Preface by Francesco Giavazzi

Macroeconomists seem to suffer from some kind of schizophrenia. The latest editions of introductory texts (Mankiw, Blanchard-Amighini-Giavazzi and others) are becoming easier and easier. At the same time, macroeconomic models used by central banks in their simulations (the so-called Dynamic Stochastic General Equilibrium Models, DSGE) are increasingly micro-founded – and thus complex. It is often difficult to identify the channels of transmission of a real shock or a shock to the economy caused by economic policies. This has led Paul Krugman[1] to ask: "Are you aware of any interesting predictions based on a DSGE model and supported by evidence? I am not." A similar stance has been taken by Oliver Blanchard,[2] though in a less trenchant manner. Blanchard also noted that a simple IS-LM model sufficiently explains most of the results that can be obtained through a DSGE model. Surely the effects taken into account by a DSGE model are much broader than those that can be analyzed through an IS-LM model: but the fact that they are so difficult to interpret often makes them of little use. It is evident that macroeconomics has nothing to gain from such divergent approaches. Once they have studied the IS-LM model in the Introduction to Macroeconomics course, undergraduate students often have to make a quantum leap when, in their third year, they take either Intermediate Macroeconomics or Political Economy. Intertemporal choice, or Euler equations, in my view central elements of macroeconomics, are barely mentioned, or not at all, in introductory courses. And yet, thinking in terms of intertemporal choice not only requires advanced math skills, but also helps students go beyond the mere analysis of the national economic indicators. The quick integration of Robert Solow's growth model and the IS curve helps students by building a bridge between two chapters of the course that are usually treated separately. The same is true for the analysis of macroeconomic equilibrium under different assumptions concerning expectations. In a nutshell, these Macroeconomic Lessons fill a gap. Surely students will find them slightly more difficult than the most popular textbooks, but their investment

[1] Paul Krugman, "The State of Macro Is Sad", New York Times, August 12, 2016.

[2] Olivier Blanchard, "Do DSGE Models Have a Future?", Policy Brief, 16-11, Peterson Institute, Washington, DC.

will pay off when they take a Macroeconomics course. It will help them understand that microeconomics and macroeconomics are two different, albeit connected, worlds, because they will appreciate that the two disciplines share the same way of thinking. Even if this were the only Macroeconomics course in their lives, they would nonetheless have acquired the ability to "think for themselves" about the problems that the political economy faces everyday.

To the teacher and the student

To the teacher. The material contained in the bulk of these lectures is basic classical macro: the Solow growth model and the classical AS-AD model in the three markets of labour, goods/funds and money. The final chapter is a bridge to microfounded theory through the analysis of a two-period economy and of the underlying intertemporal choices by consumers and firms.

We started writing these notes because we were not entirely satisfied with the presentations (known to us) of the relation between Keynes' fixed price model and the flexible price model which was mainstream at the time he developed his own theory. We lay out the two approaches with some care, comparing equilibria and effects of public policies in the two models, so that the student can clearly interpret differences of opinions on basic policy issues which come out in policy debates. In the later chapter on *AS-AD* equilibria with price expectations the flexible price model is then seen to arise as the particular case of rational expectations. There still was (to our textbook knowledge) a fracture between these models and the long-run Solow economy. We show how the short run model is obtained from the long run model by fixing the level of capital, introducing money and - crucially - separating savings and investment decisions. Incidentally, we also check in a concrete example in the national accounting chapter that the basic dynamics equation $\Delta K = I - \delta K$ is verified. This leads smoothly from that chapter to Solow; then from Solow we get the flexible price short run model, from that we derive the *IS-LM* model by deleting the labour market equilibrium condition, and we then turn to *AS-AD* and relative dynamics. We conclude this "classical" part by turning to inflation expectations: we show that with inflation expectations the AS curve becomes the Phillips curve, and naturally model the central bank behavior via the Taylor rule; and with the model thus modified we discuss zero lower bound and quantitative easing. The overall result is a less fragmented, more unified presentation of classical macro. We put constant emphasis on the fact that we are studying economic equilibria, and on how market forces come into play when the economy is out of equilibrium. Again, the final chapter studies a two-period microfounded model, and compares its policy conclusions to those obtained in the earlier chapters.

We put some effort into including exercises of various levels of difficulty, and some we hope are interesting (full solutions are available of course). *AS-AD* equilibria, for example, with rational or adaptive expectations, temporary or stable, are calculated starting from the economy's fundamentals (production function, behavioural functions and parameters). A few more little curiosities are scattered throughout the text, like an example that shows how VAT works in practice, or a short proof of why a function with constant input shares must actually be Cobb-Douglas. Empirical evidence is presented where it is linked to the models we study, and more data about the world's economies (today, in the last 20 years, in the last 200) is available on the book's web site. Incidentally, the book has about 150 pages of text and 30 pages of exercises in total.

Of course a more structured exposition requires a little more effort on the part of the student. Going back to the $\Delta K = I - \delta K$ case for illustration, the GDP example that checks it must contain machines of different ages that lose values due to depreciation, their prices, beginning and end-of-period inventories, etcetera - which is not something usually found in comparable textbooks. The question is, why do we usually spare the student this kind of analytical effort? We confess we do not exactly understand why economics students should sweat only to pass the maths exam. We believe that the curious student will find it rewarding and interesting to use in macroeconomics the same equilibrium approach learned in the micro course, applied and extended (from partial to general) to deal with entirely new families of issues. Of course adequate assistance from of the teacher is also required, and these lectures are actually aimed at teachers who like us chat more comfortably about a picture or data or a case study when there is a model that has been studied and understood behind it.

To the student. As your teacher will tell you, macroeconomics basically studies the standards of living of people, more precisely their material welfare as measured by national income (the GDP). It studies the evolution of GDP over the long run, and its fluctuations in the short run - expansions and crises. It studies what governments and central banks can do to foster the economy's long run growth and to alleviate the most serious problem that aggrieves families during periods of crises - that is unemployment. It thus tries to understand how the economic system works in the aggregate, working to that end with aggregate variables - national income and unemployment rate but also the price level, interest rates, aggregate consumption, savings and investments - and neglecting as a first approximation individual differences, for example by postulating an aggregate production function as if there was a single firm that alone produces all goods in the economy.

Macroeconomics is a difficult subject, whose more recent developments this text cannot cover. A little like Physics, there are classical and modern macroeconomics. And a little like development in modern Physics with quantum mechanics,

modern macro tries to make aggregate observations compatible with rational behaviour on the part of individual agents. And this book, as in the first Physics courses, mainly focuses on classical macro (with the exception of the last chapter). As in Physics, the simple models we study are models of bits of reality, and their purpose is to help interpret the more complex real world. Simplicity serves to isolate the aspects which are more relevant for the issue at hand.

From the formal point of view, to be at ease with the present lectures you should know the fundamentals of microeconomics. There is *nothing* particularly difficult in this book, but it is not bedtime reading - it is meant to be studied with paper and pencil at hand. Some bits you will find a little obscure, but do not swear at us before going over that bit a second time. If something is still unclear, then it is pretty likely our fault, please contact us and we will try to help. And if you reach the end of the book: thanks! Grazie di cuore.

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