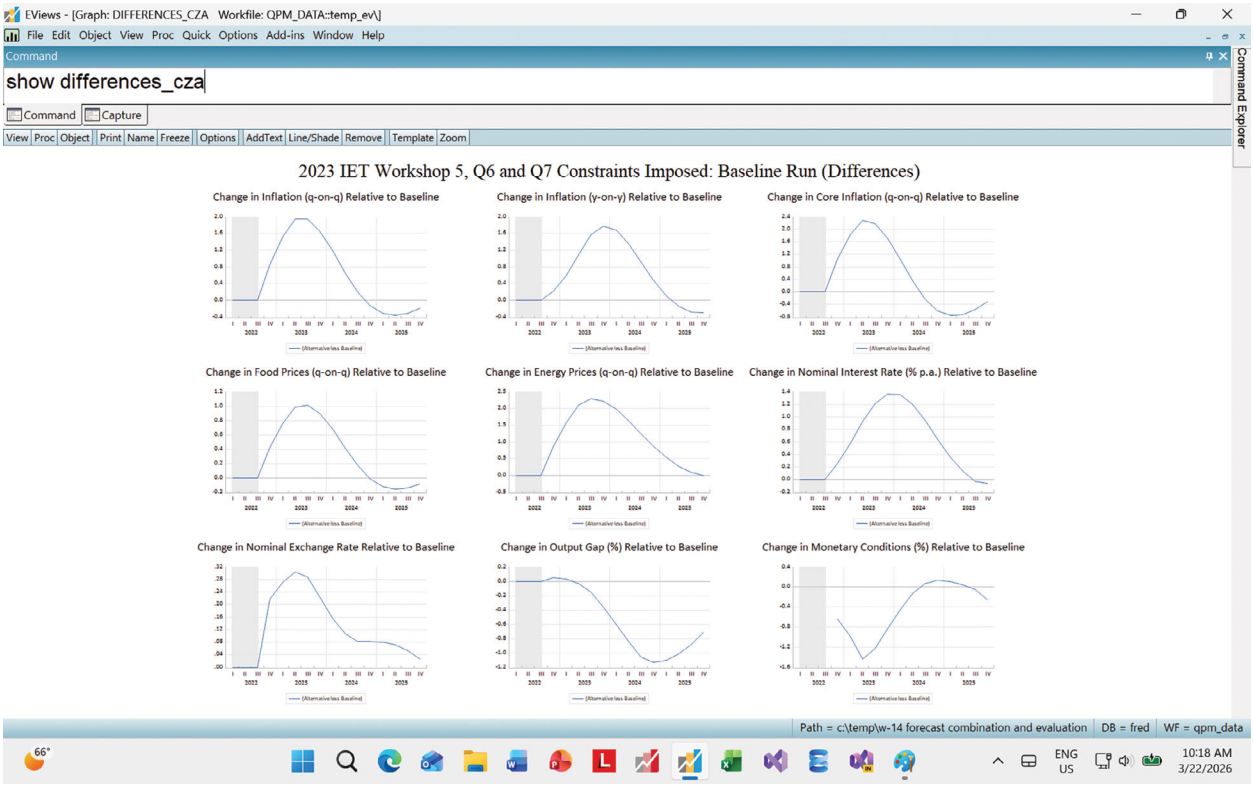


Note: IET = IMF internal training program.

The differences between the alternative solution ("**cza**") and the baseline solution ("**cz**") can be seen by opening the **DIFFERENCES_CZA** graph object saved in the **temp_ev** page file (double-click on the **DIFFERENCES_CZA** object or issue the command "show differences_cza" in the EViews command area) (Figure 71).

[34] The graph object can be shown by issuing "show `compare_cza`" in the EViews command area.

Figure 71. Alternative ("CZA") Less Baseline ("CZ") Projection

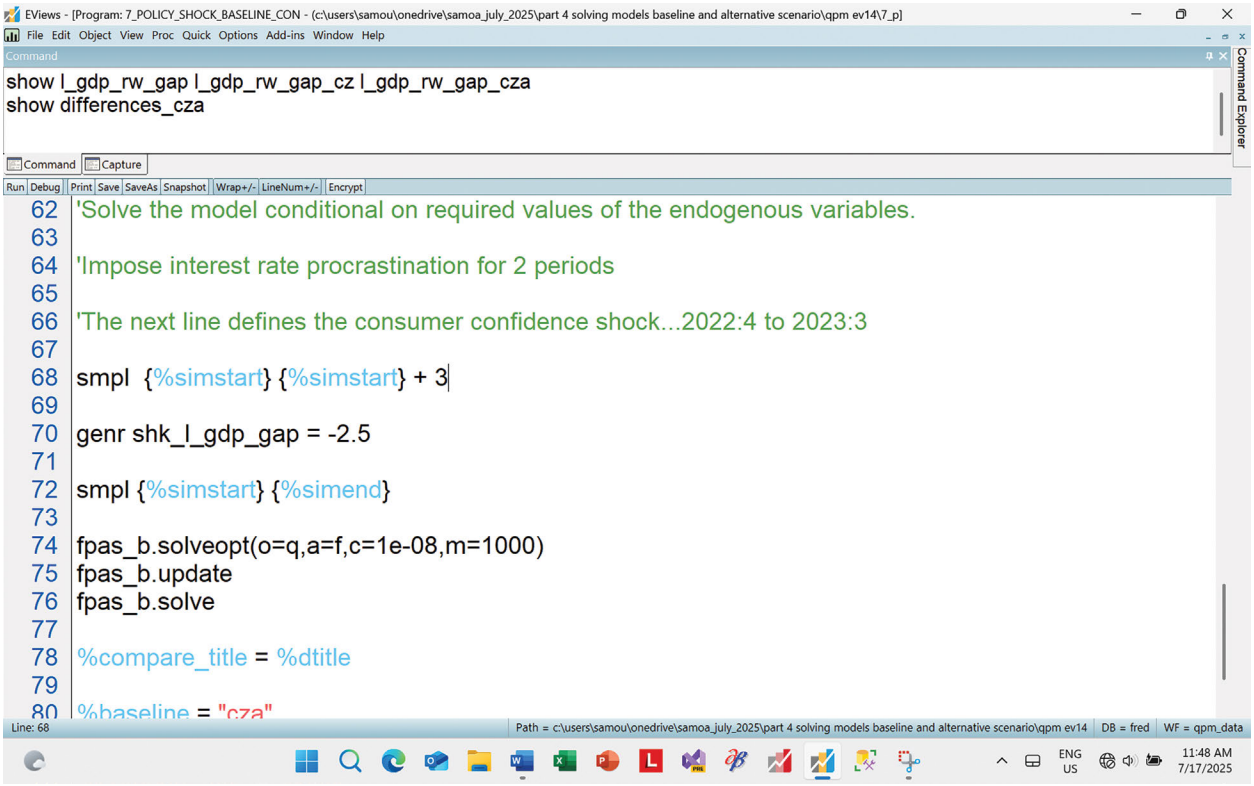


Note: IET = IMF internal training program.

B. Example #2: 7_policy_shock_baseline_con.prg

This example modifies the "**_cza**" solution (that is, Example #1) by introducing a negative shock to real GDP gap (**l_gdp_gap**) of −2.5 percent each period during 2022:4–2023:3 (that is, the first year of the forecast horizon). The aim is to model and assess the effect of a severe and lasting decline in consumer confidence. The commands required to introduce this shock are shown in Figure 72.

Figure 72. 7_policy_shock_baseline_con.prg (Lines 62–80)

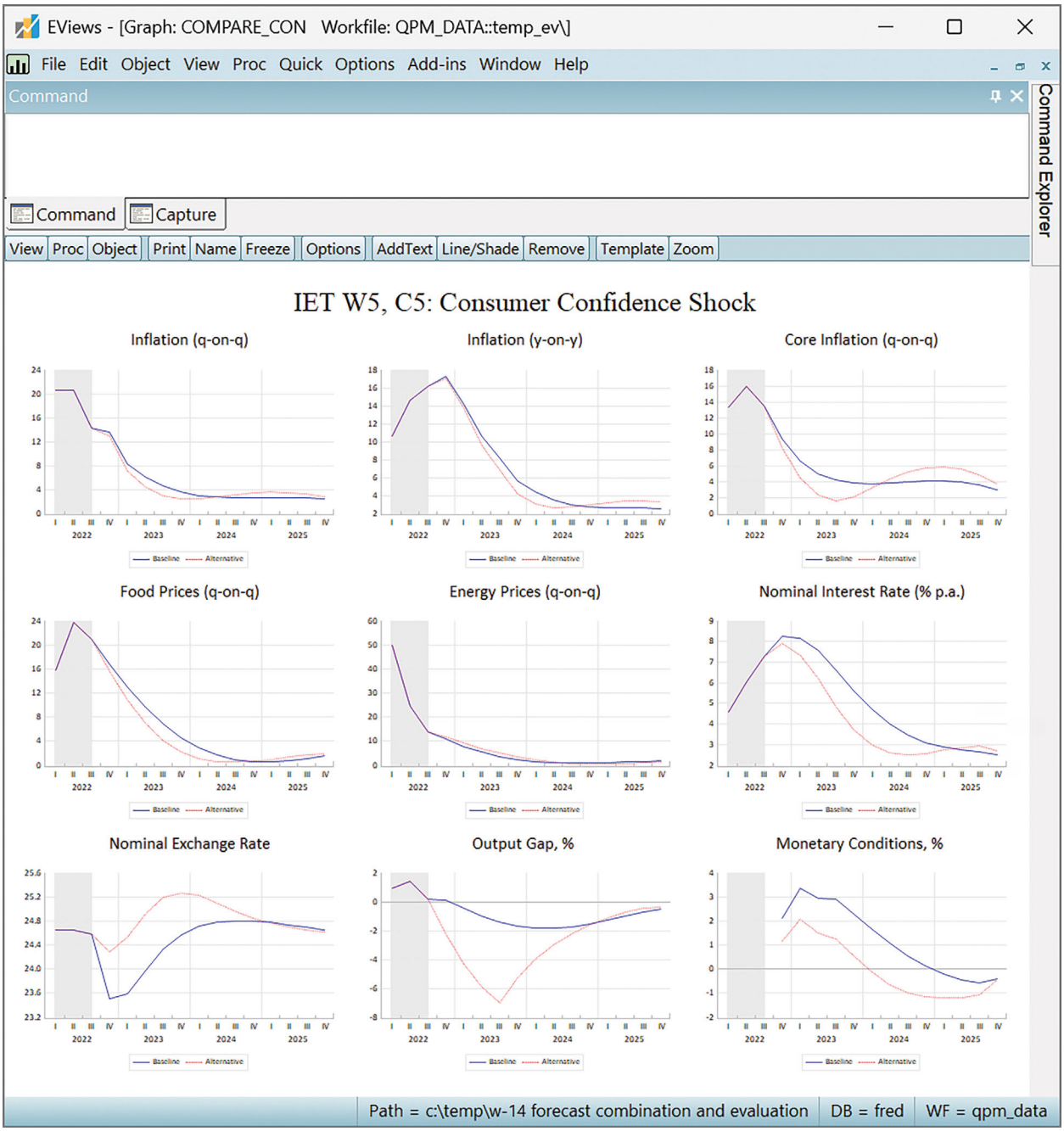


Notice that the tag of the simulation is set to "**con**" on lines 7 and 44 of the program file (not shown), namely:

```
%Alternative = "con"
fpas_b.scenario(n, a={%alternative}, desc=%dtitle, usedesc) %temp
```

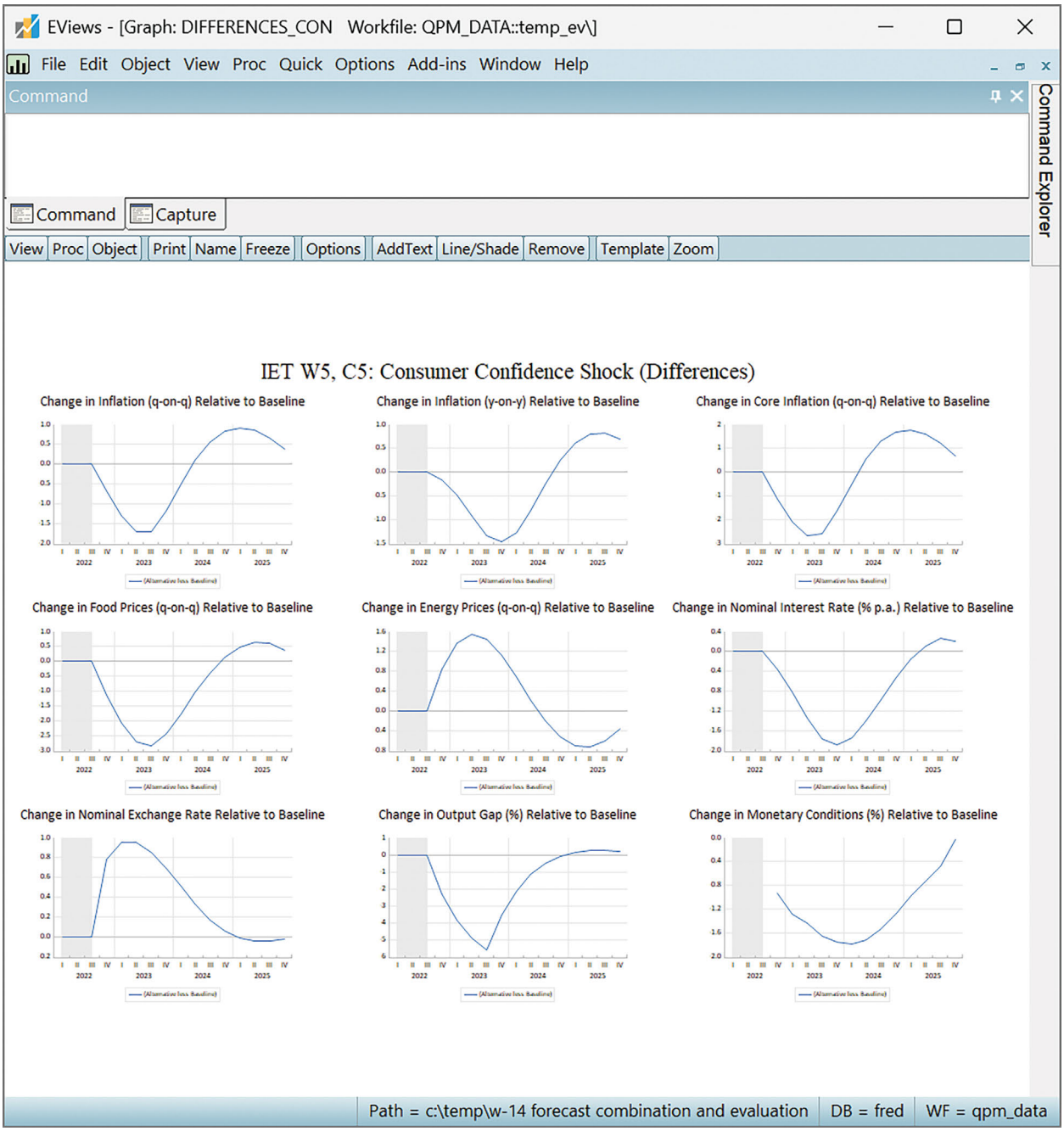
Running this program from **0_qpm.prg** and comparing the baseline without the confidence shock (**cza**) with the alternative solution with the confidence shock (**con**) gives rise to the graphs shown in Figures 73 and 74.

Figure 73. Alternative ("CON") Versus Baseline ("CZA"): Confidence Shock



Note: IET = IMF internal training program.

Figure 74. Alternative ("CON") Less Baseline ("CZA") Solution: Confidence Shock



Note: IET = IMF internal training program.

As expected, the reduction in consumer confidence reduces inflation and the nominal interest rate relative to the **cza** baseline. It also depreciates the nominal exchange rate.[35]

[35] Figure 73 can be displayed by entering the command "`show compare_con`" in the command area. Figure 74 can be displayed by "`show differences_con`".

C. Example #3: 7_policy_shock_baseline_oil.prg

The final example considers an oil price shock added to the **cza** scenario. It is assumed that global oil prices will increase by 10 percent relative to the **cza** baseline solution during 2022:4–2023:3 and that the foreign output gap will decline by 0.25 percent (again relative to the **cza** solution) during the same period (Figure 75). Note that the program adds an additional **exclude** option to force the EViews solver to use specific values for **dla_woil** and the foreign output gap, **l_gdp_rw_gap**, during 2022:4–2023:3.[36]

Figure 75. 7_policy_shock_baseline_oil.prg (Lines 64–79)

```
64
65 smpl {%simstart} {%simstart} + 3
66
67 genr DLA_WOIL = DLA_WOIL_{%baseline} + 10
68
69 genr L_GDP_RW_GAP = l_gdp_rw_gap_{%baseline} - 0.25
70
71 'Solve the model conditional on required values of the endogenous variables.
72
73 smpl {%simstart} {%simend}
74
75 fpas_b.solveopt(o = q, a = f, c = 1.0e-08, m = 1000)
76
77 fpas_b.update
78
79 fpas_b.solve
```

As before, the program shown in Figure 75 (in part) cannot be run directly. It needs to be invoked from the driver program **0_qpm.prg**. The correct syntax is shown in Figure 76.

Figure 76. 0_qpm.prg (Lines 94–112)

```
Run | Debug | Print | Save | SaveAs | Snapshot | Wrap+/- | LineNum+/- | Encrypt
94  include "6_generate_data_for_forecast_tables.prg"
95
96  include "7_policy_shock_baseline.prg" 'Solves IET (2023) Workshop 5. Section B, Q6 and Q7
97  'Calculate the baseline for the stated assumptions on world inflation, the output gap, and world interest rates.
98  'Important: this program file must be run for the remaining 7_* runs to complete successfully
99  ' as they are compared to this solution (which is tagged by CZA)"
100
101 include "7_policy_shock_baseline_oil.prg" 'Solves IET (2023) Workshop 5, Section C, Q1, World oil price shock (OIL)
102 'include "7_policy_shock_baseline_inf.prg" 'Solves IET (2023) Workshop 5, Section C, Q2, World inflation/deflation shock
    (DEF)
103 'include "7_policy_shock_baseline_pro.prg" 'Solves IET (2023) Workshop 5, Section C, Q3, Solves interest rate/monetary
    policy procrastination shock (PRO)
104 'include "7_policy_shock_baseline_gov.prg" 'Solves IET (2023) Workshop 5, Section C, Q4, Fiscal Shock (GOV)
105 'include "7_policy_shock_baseline_con.prg" 'Solves IET (2023) Workshop 5, Section C, Q5, Consumer Confidence Shock
    (CON)
106 '
107 'include "8_model_properties.prg" 'Generates impluse response functions
108
109 'include "9_create_impulse_response_graphs.prg"
110
111 smpl {%simstart}-3 {%simend} 'So that the results group (table_data) show the correct set of data for the forecast tables.
112
Line: 98 | Path = c:\users\samou\onedrive\samoa_july_2025\part 4 solving models baseline and alternative scenario\qpm ev14 | DB = fred | WF = qpm_data
```

[36] See line 51 of **7_policy_sock_baseline_oil.prg**, namely:

```
fpas_b.exclude(m) L_GDP_RW_GAP("2022:4 2023:3") DLA_WOIL("2022:4 2023:3")
```

Click on the **Run** tab (Figure 76) to generate the solution for the **oil** scenario.

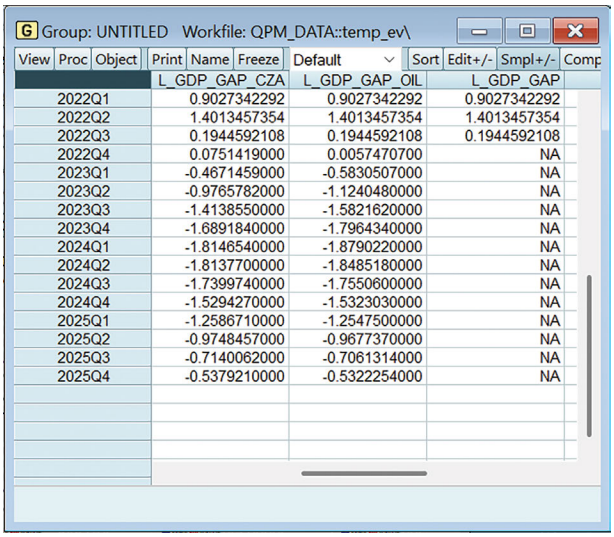
The effect of the assumptions regarding foreign oil prices and the foreign output gap can be assessed by comparing the domestic output gap for the "**cza**" scenario against that for the "**oil**" scenario, which is affected by the postulated shocks.

To do so, issue the EViews commands:

```
smpl 2022:2 2025:4
show l_gdp_gap_cza l_gdp_gap_oil l_gdp_gap
```

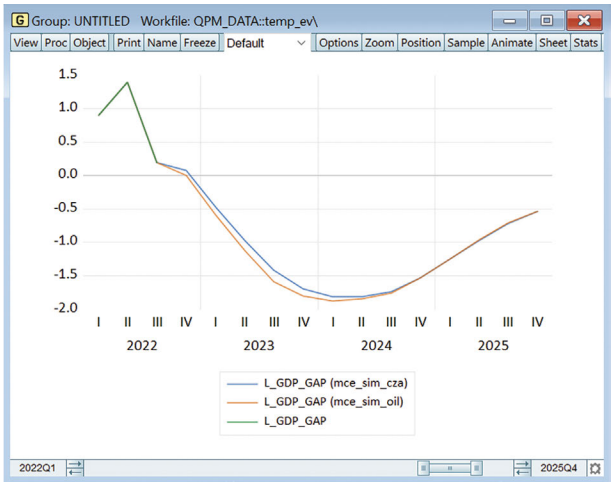
The result will be the following spreadsheet view, which suggests a more negative output gap following the oil price hike (as expected) (Figures 77 and 78).

Figure 77. Output Gap following an Oil Price Increase of 10 Percent



	L_GDP_GAP_CZA	L_GDP_GAP_OIL	L_GDP_GAP
2022Q1	0.9027342292	0.9027342292	0.9027342292
2022Q2	1.4013457354	1.4013457354	1.4013457354
2022Q3	0.1944592108	0.1944592108	0.1944592108
2022Q4	0.0751419000	0.0057470700	NA
2023Q1	-0.4671459000	-0.5830507000	NA
2023Q2	-0.9765782000	-1.1240480000	NA
2023Q3	-1.4138550000	-1.5821620000	NA
2023Q4	-1.6891840000	-1.7964340000	NA
2024Q1	-1.8146540000	-1.8790220000	NA
2024Q2	-1.8137700000	-1.8485180000	NA
2024Q3	-1.7399740000	-1.7550600000	NA
2024Q4	-1.5294270000	-1.5323030000	NA
2025Q1	-1.2586710000	-1.2547500000	NA
2025Q2	-0.9748457000	-0.9677370000	NA
2025Q3	-0.7140062000	-0.7061314000	NA
2025Q4	-0.5379210000	-0.5322254000	NA

Figure 78. Country Z Output Gap after an Oil Price Shock



V. Concluding Remarks

This technical manual describes the steps needed to calibrate, adapt, and solve the QPM using EViews 14. It also demonstrates how to create complex scenarios involving multiple exogenous shocks and constraints on specific endogenous variables. The overall aim is to simplify the technical requirements for adapting the canonical QPM to another country, thereby facilitating analysis and discussion of the effects of specific shocks on that country.

ANNEX 1. Solving the Quarterly Projection Model Using EViews 13

Unlike EViews 14, EViews 13 cannot solve models with forward-looking variables directly. To do so using EViews 13, one needs to download and invoke the model-consistent expectations (MCE) package for EViews called the "MCE_SOLVE_LIBRARY", written by the Federal Reserve Board.[37]

The EViews package that comes with this manual contains a folder named "EV13" that contains the code required to solve the quarterly projection model (QPM) using the MCE package. The structure of the code and the steps required to solve the QPM using MCE are very similar to the approach described in this manual, except for the addition of commands that invoke the FRB MCE. As such, any line numbers referred to in specific programs in this technical manual will not correspond to those in the MCE/EV13 code. That said, the overall approach to solving the QPM remains the same. The main work for setting up and solving the QPM is done in programs **0_qpm.prg**, **1_makedata.prg**, **2_definemodel.prg**, and **3_solve_model.**

[37] The FRB/US MCE_SOLVE_LIBRARY routines for EViews can be downloaded by clicking here. The QPM package for EViews 13 can be downloaded from here.

References

Berg, A., P. D. Karam, and D. Laxton. 2006. "A Practical Model-Based Approach to Monetary Policy Analysis—Overview." IMF Working Paper 06/80, International Monetary Fund, Washington, DC.

Lindquist, W. 2023. "Monetary Policy Analysis Using the Quarterly Projections Model." IMF Country Report 23/190, International Monetary Fund, European Department, Washington, DC. https://doi.org/10.5089/9798400244612.002



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