Vítor Constâncio: Ricardo Reis' contribution to macroeconomics

Speech by Mr Vítor Constâncio, Vice-President of the European Central Bank, at the ceremony marking the award of the 2016 Germán Bernácer Prize for Promoting Economic Research in Europe to Ricardo Reis, Madrid, 24 November 2017.

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I am very happy to be here to celebrate with you the awarding of the Bernácer Prize to Professor Ricardo Reis from the London School of Economics. As you know, the Prize is awarded to an outstanding, young European economist who works in the fields of macroeconomics and finance. Without a doubt, Ricardo is one of the leading macroeconomists of his generation. Today, we recognise in particular Ricardo's influential research on expectation formation and sticky information as well as on the role of fiscal policy in business cycles.

Ricardo's most cited paper – and he has written many frequently cited papers – is "Disagreement about inflation expectations", co-authored with Gregory Mankiw and Justin Wolfers.[1] This early paper showcases what have been the consistent characteristics of Ricardo's work: his research is data-driven, innovative and deals with topics important for economic policy – in this case monetary policy, given the interest of central banks in inflation expectations. While there had been work on inflation expectations prior to Mankiw, Reis and Wolfers, their paper – together with other work done around the same time by Ricardo, some of it with Gregory Mankiw, and independently by Woodford and Sims – opened a new chapter in research on expectation formation.[2] Since then, numerous economists have been motivated to develop models of data on expectations, and to study the implications of such models for the transmission of shocks and for policy.

Mankiw, Reis and Wolfers documented substantial disagreement among both consumers and professional economists about expected future inflation. The extent of disagreement in the data evolves over time, together with the state of the economy. A high dispersion of inflation expectations is positively correlated with a high level of inflation, and with a high variance in recent inflation. Ricardo and his co-authors also studied the average forecast across agents, finding weak sensitivity of the average forecast to news and serially correlated forecast errors. Subsequent research, which builds on the work of Mankiw, Reis and Wolfers, has confirmed and refined these findings. It has established that expectations deviate systematically from full-information rational expectations. The average forecast across agents of a macroeconomic variable responds slowly to news. If a shock raises inflation for some time, the average forecast of inflation increases by less than inflation itself. Moreover, the average forecast error in a cross-section of agents is likely to be of the same sign as the *ex ante* revision in the average forecast. If inflation is rising and forecasts tend to be revised up, the average forecast error is likely to be positive – people are likely to under-predict inflation. This is, of course, in contrast to the theory of full-information rational expectations, where forecast errors are unpredictable. The same pattern is present in the data for survey-based and market-based measures of inflation expectations, for expectations of macroeconomic variables other than inflation, among consumers and professional economists, and in different countries.[3]

Ricardo, together with Gregory Mankiw, developed a theory that accounts for the salient features of the data on expectations.[4] In the sticky information model of Mankiw and Reis, economic agents update their information only sporadically. When agents fail to update, they make decisions based on information that is to some extent out of date. The updating is staggered across the population, so that at any one time some people are paying attention to news, while others remain inattentive. As a result, information diffuses gradually in the economy. The average forecast responds slowly to news, as in the data. Each individual makes the best forecast given their information. At the same time, however, the average forecast error across agents can be predicted by the *ex ante* revision in the average forecast, as in the data. Finally, again in line with

the data, agents in the model disagree, because their information sets differ. In sum, the sticky information model suggests how expectations are actually formed in the real world.

A number of interesting policy implications arise from this more real-world account of expectation formation. As Ricardo showed in a paper with Lawrence Ball and Gregory Mankiw, optimal monetary policy – given productivity and demand shocks – is price level targeting, as opposed to inflation targeting.[5] This is a controversial proposition with practical inconveniences that render it unpopular among central bankers. There have thus been no attempts to implement it. A broader lesson for monetary policy resulting from the analysis is that long-term inflation expectations are likely to be more stable in a sticky-information world. Central bankers will probably find this message reassuring. On the other hand, the sticky information model suggests that, once long-term inflation expectations become de-anchored, their return to a level consistent with price stability may take time and effort on the part of the central bank.

Ricardo and Gregory Mankiw constructed and estimated a complete dynamic stochastic general equilibrium model with sticky information.[6] Their DSGE model features what the authors refer to as "pervasive stickiness": the idea that information sets are updated sporadically, which originally applied to price-setting firms, is extended here to include consumers and workers. The resulting theory predicts gradual responses of consumption, output and wages to macroeconomic shocks, in addition to the sluggish response of prices. Remarkably, sticky information is the only source of slow adjustment in the model. By contrast, the New Keynesian DSGE model requires multiple frictions, such as habit formation in consumption and investment adjustment costs, on top of price and wage stickiness, in order to capture the persistence in the macro data. The sticky information approach suggests that the origin of the pervasive slow adjustment in the data may be different from the sources highlighted in the New Keynesian literature.

In an influential pair of papers, "Inattentive Producers" and "Inattentive Consumers", Ricardo studied the decisions of agents who face the costs of acquiring, absorbing and processing information.[7] Such agents rationally choose to be inattentive to news, only sporadically updating their information. The optimal frequency of updates, or the length of inattentiveness, depends on features of the economy such as the variance of shocks. Upon aggregation, the economy behaves like the sticky information model of Mankiw and Reis.

Let me turn to Ricardo's work on the role of fiscal policy in business cycles. While a large body of literature in this area exists, much of it assumes a representative agent and focuses on government purchases or taxes. Ricardo, in a joint paper with Hyunseung Oh, documented that during the Great Recession much of the increase in government expenditures across the OECD countries was in government transfers.[8] To study the effects of transfers, Ricardo and his co-author proposed a model without a representative agent or Ricardian equivalence, in which transfers affect the economy because of imperfect credit markets, uncertainty and sticky information.

Building on this work, Ricardo and Alisdair McKay constructed a model to assess the role of automatic stabilisers in business cycles.[9] Their *Econometrica* paper will be a benchmark in the literature on fiscal policy, and they now have a follow-up paper that adds the normative perspective.[10] Their analysis – novel and more generally applicable – combines the New Keynesian DSGE framework with the incomplete-markets, heterogeneous-agent model of consumption and inequality. The resulting theory includes a realistic array of automatic stabilisers, such as unemployment benefits and progressive income taxes. The authors are able to quantify a number of mechanisms by which automatic stabilisers may work.

One lesson is that unemployment benefits are especially effective in supporting aggregate demand in a recession. People who become unemployed reduce their consumption sharply, in particular if their period of unemployment is likely to be prolonged. Moreover, those who remain employed increase their precautionary savings in a downturn as the probability of losing their job

rises. In this environment, more generous unemployment benefits have strong effects on aggregate spending. Another takeaway is that – in the US data from the so-called Great Moderation period – automatic stabilisers appear to have played little role in smoothing out the business cycles, with monetary policy being much more important. That said, Ricardo and Alisdair show that automatic stabilisers can have more sizeable effects when the central bank is constrained by the effective lower bound on its policy rates. . In any case, the conclusion about automatic stabilizers having subdued effects opens up the debate about how to make them more effective and about the need in some situations to use discretionary fiscal stabilisation policy.

Recently, Ricardo has worked on models in which the central bank's balance sheet is explicitly present. Such models are in demand in the wake of the global financial crisis, given the need to understand the effects of the expansion of the balance sheets of many central banks. Ricardo has developed, together with Robert Hall, a framework to analyse central banks' solvency under "new-style central banking" and studied a model in which the interest rate on bank reserves is the main policy tool of the central bank.[11] As you know, besides his research activities, Ricardo has also been an active participant in policy debates, notably concerning safe bonds for the euro area and economic developments in his native Portugal.[12] Ricardo's work is macroeconomics at its best: in contact with data, innovative and with lessons for policymakers. Please join me in congratulating Ricardo on being awarded this year's Bernácer Prize. Ricardo, I wish you continued success in the future.

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[1] Mankiw, N. G., Reis, R. and J. Wolfers, (2004), "Disagreement About Inflation Expectations", NBER Macroeconomics Annual, 18, 209–248. See scholar.google.com for the citations.

[2] Woodford, M., (2002), "Imperfect Common Knowledge and the Effects of Monetary Policy", in "Knowledge, Information and Expectations in Modern Macroeconomics: In Honour of Edmund S. Phelps", eds. P. Aghion et al., Princeton, New Jersey: Princeton University Press, and Sims, C. A., (2003), "Implications of rational inattention", Journal of Monetary Economics, 50, 665–690.

[3] See, for example, Gorodnichenko, Y. and O. Coibion, (2015), "Information Rigidity and the Expectations Formation Process: A Simple Framework and New Facts", American Economic Review, 105, 2644–2678.

[4] Mankiw, N. G. and R. Reis, (2002), "Sticky Information Versus Sticky Prices: A Proposal to Replace the New Keynesian Phillips Curve", Quarterly Journal of Economics, 117, 1295–1328.

[5] Ball, L., Mankiw, N. G. and R. Reis, (2005), "Monetary Policy for Inattentive Economies", Journal of Monetary Economics, 52, 703–725.

[6] Mankiw, N. G. and R. Reis, (2007), "Sticky Information in General Equilibrium", Journal of the European Economic Association, 5, 603–613, and Mankiw, N. G. and R. Reis, (2006), "Pervasive Stickiness", American Economic Review, 96, 164–169.

[7] Reis, R., (2006), "Inattentive Producers", Review of Economic Studies, 73, 793–821, and Reis, R., (2006), "Inattentive Consumers", Journal of Monetary Economics, 53, 1761–1800.

[8] Oh, H. and R. Reis, (2012), "Targeted Transfers and the Fiscal Response to the Great Recession", Journal of Monetary Economics, 59, S50-S64.

[9] McKay, A. and R. Reis, (2016), "The Role of Automatic Stabilizers in the U.S. Business Cycle", Econometrica, 84, 141–194.

[10] McKay, A. and R. Reis, (2016), "Optimal Automatic Stabilizers", NBER Working Paper 22359, CEPR discussion paper 11578.

[11] Hall, R. E. and R. Reis, (2015), "Maintaining Central-Bank Solvency under New-Style Central Banking", NBER Working Paper 21173, CEPR Discussion Paper 10741, and Hall, R. E. and R. Reis, (2016), "Achieving Price Stability by Manipulating the Central Bank's Payment on Reserves", NBER Working Paper 22761, CEPR Discussion Paper 11578.

[12] See, for example, Brunnermeier, M. K., Langfield, S., Pagano, M., Reis, R., van Nieuwerburgh, S. and D.

Vayanos, (2016), “ESBies: Safety in the tranches”, European Systemic Risk Board Working Paper 21, Reis, R., (2013), “The Portuguese Slump and Crash and the Euro Crisis”, Brookings Papers on Economic Activity, 44, 143–210, and Reis, R., (2015), “Looking for a Success in the Euro Crisis Adjustment Programs: The Case of Portugal”, Brookings Papers on Economic Activity, 46, 433–458.