

ECON 815

Introduction

Winter 2014

What is the course about?

Modern macroeconomics is about understanding cyclical fluctuations.

Important for:

- ▶ forecasting
- ▶ analyze policy changes
- ▶ design optimal policy responses to shocks

Main issue:

The first task merely requires an *econometric (reduced form) toolkit*.

The second requires a *theoretical (structural) model*.

The third requires a combination of the two.

A Brief History of Thought

Classic Non-structural Approach:

- ▶ developed pre WWII
- ▶ reduced form, univariate ARMA models (Box-Jenkins)

Keynesian Large-scale Structural Models:

- ▶ ad-hoc postulated, simultaneous equation models
- ▶ not connected to long-run
- ▶ equation-by-equation estimation

Modern Nonstructural models:

- ▶ multivariate time series analysis
- ▶ error correction models & VARs
- ▶ cointegration issues and common factor models

The course will focus on **DSGE** models.

What is DSGE about?

Dynamic – how an economy evolves throughout time

Stochastic – in response to shocks

General – at a high level of aggregation

Equilibrium – based on (optimal) decision rules.

Key Aspects:

- ▶ at the core, there is a structural, microfounded model
- ▶ due to non-linearities, this model is solved in an approximate way
- ▶ the model is then compared to the data taking the model serious – which is quite schizophrenic
- ▶ have become an indispensable way for policy analysis
- ▶ by now: it has become an art how to match models and data for estimation

Ultimately: a synthesis of reduced form and structural approaches.

Overview

1. Two-period economy
2. The canonical RBC model
 - ▶ steady state
 - ▶ linear approximations
 - ▶ calibration
 - ▶ computing IRFs and simulate
 - ▶ (possibly VAR and SVAR)
3. Fiscal Policy and Business Cycles
4. (Newkeynesian) DSGE models and Monetary Policy
5. Financial Shocks

A Glance at the Data

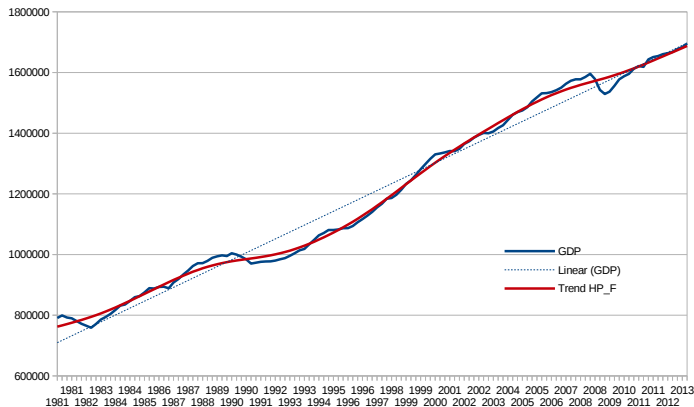


Figure: Canadian Real GDP – 1981:1 - 2013:3

Issue: macro variables are often $I(1)$ and we want to explain fluctuations around trend.

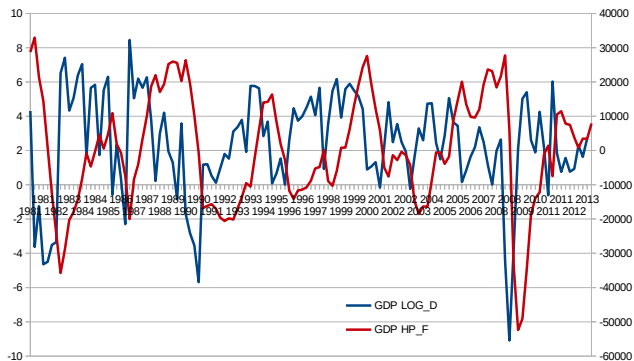


Figure: Fluctuations in Real GDP – 1981:1 - 2013:3

Issue: there are many ways to “detrend” the data and render variables stationary.

Stationarity and Detrending

1) First-differences:

- ▶ growth rates are given by $\frac{\dot{y}_t}{y_t} = \frac{d \ln y_t}{dt}$
- ▶ or: $\frac{y_t - y_{t-1}}{y_{t-1}}$ which can be approximated by $\Delta \ln y_t$

2) HP filter:

- ▶ decompose series into a cyclical component and a trend
- ▶ least square estimator: $\min_{y_t^g} \sum_{t=0}^T (y_t - y_t^g)^2 + \lambda \sum_{t=0}^T (\Delta^2 y_t^g)^2$
- ▶ for quarterly business cycle data set $\lambda = 1600$

3) Cointegration

- ▶ take two time series y_t and x_t
- ▶ they are cointegrated whenever there exists some γ s.th.
 $\epsilon_t = y_t - \gamma x_t$ is $I(0)$
- ▶ if the variables are cointegrated, simple differencing would lose information
- ▶ classic example: consumption and output have both a long-run relationship and short-run dynamics

Second Moments

“Classic” Approach of DSGE:

- ▶ calibrate the data
- ▶ solve the model
- ▶ simulate the model
- ▶ compare moments (or IRFs to shocks)

Table: Mean Annual Growth, Standard Deviation and Covariance with Output (Canada 1981:1 – 2013:3)

	Mean	$\frac{SD}{SD_Y}$	-4	-3	-2	-1	0	1	2	3	4
Output	2.35	1	0.03	0.21	0.31	0.55	1	0.55	0.31	0.21	0.03
Cons.	2.43	0.72	-0.13	0.21	0.24	0.32	0.53	0.31	0.26	0.15	0.07
Inv.	2.92	5.12	-0.01	0.09	0.32	0.47	0.59	0.48	0.15	0.00	-0.07
Hours	1.22	0.97	-0.08	0.07	0.25	0.53	0.70	0.61	0.35	0.18	0.09
Prod.	1.13	0.76	0.15	0.19	0.10	0.05	0.41	-0.05	-0.04	0.05	-0.08

Stylized RBC Facts

- ▶ relatively stable long-run trend growth (balanced growth path)
- ▶ investment fluctuates more than output
- ▶ consumption is smooth relative to output
- ▶ hours and output fluctuate about the same (but avg. weekly hours fluctuate much less)
- ▶ productivity fluctuates somewhat less than output, but it procyclical (seems to drive output)
- ▶ Also: real wages vary less than productivity and avg. compensation not correlated with output

Key: We should expect that technology shocks play a large role with investment and labor input being the main propagating mechanisms.