

A Preamble

Basic features of the data:

- Inspecting and plotting (trends, outliers, volatility)
- Basic descriptive summary statistics

Use *judgment* once a projection is obtained.

Revise if necessary to ensure economic and accounting *consistency*.

SIMPLE



ADVANCED

Simple Method:
Maintain the variables. ✓

Trend Method:
Project the variables. ✓

Simple Econometric Forecast Methods:
Perform a linear regression. ✓

Advanced Econometric/Simulation Methods:
General equilibrium models or system of equations. ✓

Review of Basic Concepts

Real sector refers to real economic transactions of an economy. (NIPA)

Gross Domestic Product (GDP): the market value of all final goods and services produced within a country in a given period.

Nominal GDP (Y): measures the total value of production at current prices.

Real GDP (RY): focuses on changes in GDP that reflect changes in quantities, rather than changes in prices.

GDP deflator (PGDP): an index that measures the average price of goods and services produced relative to a base year.

Potential Output and Output Gap

Potential Output

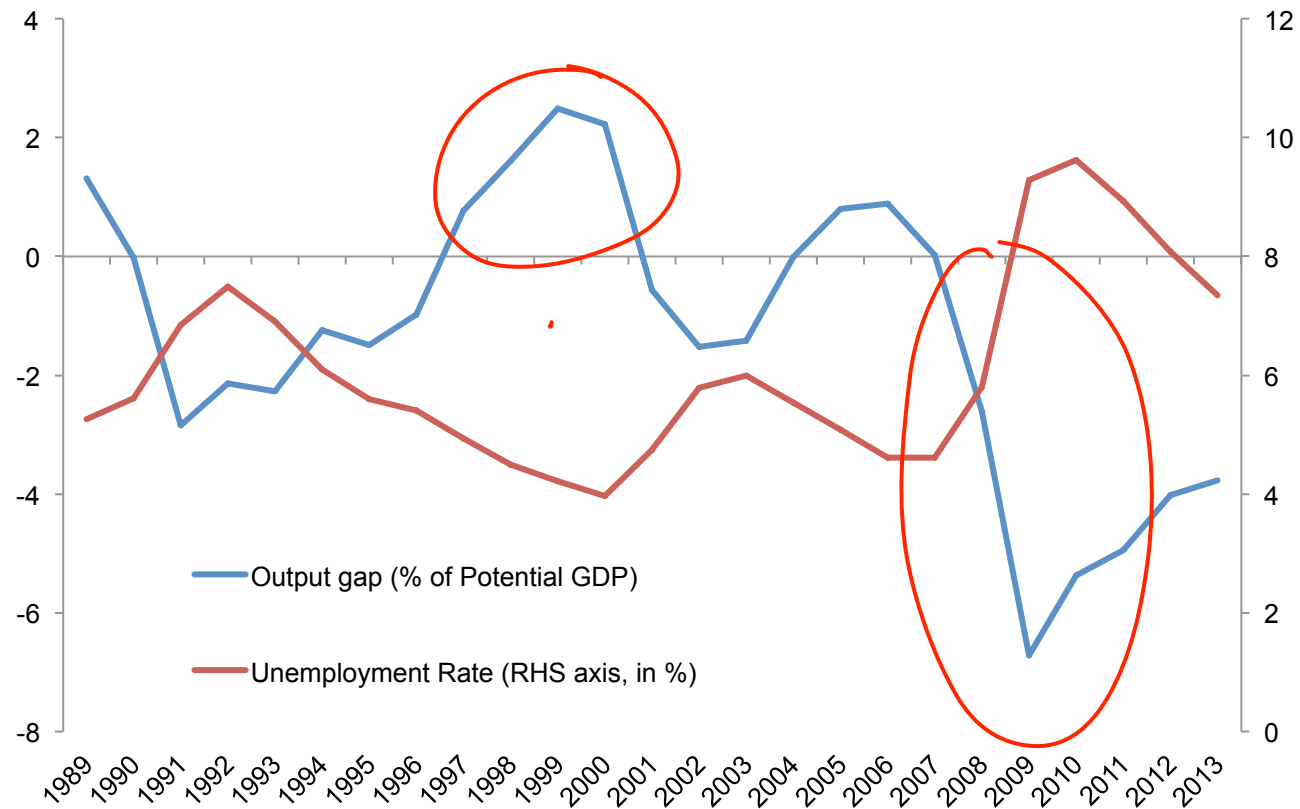
A measure of sustainable output.

Output Gap

A measure of the business cycle position.

$$Y_{GAP} = \frac{((RY) - Y^p)}{Y^p} * 100$$

Output Gap and Unemployment in the U.S.



Source: WEO, Oct. 2014

Supply Side: Determinants of Output

$$Y = f(\underline{K}, \underline{L}, \underline{A})$$

Question: *How to estimate potential output?*

- Production Function Approach ✓ $Y = AK^\alpha L^{1-\alpha}$
 - Time Series Techniques (univariate, multivariate)
-

Projection of Potential GDP in Macronia

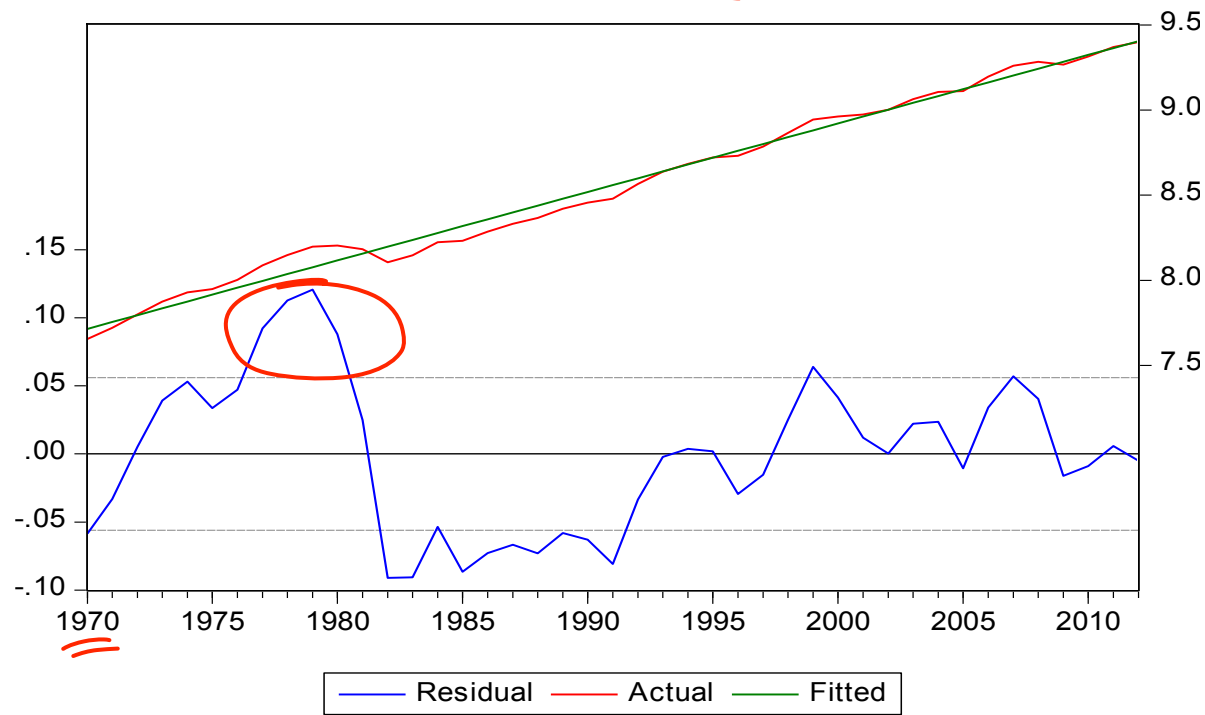
Deterministic Trend

$$\underline{\text{Ln (RY}_t\text{)}} = \underline{\alpha} + \underline{\beta^*t} + \underline{\varepsilon_t}$$

Macronia: Potential GDP Forecast

$$\ln(RY_t) = 7.67 + 0.04^*t$$

4%



A Pragmatic Approach: Projection of GDP

Forecast real GDP growth from *information provided* and *judgment*.

$$RY_{\underline{t+1}} = RY_t * (1 + \textcircled{g}/100)$$

$$RY_{2014} = RY_{2013} * (1 + 0.07)$$

7%

Demand Side: Projection of Expenditure

$$\text{GDP} = (C_p + C_g) + (I_p + I_g) + (X - M)$$

Determinants of Private Consumption

$$C_p = f (YD, YD^e, \text{wealth, real interest rate, uncertainty, credit, ...})$$

Disposable Income (in the current period), YD (+) ✓✓

Expectations (consumer confidence indexes, employment growth), YD^e (+) ✓✓

Wealth (stock market performance, housing prices) (+) ✓

Uncertainty (precautionary saving) (-) ✓

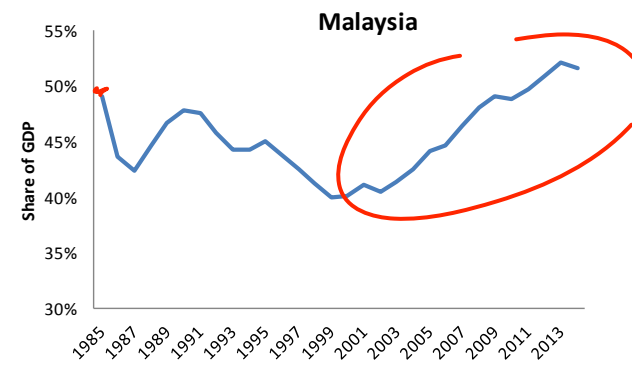
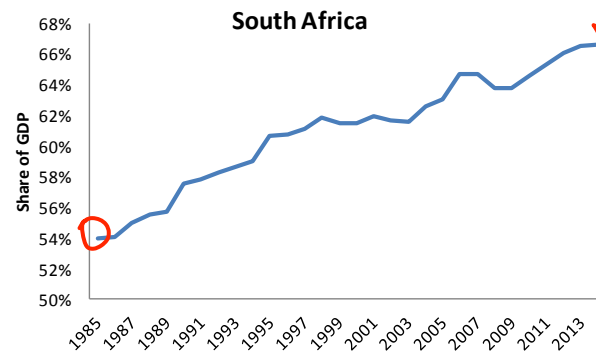
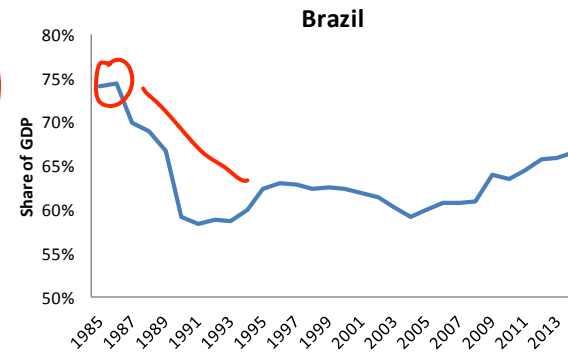
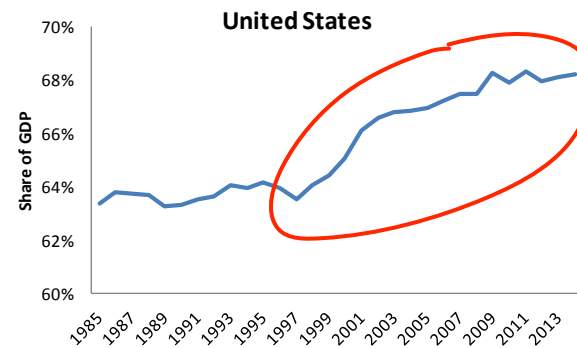
Availability of Credit (+) ✓

Real Interest Rate (?)

Substitution effect (-)

Income effect (+)

Private Consumption (% of GDP)



Projection of Real Private Consumption

Approach 1 (naïve):

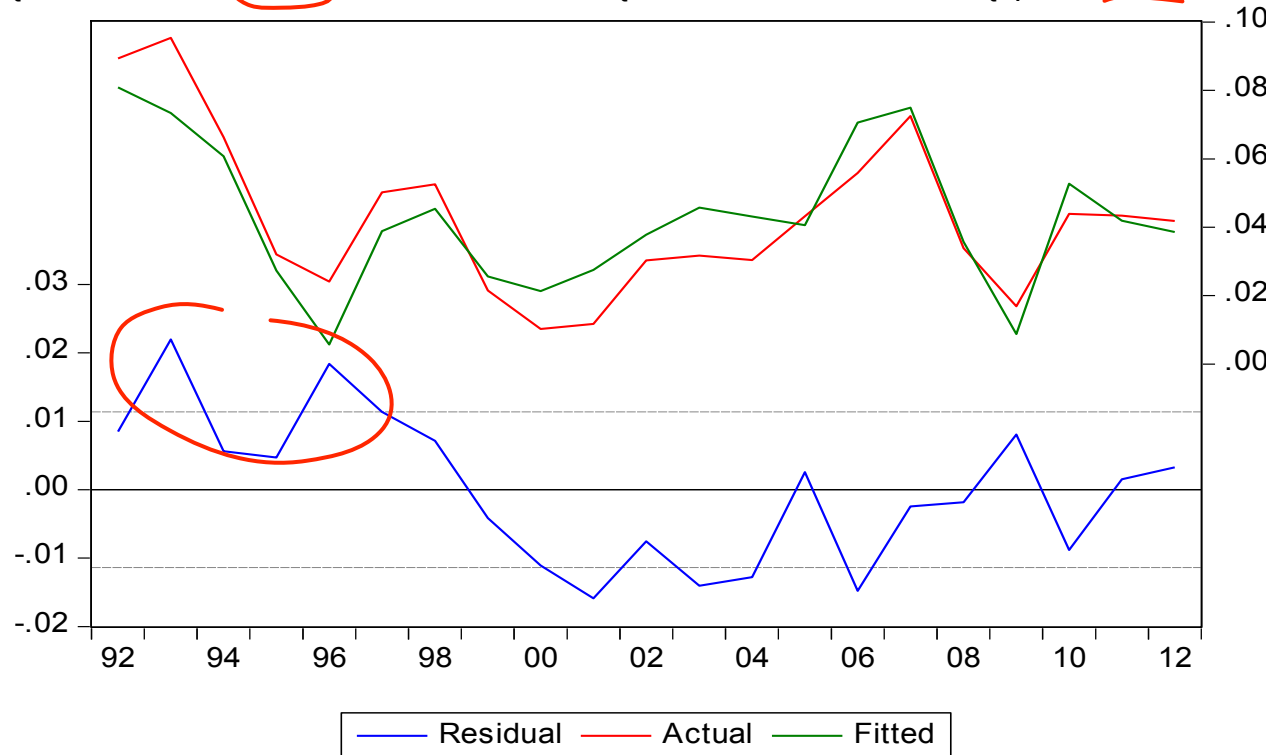
$$\underline{\text{RCp}_{2014}} = (\text{RCp}_{2013} / \text{RY}_{2013}) * \text{RY}_{2014}$$

Approach 2 (econometric):

$$\underline{\Delta \text{Ln}(\text{RCp}_t)} = c + \beta * \Delta \text{Ln}(\text{RGNDI}_t) - \lambda * [\text{Ln}(\text{RCp}_{t-1}) - \delta * \text{Ln}(\text{RGNDI}_{t-1})] + \varepsilon_t$$

Error Correction Model

$$\Delta \text{Ln}(\text{RCp}_t) = 0.01 + 0.65 \cdot \Delta \text{Ln}(\text{RGNDI}_t) - 0.41 \cdot [\text{Ln}(\text{RCp}_{t-1}) - 0.88 \cdot \text{Ln}(\text{RGNDI}_{t-1})]$$



Determinants of Private Investment

$$I_p = f (RY, \Delta RY, \text{Factor costs, RER, interest rates, credit, uncertainty, volatility,...})$$

Current and expected future demand, $RY, \Delta RY$ (+) ✓

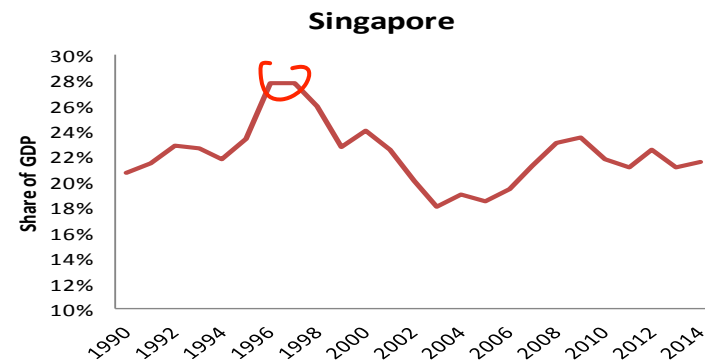
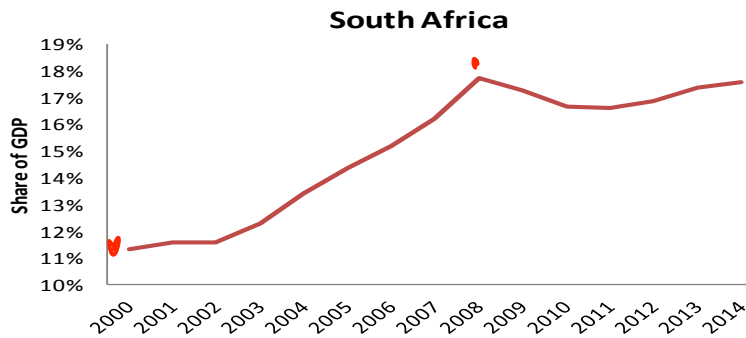
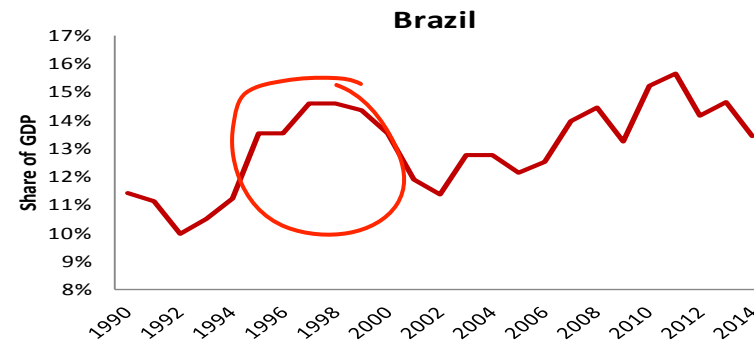
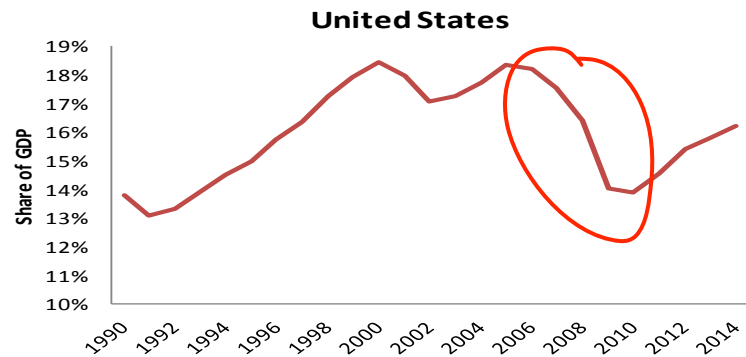
Factor Costs: wages, energy prices (-) ✓

Competitiveness: real exchange rate ✓

Availability and Cost of Credit: interest rates and monetary aggregates (+/-) ✓

Uncertainty: macroeconomic, and political volatility (-)

Private Investment (% of GDP)



Projection of Private Investment

Approach 1 (naïve):

$$Rip_{2014} = \underbrace{(Rip_{2013} / RY_{2013})}_{\text{ratio}} * \underbrace{RY_{2014}}_{\text{value}}$$

Approach 2 (econometric):

$$\underline{\ln(Rip_t)} = c + \beta_1 * \ln(RY_t) + \beta_2 * \underline{RIBR_t} + \varepsilon_t$$

Review of Basic Concepts

- Inflation is a sustained increase in the general level of prices of goods and services in an economy.
 - CPI measures the cost of a basket of goods and services purchased by a typical household for consumption in some base period.
 - The CPI and the GDP deflator cover different sets of goods and services.
-

Determinants of Inflation

Demand side factors

Example: excess demand ($Y_{GAP} > 0$) leads to inflationary pressures.

Supply side factors

Example: supply shocks such as oil prices, terms of trade, food prices.

Economic policy (fiscal, monetary, exchange rate)

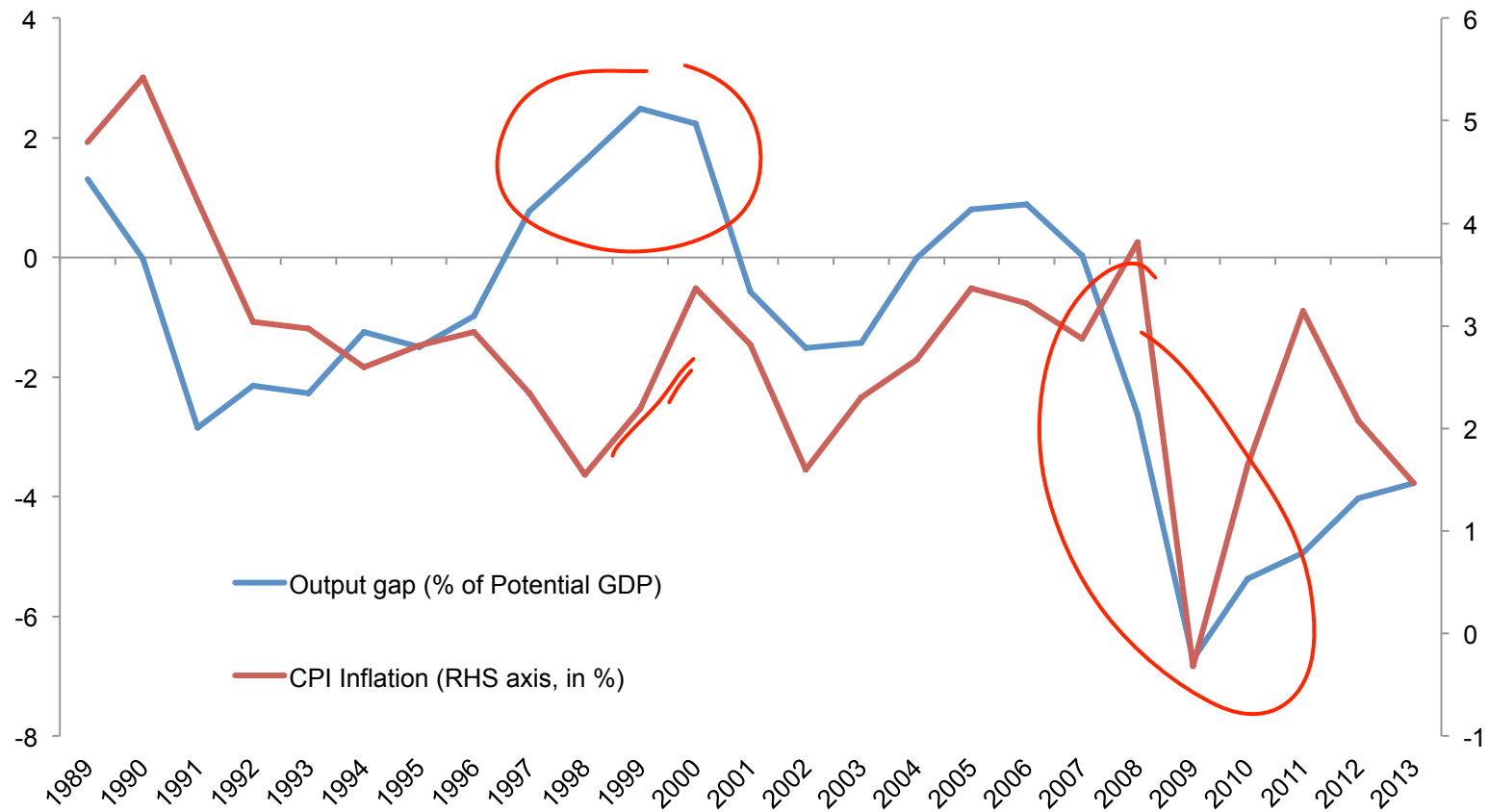
Affects inflation through various transmission channels.

Phillips Curve

The standard formulation for a small open economy:

$$\pi_t = (1 - \rho) * E(\pi_{t+1}) + \rho * \pi_{t-1} + \beta * ygap_t + \gamma * RERgap_t + v_t$$

Inflation and the Output Gap in the U.S.



Source: WEO, Oct. 2014

Forecasting Inflation in Macronia

Apply a simplified Phillips Curve to Macronia data:

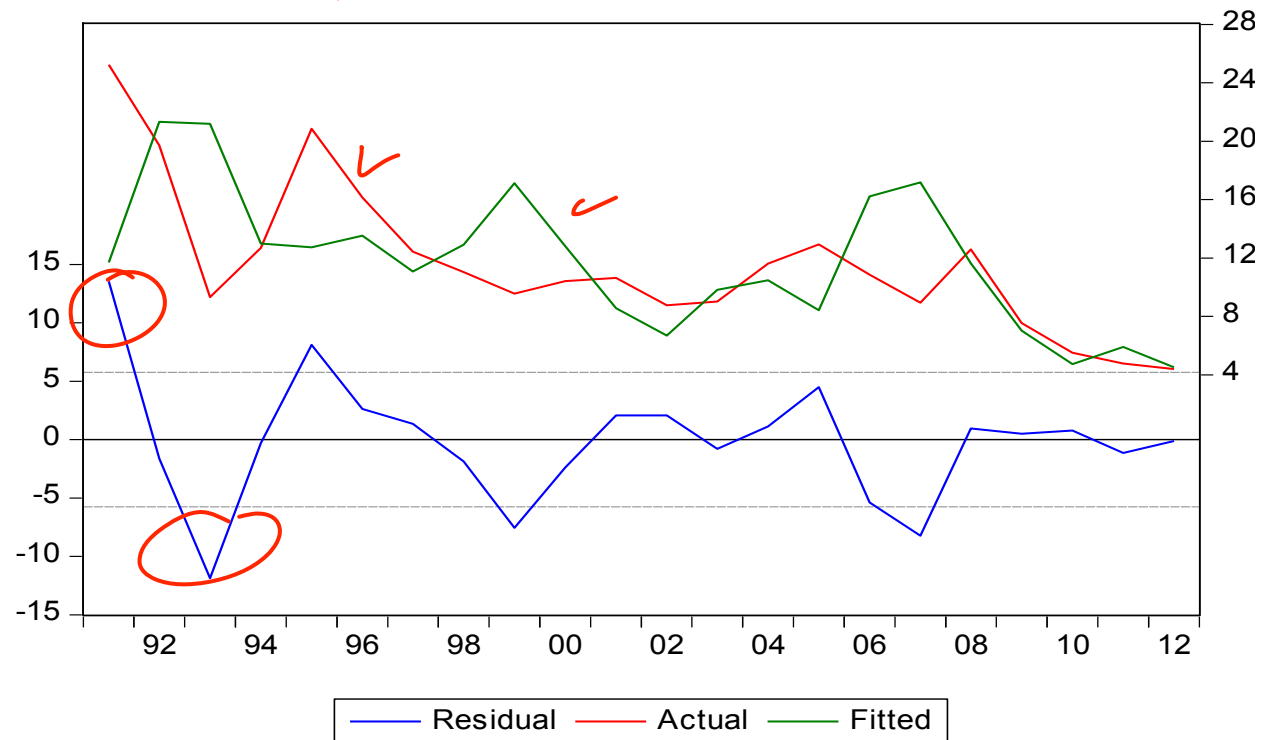
$$\pi_t = c + \rho^* \pi_{t-1} + \beta^* ygap_t + \gamma^* RERgap_t + \varepsilon_t$$

Use the fitted values to obtain a forecast of inflation.

We focus on average CPI inflation in the regression.

Estimated Phillips Curve

$$\pi_t = 2.53 + \underline{0.73} \pi_{t-1} + \underline{1.45} ygap_t + \underline{0.28} RERgap_t$$



Initial Projection of Nominal GDP

Use our forecast of CPI inflation to formulate an initial guess for $\% \Delta \text{PGDP}$.

$$\text{PGDP}_{2014} = \text{PGDP}_{2013} * \left(\frac{1 + \% \Delta \text{PGDP}}{100} \right)$$

$$Y = \underline{\text{RY}} * \underline{\text{PGDP}} / 100$$

$$Y_{2014} = \text{RY}_{2014} * \frac{\text{PGDP}_{2014}}{100}$$

Projecting Component Deflators

Consumption: $\% \Delta PC = \% \Delta CPI$

Investment: $\% \Delta PI = (1-a) \% \Delta CPI + a \% \Delta PM$

Export: $\% \Delta PX = ((1 + \% \Delta P \text{ of } X \text{ in US\$}/100) * (1 + \% \Delta NER/100) - 1) * 100$

Import: $\% \Delta PM = ((1 + \% \Delta P \text{ of } M \text{ in US\$}/100) * (1 + \% \Delta NER/100) - 1) * 100$

Looking Beyond the Real Sector

Household and corporate incomes also dependent on taxes, transfers and net factor income from abroad.

Financing of investment will also depend on government balances, external finance and credit from the banking system.

Forecasts have to take into account interrelations among sectors: we need both accounting and economic coherence.

Looking Beyond the Real Sector

Interest Rates (Monetary) ✓

Exchange Rates (External sector) ✓

Government Investment and Government Consumption (Fiscal) ✓

Net Exports (External) ✓
