



Rebuilding Macroeconomic Theory

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1 The Need to Rebuild

- During the Great Moderation, the New Keynesian Dynamic Stochastic General Equilibrium (DSGE) model became the ‘benchmark model’: the one taught to graduate students
- When the Great Moderation collapsed into the GFC, macroeconomists looked rather foolish
 - The benchmark model explained neither why the GFC happened,
 - nor why the recovery since the GFC has been so slow.
 - what should we teach the next generation of grad students?
- I will be drawing on papers in ***Oxford Review of Economic Policy***, (*OxREP*) Vol 34 Issue 1 – 2 “Rebuilding Macroeconomic Theory”
<https://academic.oup.com/oxrep/issue/34/1-2>
- Very wide range of authors. All articles in the issue are available free online for students and Faculty at the ANU.



- Some history: response to past theoretical crises
- Some questions
 - What do we need to add to the benchmark model?
 - Should we build a very different benchmark model?
 - What are the implications for those who build policy models for use in policymaking institutions
- What I say will build largely on the papers in the *OxREP* issue.



2 Past Paradigm Shifts

2.1 Response to the Unemployment of the 1930s

- Prior to that time, economists only had Alfred Marshall's method of separate analyses of the key markets – for labour, goods and money: partial equilibrium
- After a fall in investment, the economy did not rapidly return to full employment as in Marshall's theory
- Keynes's response was that everything depends on everything else: general equilibrium
 - A shortage of aggregate demand for *goods* leads to unemployment of *labour*
- Keynes took the Marshallian model and added nominal rigidities.
 - This meant that, in response to a fall in investment, the economy did not rapidly return to full employment.



- To understand implications of nominal rigidities, Keynes invented *new content*:
 - the consumption function and the multiplier: the IS curve
 - liquidity preference & the LM curve: to ensure that the interest rate did not always move to make savings equal to investment *at full employment*.
- To understand implications Keynes needed *new method*:
 - the kind of general-equilibrium analysis provided by the IS–LM system
 - What happens in the goods market affects the labour market and *vice-versa*
- He invented a *new role for policy*: fiscal policy and monetary policy in dealing with unemployment and in preventing excessive booms
 - This change in content method and policy was a clear paradigm shift.



2.2 The 1970s and 1980s

- The punchline of the 1970s is that there was a problem with existing theory – the fix price IS-LM model was inadequate to discuss problems of inflation.
- There was not an immediate agreement on a new paradigm. Instead, there were two kinds of response, both of which are still with us



(i) The Evolutionary Response of the 70s

- The first set of responses to the great inflation came from “saltwater” economists in the US and people like me in the UK
- A change of *content*:
 - allowing for a short run Phillips curve, adaptive inflation expectations, & a vertical long-run Phillips curve,
 - a modelling of the supply side including economic growth
- A change of *policy*:
 - adoption of an inflation targeting regime to control inflation
 - by monetary policy, not fiscal policy
 - Coupled with adoption of many supply-side reform agendas to promote economic growth
 - This move to inflation targeting was not really a paradigm shift



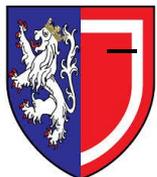
(ii) *The Microfoundations Revolution*

- Freshwater belief: inflation had discredited active Keynesianism.
- *Change of paradigm* arising out of the Lucas critique:
 - models to be microfounded, optimizing, and forward-looking, with expectations of the future being model-consistent or “rational”
 - The microfoundations revolution **largely accepted**: huge implications
- *Change of method and policy*: requirement that the economy be treated as if it is in constant equilibrium
 - and therefore not needing policy intervention.
 - This second requirement has been **comprehensively rejected**
 - Reason provided by Fischer (1977), Taylor (1980) and Calvo (1983)
 - Even if expectations forward-looking & rational, staggered timing of price changes can still lead to gradual adjustment, to nominal rigidities, and so to a role for aggregate demand
 - *Overall outcome*: New Keynesian DSGE model
 - Microfounded model used to study inflation targeting.



3 Synthesis in the Benchmark NK DSGE Model: Smets Wouters and CEE

- An IS curve determining aggregate demand, it has 2 components.
 - A forward-looking Euler equation for consumption of representative consumer.
 - A forward-looking equation for investment by the representative firm which is driven by Tobin's Q , which is influenced by the real interest rate in relation to the marginal cost of capital, and by the size of capital adjustment costs
- The natural level of output is determined by a production function
 - using capital and labour, given the level of technology.
- Long run equilibrium determined by the supply side
 - Growth occurs as a result of the accumulation of capital induced by population growth and technical progress
 - Real interest rate converges to the rate of time preference
- Aggregate demand can differ from the natural level of output because of nominal rigidities and so an output gap can emerge.
 - Such a gap causes inflation, in a way described by the forward-looking Phillips curve, depending on the Calvo price-setting process of the representative firm.
 - Monetary policy is represented by a Taylor rule: determines nominal interest rate, and thus the real interest rate, this influences both cons. and investment



- Policy is simple:
 - Neutralise demand and technology shocks
 - Gradual stabilisation of inflation
 - divine coincidence.
- Crucial features of this model.
 - Model can be treated as linear and there is a unique equilibrium:
 - Ramsey growth path acts as attractor
 - Forward-lookingness means that this attractor is powerful
 - Absence of frictions other than nominal rigidities and investment adjustment costs means that return to long run equilibrium is also very rapid.



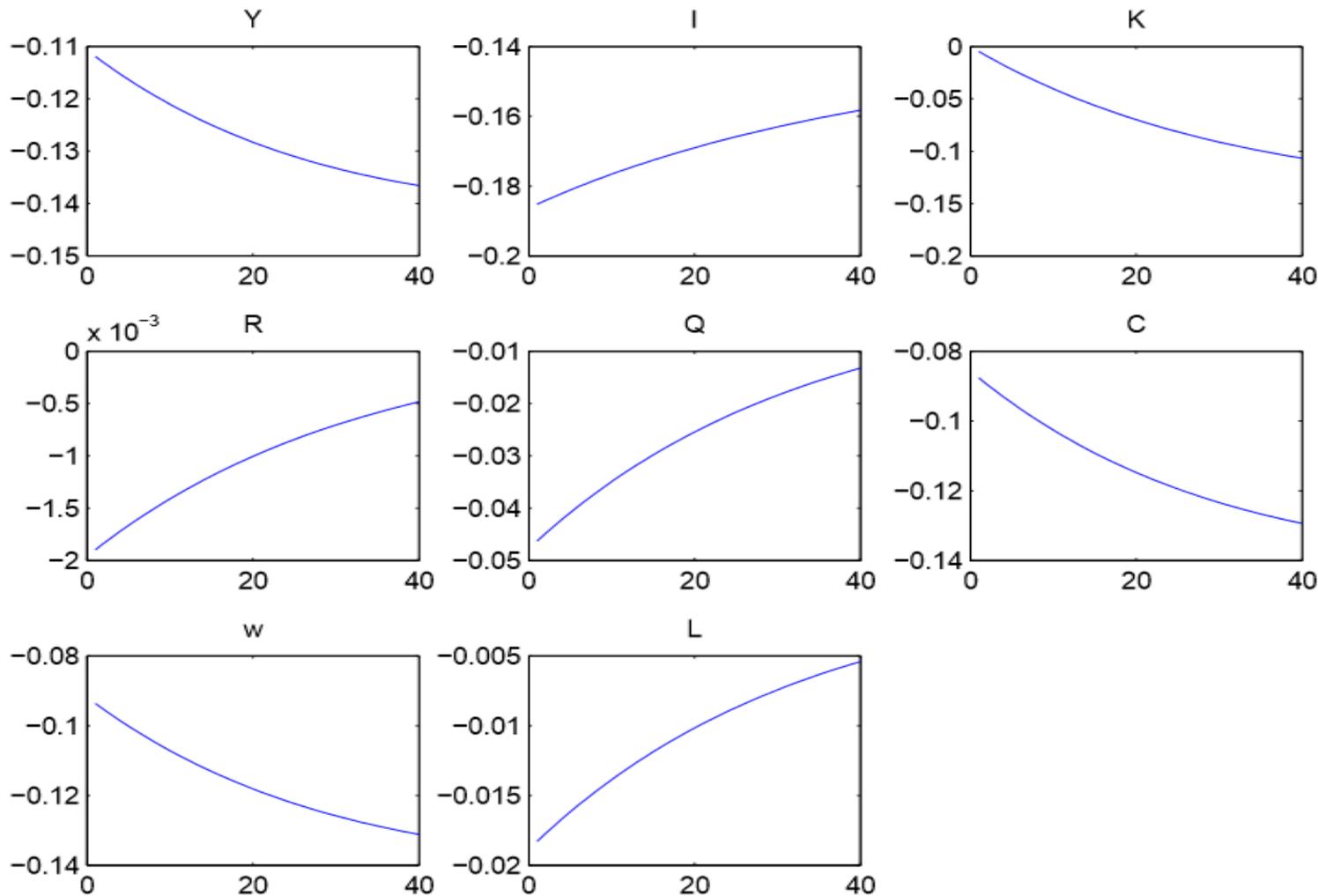


Figure 1: Response to a 10% negative TFP shock



Notation: C , I , Y , L , K , w , R , and Q , represent (respectively) consumption, investment, output, labour supply, the capital stock, the real wage, the (gross) real interest rate, and Tobin's Q .

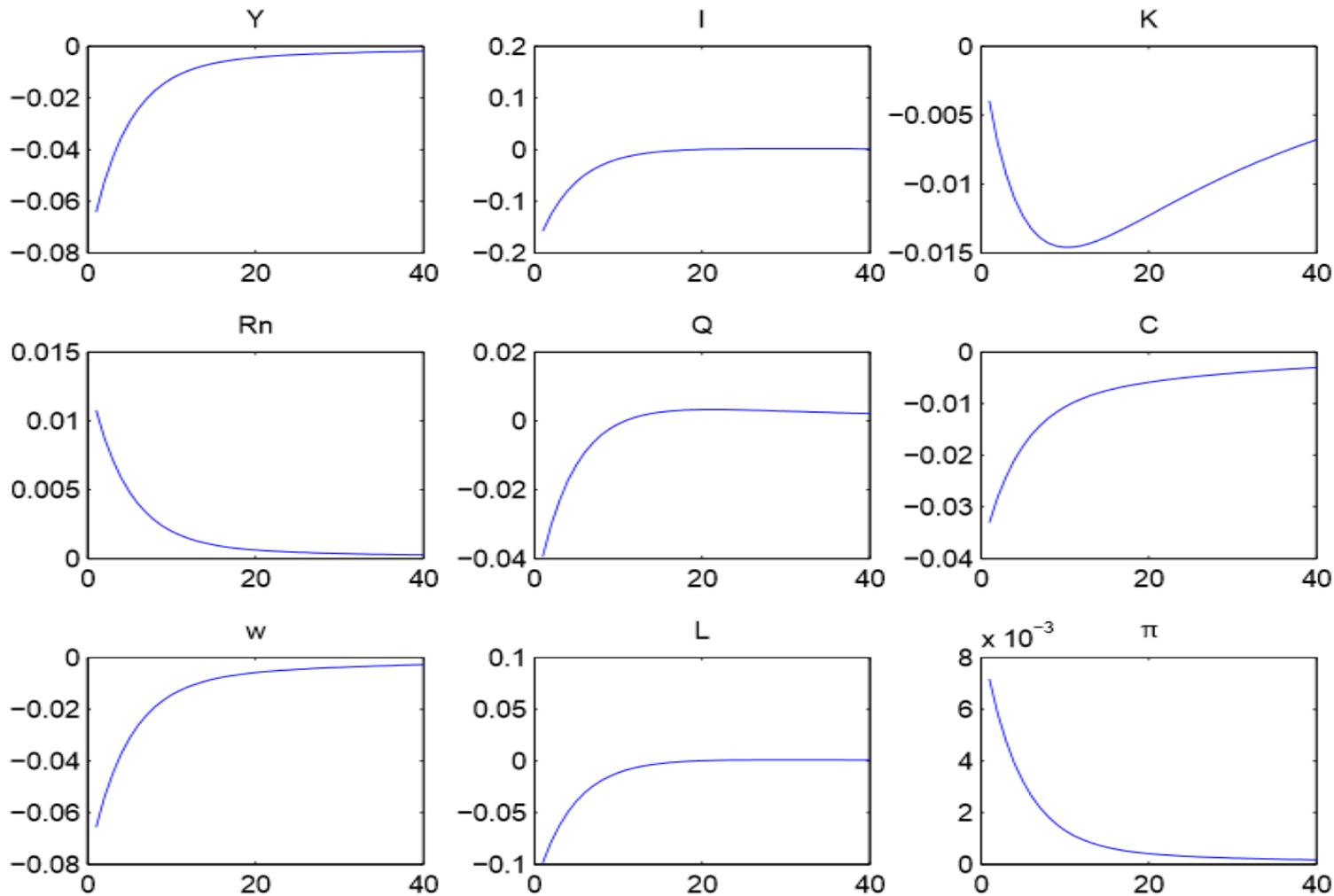


Figure 2: Response to a 1% positive cost-push shock

Notation: C , I , Y , L , K , w , R , Q , and π represent (respectively) consumption, investment, output, labour supply, the capital stock, the real wage, the (gross) real interest rate, Tobin's Q , and inflation.



But the Ramsey growth path is not the relevant attractor

Advanced Economies log Real GDP and extrapolated trend
(Index, 2000=100)

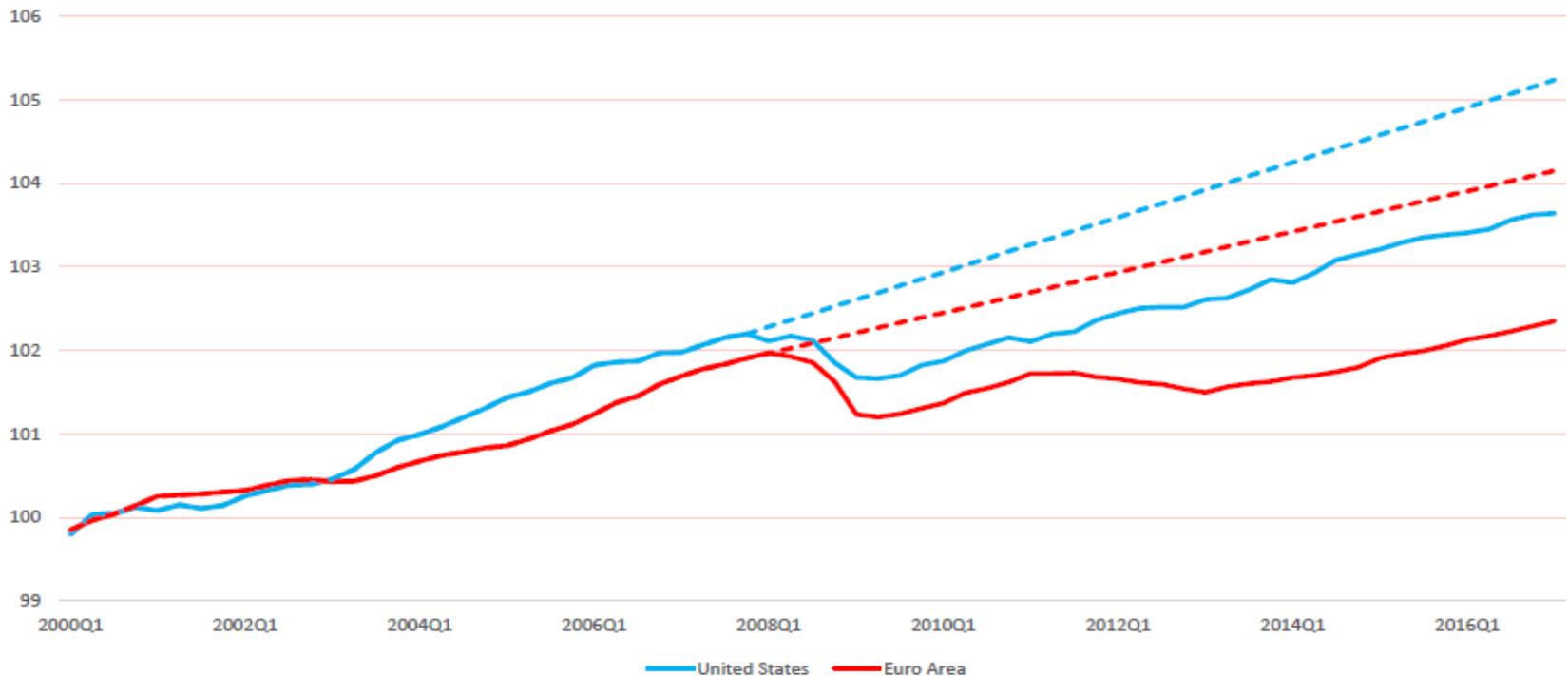


Figure 1. Source: Blanchard and Summers 2017

The Difficulty is not surprising....

- This comes from two further features underpinning the model:
- First, there is no financial sector – the efficient markets hypothesis gives rise to an expectations-augmented yield curve in which there is no endogenous risk premium.
- Second, with such a feature the model always converges back to the Ramsey equilibrium growth path, even if there is a very large reduction in private demand which causes the zero bound to the nominal interest rate to be reached.



Analogy with two previous theoretical crises

- In the 1930s, Marshallian partial equilibrium was inadequate
- In the 1970s/1980s, fix-price models were inadequate
- In 2018, benchmark new-Keynesian DSGE model is inadequate
 - Why is the Ramsey trajectory is not the relevant attractor?
 - What exactly is the problem?
 - How to adjust the newKeynesian DSGE models in response?
- I will suggest responses coming from papers in the *OxREP* issue



4.1 Adding things to the core model: supply side shocks

- The secular stagnation hypothesis argues that the slow recovery has been caused by slower population growth, a reduced rate of technological progress, and an increase in savings.
 - Slow recovery since 2008 can be explained without changing the basic ideas in the SW model, exogenous negative shock to TFP.
- McKibbin and Vines (2000) provided an analysis of the East Asian financial crisis of 1997–8 (Thailand and Korea; the shock being a reduction in the expected rate of technical change in East Asia
 - Long run outcome gives very large short-run fall in investment – larger with the zero bound
- Gordon and McKibbin and Stoeckel (in the *OxREP* issue) argue that something similar has happened recently.
 - This produces the kind of account of secular stagnation which Summers has been advocating.

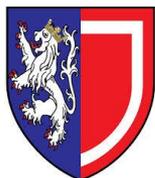


- Note that this is secular stagnation as slow potential growth not the unemployment that Hansen focused on in the 1930s, when the secular stagnation idea originates
 - Unemployment outcome depends on policy choices.
- It is possible that the supply side shocks are endogenous to the short-run reduction in demand which happened during the GFC
 - Hysteresis in the labour market
 - Reduced investment leading to a reduction in embodied technical progress



4.2 Adding things to the core model: More careful treatment of demand

- Need to reflect the importance of own funds for decisions. Be it funds on hand, collateral, and ability to borrow for firms and households, capital ratios and leverage for intermediaries.
- Hendry and Muellbauer provide significant detailed support for these claims in the modelling of consumption. In their view, proper modelling of e.g. consumption requires two things.
 - First, abandoning the analytical straitjacket of the Euler equation
 - Second, this does not just mean fitting a ‘looser’ form of the same equation, with different coefficients than those imposed by theory. Instead, it must link liquid, illiquid, and housing assets to consumption, and should study house price booms and collapses, even if the theory behind the linkages might not be fully understood. They argue for evidence-based research: driving theory with data.
 - ***This is clearly a contentious issue: other authors in the *OxREP* issue, e.g. Jeper Lindé and Ricardo Reiss, defend the usefulness of microfounded models for policy work.



4.3 Adding things to the core model: finance

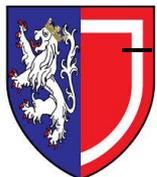
(a) Exogenous Risk premia

- McKibbin and Stoeckel's paper in the *OxREP* issue
- When there is a positive shock to risk, the interest rate spread on loans to firms increases firm borrowing falls. Investment by firms falls. In the presence of nominal rigidities there is a recession. There is a fall in the stock market which further constrains investment and amplifies the magnitude of the recession.
- McKibbin and Stoeckel in their paper in *OxREP* calibrate such a model and use it to back out the risk premia present during the financial crisis
- No clear explanation of where the risk comes from
- This work can also help to explain large and long-lasting large crisis.
- But where do the risks come from?



(b) Endogenous Risk and Leveraged lenders

- Conventional risk models effectively treat individual financial entities in isolation. Risk applies to institutions individually; spillovers are not modelled.
 - In practice, financial institutions are spread through *direct* contractual linkages: individual bank defaults lead to liquidity constraints and balance sheet effects for other institutions. There are also important *indirect* effects: financial distress leads to adverse price movements, and so spread through the system in this way too.
 - Whether risk spreads depends crucially on whether other market participants act as *shock absorbers* or *shock amplifiers*.
- A new transmission mechanism can emerge, which Brunnermeier describes as a paradox of prudence.
 - Keynes's paradox of thrift; more saving by one can lead to less savings by others
 - This paradox of prudence: contraction of asset demand due to balance sheet effects by one institution can lead to contraction by other institutions.



- Many argue (incl Christiano, Eichenbaum and Trabandt) that crisis was caused by rollover crisis in shadow banking sector which had over-lent for investment in mortgages.
- The build-up of risk can be endogenous and gradually happen over time, in the background of a seemingly well-functioning economy: system can again move from being shock absorber to shock amplifier.
- These are setups in which small shock can lead to large propagation



- These are setups in which small shock can lead to large propagation.
- They can help us to explain Figure 1
- Important non-linearity; solvency and liquidity connected
- Modelling difficulties:
 - Multiple equilibria
 - Challenge is to explain policies prevent bad equilibrium from being selected.
- This creates a fundamental difficulty:
 - It calls into question the forward-looking rational-expectations framework of the microfoundations approach



5 A summary of the conceptual challenges to the core model (Blanchard)

5.1 The difficult challenges

- The need to depart from rational expectations.
 - Bounded rationality.
 - Extrapolative expectations (Minsky like).

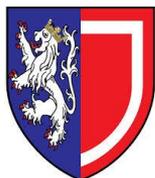
5.2 The very difficult challenges

- The existence of non linearities,
 - (i) Zero lower bound
 - (ii) Doom loops between sovereign and financial. Zero lower bound.
- Multiple equilibria
 - Liquidity runs (used to be bank runs, and more general liquidity runs).
 - Difficult to capture probability that they happen.
- The need to know the plumbing. Need for a study of granularity
 - Complex interactions between individual entities. Financial example: Direct, and indirect through asset sales.
 - Another example from outside finance – vulnerability of global supply chains



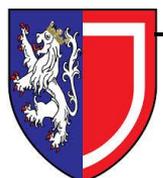
6 An example of a radically different core model

- Carlin and Soskice describe the possibility of a sustained Keynesian unemployment equilibrium as an explanation of Figure 1:
 - This is a model in which further important parts of the microfoundations requirement are suppressed
- There is one equilibrium in which inflation is at target, equilibrium exists in the labour market, the real interest rate is positive and at its ‘neutral’ rate, technical progress and growth continue
 - This is very similar to the benchmark model - described above - that led economists to expect a very different post-crisis decade from the one that occurred.
- But there is another equilibrium.



To understand post-crisis behaviour, Carlin and Soskice propose the other – Keynesian – equilibrium.

- In this equilibrium, inflation is constant, but at zero.
- The nominal interest rate is at the zero lower bound, also zero.
 - The economy becomes trapped in a Keynesian equilibrium because a sufficiently large fall in aggregate demand takes it to the zero lower bound and renders stabilising monetary policy ineffective.
 - Nominal wages do not fall. Krugman discusses this issue in his *OxREP* paper. The model assumes that, on empirical grounds, workers' inflation expectations are backward-looking, consistent with this no-cuts outcome.
 - There is no downward deflationary spiral and the economy remains in a Keynesian equilibrium.
- Precautionary savings arises because households cannot insure against idiosyncratic unemployment risk.
- Investment stagnates because of a strategic complementarity in which investment is trapped at a low level



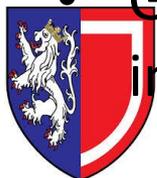
– Carlin and Soskice adopt a model of embodied technological change in which low productivity growth is a consequence of low investment.

- This is a model with two equilibria and two associated macroeconomic policy regimes, replacing the unique equilibrium of the benchmark model.
 - In the low activity equilibrium, investment (and embodied productivity growth) is characterised by low expectations about future market growth.
 - Nominal wage cuts are precluded because of the realistic assumption that they provoke coordinated employee opposition.
 - Monetary policy (largely) powerless to stimulate recovery
 - Fiscal multiplier much larger than one
- This possibility of a shift in regimes, which Carlin and Soskice describe, seems important.



7 Implications for those building policy models

- Wren-Lewis describes the very large effect that the microfoundations requirement has had on those building macroeconomic models to be used for policy purposes.
 - As he says, before the microfoundations revolution, policy models were empirical, using the developments in theory and in econometrics which had followed the *General Theory*.
 - After the microfoundations revolution, even those doing policy-related work became much more deductive in their approach. Even those building policy models now see the foundations of their work as coming from basic microeconomic theory, requiring models to have fully worked out fully-worked out equilibria.
- He argues that this tradition inhibited work on the build up of risk in the run-up to the financial crisis.
- Given our loss of confidence in this requirement this has significant implications.



8 The need for many kinds of models

- Forecasting. No need for theory, unless helps.
 - Analogy with approach to translation by AI.
- Descriptive. First step towards theory.
 - Organized data description. Structural VARs.
- More formal models DSGE. Staying close to theory,
 - Takes liberty with the facts
- Less formal. Structural Economic Models. (Wren Lewis)
 - Taking some liberty from theory, aim is to stay closer to the facts.
- Pedagogical. Toy models. (Ramsey, OLG, ISLM, Mundell Fleming,...)
- All are interrelated and all are needed.
- Just have to make them all legal and more widely accepted.



9 Conclusions

- We have described a number of ways in which it seems necessary to change the assumptions of the core macroeconomic model, and, more generally, to reduce the influence of the microfoundations hegemony.
- The related lesson is that there needs to be more pluralism.
- There may no longer be a true church
- The subject may well become much more messy.
- See ***Oxford Review of Economic Policy***, Vol 34 Issue 1 – 2
“Rebuilding Macroeconomic Theory”

<https://academic.oup.com/oxrep/issue/34/1-2>

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