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# Macroeconomic Analysis

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Laurea magistrale in *Economics* (classe LM-56, 9 CFU)

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## Syllabus and references

**Main topic.** The course deals with some key themes of modern macroeconomics, in particular presenting the evolution of *business cycle analysis* from the "neoclassical synthesis" to more recent new-Keynesian interpretations. Fundamental economic concepts will be rigorously illustrated with the aid of formalized models, widely used in various fields of macroeconomics.

**Readings.** The course is not based on a textbook. For most topics, lecture notes will be made available; moreover, for each topic, a set of readings, mostly drawn from scientific international journals and containing the original versions of the models discussed in the lectures, are suggested.



**Background.** Working knowledge of *microeconomics* and *macroeconomics* at the level of three-year undergraduate courses is required. The formalized analysis of macroeconomic models requires familiarity with the mathematical and statistical tools acquired in the three-year undergraduate program in Economics. In particular, extensive use of differential calculus and constrained optimization techniques will be made.

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## Introductory readings: theories and facts

This section provides some references on the theoretical developments of macroeconomics (and business cycle analysis in particular) and on the main features of observed business cycle fluctuations.


Critical assessments of the **evolution of macroeconomic theory** are provided by: (these papers require some knowledge of the models that will be studied in the course; therefore, the suggestion is to quickly browse through them at the beginning, and come back later for a more thorough reading)

- [Blanchard O.J.](#) (2000) "What do we know about macroeconomics that Fisher and Wicksell did not?", *Quarterly Journal of Economics*, 115, p.1375-1409 - 
- [Blanchard O.J.](#) (2009) "The state of Macro", *Annual Review of Economics*, 1, p. 209-228 - 


The **cyclical properties** of the main macroeconomic time series for the **USA** in the post-World War II period (the "stylized facts" of the business cycle that theory should account for) are analyzed in:

- [Kydland F.E.](#) and [E.C. Prescott](#) (1990) "Business cycles: real facts and a monetary myth", *Quarterly Review*, Federal Reserve Bank of Minneapolis, 14(2), p. 3-18 - 
- [Stock J.H.](#) and [M.W. Watson](#) (2000) "Business cycle fluctuations in U.S. macroeconomic time series", in J.B. Taylor e M. Woodford (editors), *Handbook of Macroeconomics*, Volume 1A, Elsevier - (NBER working paper version 1998) - 

A more recent account of **business cycle facts** for the USA in the light of the Great Recession (2007-2009) is provided by

- [Ng S.](#) and [J. Wright](#) (2013) "Facts and challenges from the Great Recession for forecasting and macroeconomic modeling", *Journal of Economic Literature*, 51(4), 1120-1154 - 



Some of the papers above, and many others in the literature on this issue, use "filtering" techniques to separate cyclical fluctuations in aggregate macroeconomic series from their trend behavior. For technical details on the most widely used filtering procedure, the "Hodrick-Prescott (HP) filter" see:

- [Hodrick R.J. and E.C. Prescott](#) (1997) "Postwar US business cycles: an empirical investigation", *Journal of Money, Credit and Banking*, 29(1), p. 1-16 - 

Information on how the "**official**" **dating** of the "expansion" and "recession" stages of the business cycles is determined are available:




- for the USA: from the [National Bureau of Economic Research](#) (NBER), with a complete [chronology](#) of the US business cycles from 1854, and some [methodological notes](#)
- for the Euro area: from the [Centre for Economic Policy Research](#) (CEPR), with a business cycle [chronology](#) from 1970, and some [methodological notes](#)

The **recent experience** of business cycle fluctuations in the Euro area and the US is analyzed and compared in:


- [European Central Bank](#), "The latest Euro area recession in an historical context", *Monthly Bulletin*, November 2009, 97-113 - 
- [European Central Bank](#), "Patterns of Euro area And US macroeconomic cycles: What has been different this time?", *Monthly Bulletin*, May 2011, 69-85 - 

[A short introductory handout](#) on business cycle analysis is available - 


[Articles from \*The Economist\*](#) :

- September 2008: discussing the *definition and measurement of "recessions"* - 
- August 2014 and May 2016: evaluating the *length of the current US expansion* in the light of recent business cycle experience - 
- July 2019: again on the length of the (still) current US expansion - 

## 1. The "neoclassical synthesis"

Fully developed in the 1950s, the so-called "neoclassical synthesis" has been the basic paradigm for the interpretation of macroeconomic phenomena until the end of the 1960s. Based on the Keynesian model of income determination as interpreted by J.R. Hicks ("Mr. Keynes and the Classics. A suggested interpretation", *Econometrica*, 1937) and F. Modigliani ("Liquidity preference and the theory of interest and money", *Econometrica*, 1944), with the addition of simple assumptions on the changes over time of wages and prices suggested by A.W. Phillips ("The relation between unemployment and the rate of change of money wage rates in the United Kingdom, 1861-1957", *Economica*, 1958-), the model aimed at integrating the "classical" analysis of the long-run with the "keynesian" theory of short-run fluctuations.


On the subsequent utilization of the Phillips curve as a "menu" for policy choices:

- [Samuelson P.A. e R.M. Solow](#) (1960) "Analytical aspects of anti-inflation policy", *American Economic Review*, 50, p.177-194 (especially p. 186-194) - 

On the history of the Phillips curve and its role in US macroeconomic policy:

- [King R.G.](#) (2008) "The Phillips curve and US macroeconomic policy: snapshots 1958-1996", *Federal Reserve of Richmond Economic Quarterly Review*, 94, Fall - 

On the use of the standard Phillips curve framework to interpret recent macroeconomic developments:

- [Coibion O. and Y. Gorodnichenko](#) (2015) "Is the Phillips Curve alive and well after all? Inflation expectations and the missing deflation", *American Economic Journal: Macroeconomics*, 7(1), 197-232 - 
- [European Central Bank](#) (2014) "The Phillips curve relationship in the Euro area", *Monthly Bulletin*, July, 99-114 -



- Article from *The Economist* (June 2017) discussing recent US evidence -
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## 2. The "natural rate of unemployment" and the long-run Phillips curve

Lecture notes 1 are available.

The first fundamental critiques of macroeconomic policies based on a permanent trade-off between inflation and unemployment, and the development of the concepts of "natural rate of unemployment" and the "long-run Phillips curve" were put forward by M. Friedman and [E. Phelps](#) at the end of the 1960s. A simple formalization of Friedman's view is in the [lecture notes 1](#). The original papers are:

- [Friedman M.](#) (1968) "The role of monetary policy", *American Economic Review*, 58, p.1-17 -
- [Friedman M.](#) (1977) "Nobel lecture: Inflation and unemployment", *Journal of Political Economy*, 85, p.451-472 -

More recent empirical assessment of the natural rate idea:

- [Blanchard O.J.](#) and [L.F. Katz](#) (1997) "What we know and do not know about the natural rate of unemployment", *Journal of Economic Perspectives*, 11 Winter -
- [Blanchard O.J.](#) (2018) "Should we reject the natural rate hypothesis?", *Journal of Economic Perspectives*, 32 Winter -
- [Ball L.](#) and [N. G. Mankiw](#) (2002) "The NAIRU in theory and practice", *Journal of Economic Perspectives*, 16 Fall -

Articles from *The Economist* :

- September 2011 - - and August 2017 - : making use of the "natural rate of unemployment" concept in discussing US Federal Reserve's monetary policy.
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## 3. Rational expectations and "New Classical Macroeconomics"

Lecture notes 2 are available


The introduction in macroeconomic models (featuring the natural rate of unemployment) of the assumption of "rational expectations" in the behavior of economic agents had dramatic consequences for the theory of economic policy, usually associated with the "new classical macroeconomics" school of the 1970s and 1980s. A formalization of the rational expectations hypothesis and a comparison with the (older) assumption of "adaptive" expectations is in the [lecture notes 2 \(section 1\)](#) in the context of a model of "hyperinflation". In the [lecture notes 2 \(section 2\)](#) we study a macroeconomic model making use of rational expectations due to R.E. Lucas, which is also an example of the wide-ranging "Lucas critique" of traditional macroeconomic models used for policy analysis:

- [Lucas R.E. Jr.](#) (1973) "Some international evidence on output-inflation trade-offs", *American Economic Review*, 63, p.326-334 -

The main implications of this model for business cycle theory and the role for macroeconomic stabilization policies are extended by the new classical macro models analyzed in the [lecture notes \(2, section 3\)](#). See in particular:

- [Sargent T.J.](#) e [N. Wallace](#) (1976) "Rational expectations and the theory of economic policy", *Journal of Monetary Economics*, 2, p. 169-183
- [Barro R.J.](#) (1976) "Rational expectations and the role of monetary policy", *Journal of Monetary Economics*, 2, p. 1-32
- [Lucas R.E.](#) e [T.J. Sargent](#) (1978) "After Keynesian macroeconomics", in *After the Phillips curve: persistence of high inflation and high unemployment*, Federal Reserve Bank of Boston -

**Nobel prize for Economics 2011** awarded to [T.J. Sargent](#) and [C.A. Sims](#) for their contributions to empirical macroeconomics:

- [motivation](#) and [scientific background](#)
- [comment on \*The Economist\* October 15, 2011](#) - .



Hints for the [answers to problem set in lecture notes 2](#) will be available

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#### 4. Nominal rigidities, rational expectations and stabilization policies

**Lecture notes 3** are [available](#)


A stabilization role for macroeconomic (especially monetary) policies can be found even in a rational expectations framework if nominal rigidities are introduced in the wage-setting or price-setting mechanisms, as shown by the models illustrated in the [lecture notes 3](#). Original papers:

- [Fischer S.](#) (1977) "Long-term contracts, rational expectations and the optimal money supply rule", *Journal of Political Economy*, 85, p. 191-205 - .
- [Taylor J.B.](#) (1979) "Staggered wage setting in a macro model", *American Economic Review*, 69, p. 108-113 - .

On the inflation/output variability trade-off:

- [Taylor J.B.](#) (1994) "The Inflation-Output Variability Tradeoff Revisited", in J. Fuhrer (ed.) *Goals Guidelines, and Constraints Facing Monetary Policymakers*, Federal Reserve Bank of Boston - .



A recent assessment of sticky wages/prices models is provided by:

- [Taylor J.B.](#) (2017) "The staying power of staggered wage and price setting models in macroeconomics", in *Handbook of Macroeconomics*, vol. 2, North-Holland, chapter 25 -  (working paper version)
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#### 5. Dynamic macroeconomic models of real-financial interactions

**Lecture notes 4** are [available](#)

The rational expectations hypothesis has been widely used also in macroeconomic models (not of the new classical variety) focusing on the interactions between the real and the financial sectors of the economy. In the [lecture notes 4](#), two classic examples are presented: a IS-LM model extended to allow for a stock market (Blanchard) and the Dornbusch's "overshooting" model of the exchange rate. Original papers:

- [Blanchard O.J.](#) (1981) "Output, the stock market and interest rates", *American Economic Review*, 71, p. 131-142 - .
- [Dornbusch R.](#) (1976) "Expectations and exchange rate dynamics", *Journal of Political Economy*, 84, p. 1611-1176 - .

Hints for the [answers to problem set in lecture notes 4](#) will be available.



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#### 6. Real business cycle theory




**Slides** are [available](#)

Building on the fundamental theoretical framework of the new classical macro (therefore viewing business cycles as an equilibrium phenomenon), the emphasis is shifted by real business cycle (RBC) theorists onto technological shocks as the main source of fluctuations.

Among early contributions:

- [Prescott E.C.](#) (1986) "Theory ahead of business cycle measurement", *Quarterly Review*, Federal Reserve Bank of Minneapolis, 10(4), p. 9-22 - 
- [Plosser C.I.](#) (1989) "Understanding real business cycles", *Journal of Economic Perspectives*, 3, p. 51-77 - 

Survey papers with assessments of the RBC literature:



- [Stadler G.W.](#) (1994) "Real business cycles", *Journal of Economic Literature*, 32, p. 1750-1783 - 
- [King R.G.](#) and [S. Rebelo](#) (2000) "Resuscitating real business cycles", in J.B. Taylor e M. Woodford (editors), *Handbook of Macroeconomics*, Elsevier (NBER working paper version) - 
- [Rebelo S.](#) (2005) "Real business cycle models: past, present, future", *Scandinavian Journal of Economics*, 107, p. 217-238 - 

## 7. New Keynesian Macroeconomics: macroeconomic implications of imperfections in the goods and labor markets


Lecture notes 5 are available

Recent attempts to rebuild business cycle theory on Keynesian ideas (but with rigorous microeconomic foundations) has produced several models focusing on various market imperfections (imperfect competition, real and nominal rigidities). These models provide the theoretical framework for the *dynamic stochastic general equilibrium* (DSGE) models also used for policy analysis.



Some early models exploring the macroeconomic and policy consequences of imperfections in the goods and labor markets are presented in:

- [Romer D.](#) (1993) "The new Keynesian synthesis", *Journal of Economic Perspectives*, 7, p. 5-22 - 
- [Blanchard O.J.](#) and [N. Kiyotaki](#) (1987) "Monopolistic competition and the effects of aggregate demand", *American Economic Review*, 77, p. 647-666 - 



A focus on the implications for monetary policy is provided by:

- [Gali J.](#) and [Gertler M.](#) (2007) "Macroeconomic modeling for monetary policy evaluation", *Journal of Economic Perspectives*, 21, p. 25-45 - 

Implications for inflation dynamics and its interaction with the output gap are discussed by:

- [Hornstein A.](#) (2007) "Evolving inflation dynamics and the New Keynesian Phillips curve", Federal Reserve of Richmond *Economic Quarterly Review*, 93, Fall - 
- [Mavroeidis S.](#), [M. Plagborg-Moller](#) and [J. Stock](#) (2014) "Empirical evidence on inflation expectations in the New Keynesian Phillips curve", *Journal of Economic Literature*, 52(1), 124-188 - 

Recent assessments of DSGE modeling in general, and the New Keynesian macroeconomics in particular, can be found in:

- [Christiano L.J.](#), [M.S. Eichenbaum](#) and [M Trabandt](#) (2018), "On DSGE models", *Journal of Economic Perspectives*, 32, 113-140 - 
- [Gali J.](#) (2028) "The state of New Keynesian Economics: a partial assessment", *Journal of Economic Perspectives*, 32, 87-112 - 




## 8. Unemployment: search and matching models of labor market dynamics

Lecture notes 6 are available


The evidence of sizeable flows of workers getting into and out of unemployment motivated the development of models of labor market dynamics based on the process of search by agents on the market. The original insights have been developed by P. Diamond, D. Mortensen and C. Pissarides (DMP model). A comprehensive treatment can be found in:

- [Pissarides C.A.](#) (2000) *Equilibrium Unemployment Theory*, Second edition, ch. 1-3

The basic DMP model and its implications are presented and discussed by:

- [Hornstein A., Krusell P., G.L. Violante](#) (2005) "Unemployment and Vacancy fluctuations in the matching model: inspecting the mechanism", Federal Reserve Bank of Richmond *Economic Quarterly Review* - 
- [Hall R.](#) (2005) "Employment fluctuations with equilibrium wage stickiness", *American Economic Review*, March - 
- [Pissarides C.A.](#) (2011) "Equilibrium in the labor market with search frictions", *American Economic Review* - 


A recent survey of theory and evidence on the relationship between unemployment and vacancies is provided by:

- [Elsby M., R. Michaels, D. Ratner](#) (2015) "The Beveridge curve: a survey", *Journal of Economic Literature* - 




## Additional Material

### Perspectives on the recent "Great Recession" episode (2007-2009)


A good account of the early stages of the financial crisis, focusing on the liquidity squeeze and credit crunch occurred in the US in 2007 and 2008 is provided by

- [Brunnermeier M.C.](#) (2009) "Deciphering the liquidity and credit crunch 2007-2008", *Journal of Economic Perspectives*, 23, p. 77-100 - 



The interactions between financial markets and the real economy, and their implications for macroeconomic analysis, are investigated by

- [Hall R.E.](#) (2010) "Why does the economy fall to pieces after a financial crisis?" *Journal of Economic Perspectives*, 24, p. 3-20 - 
- [Gertler M. and S. Gilchrist](#) (2018) "What happened: financial factors in the Great Recession", *Journal of Economic Perspectives*, 32, 3-30 - 
- [Mian A. and A. Sufi](#) (2018) "Finance and business cycles: the Credit-driven household demand channel", *Journal of Economic Perspectives*, 32, 31-58 - 


A comprehensive account and interpretation of the recent recession can be found in

- [Hall R.E.](#) (2011) "The long slump", *American Economic Review*, 101, 431-469 - 

Recent economic and financial developments raised deep criticisms of standard models used in macroeconomics and financial economics. A summary of the earlier debate is offered

by a series of articles in [The Economist](#) (July 2009) -  with a [reply by R.Lucas](#) - 

A perspective on the evolution of business cycle theory in the light of the Great Recession is provided by:

- [Keohe P.J., V. Midrigan and E. Pastorino](#) (2018) "Evolution of modern business cycle models: accounting for the Great Recession", *Journal of Economic Perspectives*, 32, 141-166 - 

A series of articles in [The Economist](#) (September-October 2013) on the origins and consequences of the recent financial crisis - 