What is right (and left to do) in macroeconomics? A lot

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Cournot Centre Conference
Paris, December 2,3 2010

Introduction

"What matters is not whether a model is ad hoc, but the hoc the model is had"

- ▶ Obviously not an expression of sympathy for ad *hoc* work
- ▶ A healthy reminder that all models will include large area of ignorance (the 'don't knows')
- ▶ Focusing sharply on the *'hoc'*, theory can help us approximating the roots of the problem at hand

Sometimes, some hoc forcefully makes its way into macro — the global crisis. While this time may not be different (the point by Reinhart & Rogoff 2009), it does place our understanding of cyclical fluctuations under a new light, shaking views shaped by the post-war experience of industrial countries.

Outline

To parts

- First: comments on current challenges to macroeconomics, mainly focusing on possible directions to model policy-relevant financial imperfections
- Second: current work on monetary and fiscal interactions

Policy-driven questions for macroeconomics

The global crisis has emphasized at least three issues we need to know more about:

- ▶ Macroeconomic transmission of sharp fluctuations in uncertainty
    - ▶ economic, financial and policy determinants of the 'uncertainty shock' in the fall of 2008
- ▶ Transmission and amplification of financial shocks
    - ▶ from the disappearance of the interbank market to the global recession
- ▶ Distortions at the root of mispricing and misallocation of resources (as a cause and a consequence of the crisis)
    - ▶ housing bubbles, global imbalances

A key theory question

Crisis theory is dominated by an unresolved tension between two competing views of instability. Borrowing from Sargent:

- ▶ Market coordination across multiple equilibria: Diamond Dybvig
  - ▶ stress on maturity mismatch between assets and liabilities of financial intermediaries, plus costly early liquidation of long-term assets
  - ▶ sunspots can coordinate expectations on a bad equilibrium
- ▶ Policy distortions lead to mispricing and excessive risk taking: Kareken and Wallace
  - ▶ Public guarantees (mispriced insurance) distort incentives in intermediation

A key theory question (cont.ed)

- Empirical studies plagued by observational equivalence.
- The arena of the tension is of course policy prescriptions
  - Insurance (can eliminate the bad equilibria) versus market discipline

Implications for macroeconomic modelling

Martin Eichenbaum has recently emphasized the above unresolved tension, as a reason for the delay with which financial issues are being incorporated in general equilibrium models for policy assessment and design, the DSGE.

- ▶ Ultimate goals of DSGE:
    - ▶ identify and quantify trade-offs relevant for policy making
    - ▶ mapping the distortions at the root of these trade-offs
- ▶ Before the crisis, lot of work (but by no means all the work) in the DSGE literature focused on distortions in the goods and labor markets. The emerging issue is now: financial distortions. Obviously, it requires more than cosmetic fixes ('my model has banks, what about yours?').

Directions for macro research: credit constraints

- Models encompassing credit constraints in general equilibrium (building on Kiyotaki-Moore, or Bernanke Gertler Gilchrist among others)
  - Roots in high theory (see e.g. Geanakoplos)
  - Potential for amplification effects, for instance, via pecuniary externalities. Level of activity depends on credit $=>$ credit depends on value of collateral ($=$asset prices) $=>$ asset prices depend on level of activity
- Scope for exploring 'financial shocks'

A note on credit constraints and overborrowing

- ▶ Credit constraints are logically associated with underinvestment, and/or an inefficiently low level of economic activity

  - ▶ Overborrowing and excessive risk taking can still be defined, but relative to a 'constrained Pareto efficient allocation', not relative to the first-best one

- ▶ Some authors (e.g. Ventura and co-authors) emphasize that with credit constrained agents, bubbles can actually bring the economy closer to its first best: an inflated collateral offsets the distortions due to the constraints

  - ▶ Same view expressed in some models of the saving glut underlying global imbalances: bubbles may translate into a higher equilibrium supply of assets available to agents for savings (e.g. Caballero Fahri and Gourinchas)
  - ▶ Against common sense? People usually think of bubbles as source of misallocation, not as a cure for it.

Credit constraints and misallocation

- Model with credit-constraint are nonetheless going to play a key role in the literature to come, possibly allowing for more heterogeneity at country, sectoral, or agent level

- Idea clearly spelled out in ongoing work by Nobu Kiyotaki: have financial distortions cause large misallocation of resources and mispricing

  - market equilibria in which inefficient producers/sectors are financed

- In this framework, bubbles can amplify misallocation.

- Still, no full-fledge analysis of leveraged financial intermediaries...

Overborrowing with incomplete markets

▶ Surprisingly underexplored direction of research:
  Overborrowing and mispricing relative to the first best follow
  from market imperfections preventing a high level of risk
  sharing

▶ Joint work with Luca Dedola (ECB) and Sylvain Leduc (San
  Francisco Fed) for the new Handbook of monetary economics,
  emphasizes them as key arguments in welfare-based loss
  functions and optimal targeting rules relevant for
  policymakers.

Policy loss function with representative agent

$$\propto -\frac{1}{2}\{(\sigma + \eta)\left(\widehat{Y}_{H,t}^{gap}\right)^2 + \frac{\theta}{\kappa}\pi_{H,t}^2$$

in output gap and inflation only

Policy loss function with multiple agents/markets:

$$
\propto -\frac{1}{2} \{ (\sigma + \eta) \left(\widehat{Y}_{H,t}^{gap} \right)^2 + (\sigma + \eta) \left(\widehat{Y}_{F,t}^{gap} \right)^2 +
$$

$$
\frac{\theta}{\kappa} \left[a_H \pi_{H,t}^2 + (1 - a_H) \pi_{H,t}^{*2} + a_H \pi_{F,t}^{*2} + (1 - a_H) \pi_{F,t}^2 \right] +
$$

$$
-2a_H (1 - a_H) \frac{\sigma \phi - 1}{\sigma} \left(1 + \frac{4(1 - a_H) a_H \sigma \phi}{(2a_H - 1)^2} \right) \Psi_1 \left(\widehat{\mathcal{T}}_t^{gap} \right)^2 +
$$

$$
\frac{2a_H (1 - a_H) \phi}{4a_H (1 - a_H) \phi \sigma + (2a_H - 1)^2} \Psi_2 \widehat{\Delta}_t^2 +
$$

$$
+ \frac{2a_H (1 - a_H) (\phi - 1)}{\sigma (2a_H \phi - 1) - (2a_H - 1)} \Psi_3 \left(\widehat{\mathcal{D}}_t^{gap} \right)^2 \}
$$

- ▶ Under Complete Market: $\Psi_1 = \Psi_2 = 1$ and $\widehat{\mathcal{D}}_t^{gap} = 0$
- ▶ Under the law of one price: $\widehat{\Delta}_t = 0$ and $\pi_{H,t}^2 = \pi_{H,t}^*$

Why are incomplete markets important?

Illustration by means of an example:

- ▶ Two countries, each specialized in one type of tradables. No capital.
- ▶ Incomplete markets (say, bond economy), no credit constraint
- ▶ For convenience: news shocks. At time 0, home agents forecast higher productivity in the future.
  - ▶ cyclical fluctuations are driven by expectations of future profitability
- ▶ Below are example of economies in which
  - ▶ with flexible prices, international borrowing and lending cause inefficient demand imbalances and mispricing
  - ▶ with nominal rigidities, optimal cooperative monetary policymaking is quite effective in compensating for these inefficiencies.

News shocks vs Autoregressive AR
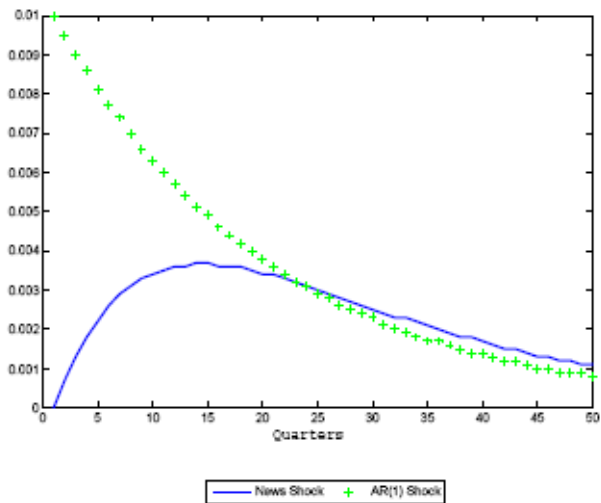
No misalignment and demand imbalances under complete market and flexible prices
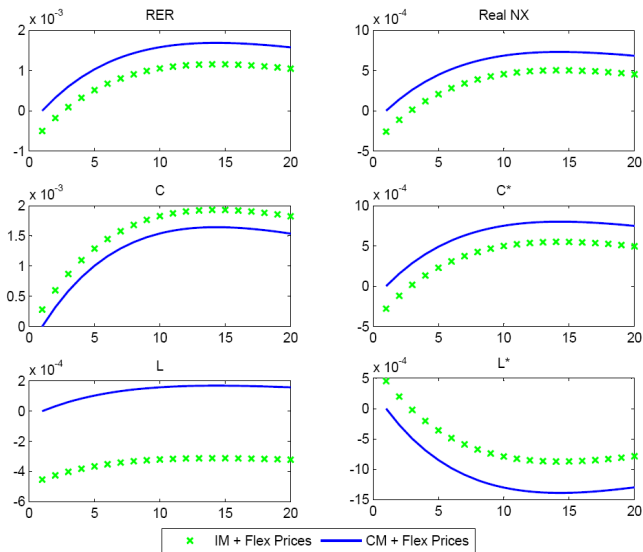
Anticipated Home productivity increase with High trade elasticity / good substitutability
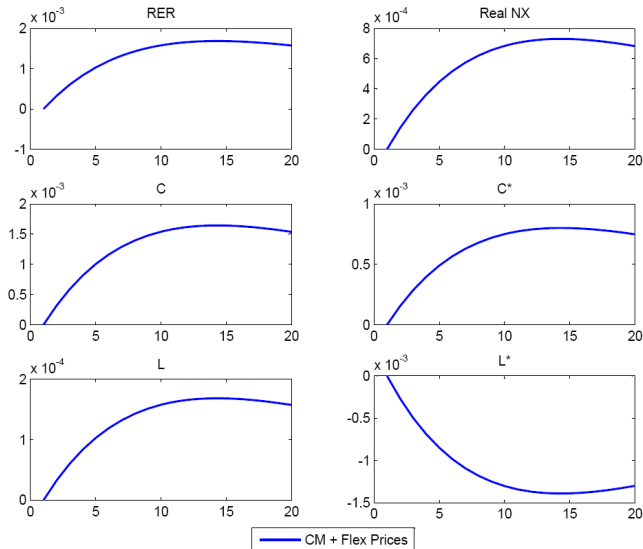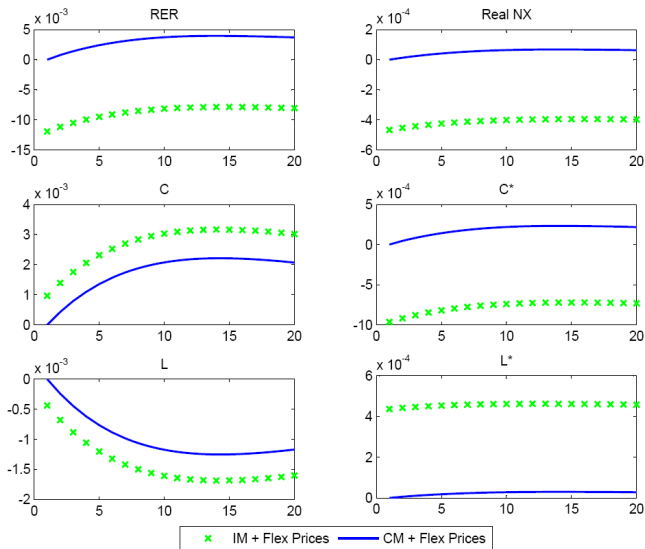
Misalignment and demand imbalances with international borrowing under flex prices

Anticipated Home productivity increase with High trade elasticity / good substitutability
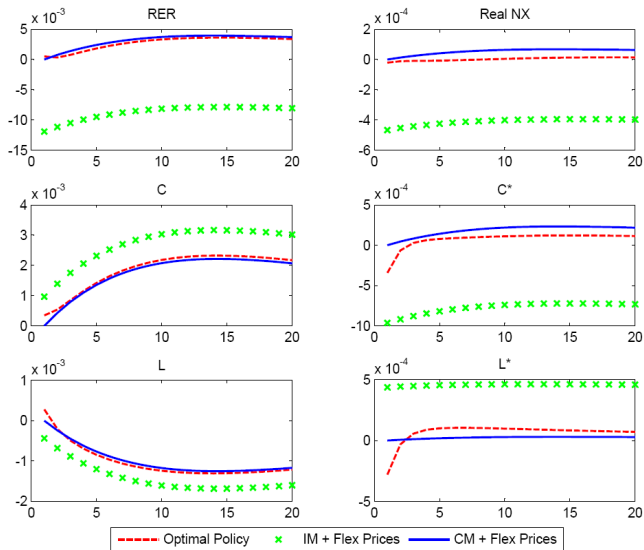
Same (with larger 'gaps') under a different parameterization of the model

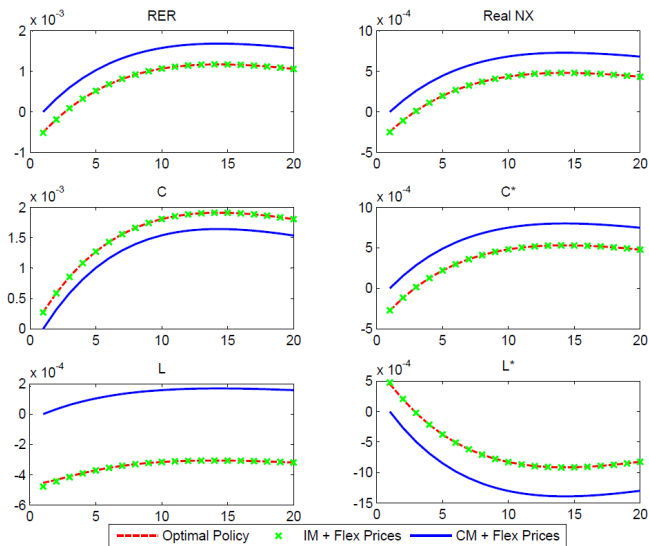Anticipated Home productivity increase with low trade elasticity / good complementarity

Add nominal rigidities and optimal policy

Leaning against misalignment is effective in containing imbalances!

An example in which monetary policy is less successful

Optimal policy arbitrarily close to strict inflation targeting (flex-price)

Rethinking the scope of monetary policy?

- ▶ Monetary policy cannot be expected to be effective in all circumstances (its power is indeed reduced for different parameterizations of the model). This raises important empirical/calibration issues.
- ▶ Yet, in our model,
  - ▶ correction of imbalances is compatible with flexible inflation targeting
  - ▶ the volatility of the implied optimal interest rates is no larger than in a regime of mechanical CPI inflation targeting
  - ▶ optimal targeting rules can be well approximated by rules in observable variables only
- ▶ Central banks of course cannot be expected to fix everything. But the crisis calls for a reconsideration of the fundamental trade-offs shaping their strategies.

A bridge between the first and the second part of the talk

- We may expect to see soon models resolving somehow the tension between competing theories of financial instability, and placing the behavior of leveraged institutions at the core of the macroeconomic transmission (e.g. Markus Brunnermeier), possibly casting new light on core policy issues

- In the meanwhile, perhaps the most popular model of the crisis abstracts from the financial sector altogether. It simply assumes a large exogenous shocks to demand, and works out the consequences in a stripped down new-Keynesian model with a 'zero lower bound on interest rates', raising the possibility of a 'liquidity trap'.

- I take this model as the starting point of my comments on fiscal and monetary policy interactions.

The liquidity trap in the new-Keynesian framework

- A key features of the NK literature is the role assigned to inter-temporal prices in driving aggregate demand. Which price?

- Using a baseline specification, without much loss of generality, we can write (for temporary shocks)

$$D = -a \cdot r = -a \cdot E_t \Sigma_{s=0}^{\infty} \left(i_{t+s} - \pi_{t+s+1} + R_{t+s} \right)$$

- (Consumption) demand is driven by the long-term interest rate r, the yield in real terms on a bond of infinite duration

- By the expectations hypothesis, r moves with expectations over the entire path of short term real rates, i-π augmented with a risk premium

- D rises when r falls and viceversa

The liquidity trap in the new-Keynesian framework

$$D = -a \cdot r = -a \cdot E_t \Sigma_{s=0}^{\infty} \left(i_{t+s} - \pi_{t+s+1} + R_{t+s} \right)$$

- ▶ The literature after Woodford and coauthors, focuses on the case in which, because of the ZLB $i \geq 0$, a large negative shock on demand cannot be counteracted by a sharp fall in the policy rate over the immediate future

- ▶ Under certain conditions, the equilibrium is such that the shock ignites a vicious feedback mechanism: low demand causes firms to drop prices over time; anticipated inflation raises short term interest rates, lowering r; a higher r causes demand to fall even more, which further lowers inflation etc.

- ▶ Note: while most models posit that the economy at some point 'exits' from the ZLB, in principle one can study equilibria in which the economy is trapped there!

The liquidity trap in the new-Keynesian framework

$$D = -a \cdot r = -a \cdot E_t \Sigma_{s=0}^{\infty} \left(i_{t+s} - \pi_{t+s+1} + R_{t+s} \right)$$

- The above equation however also suggests that, with enough commitment, it is unclear that the ZLB should be a problem in the first place, since policymakers can affect demand working credibly on the entire path (present and future) of real interest rates (a credible price level target is a blessing here)
    - 'Taylor rule'
- More in general, the dependence of demand on i, π and R sets a clear framework for reconsidering fiscal and monetary interactions.

Fiscal-monetary interaction in a liquidity trap

$$D = -a \cdot r = -a \cdot E_t \Sigma_{s=0}^{\infty} \left(i_{t+s} - \pi_{t+s+1} + R_{t+s} \right)$$

The literature has explored three modalities of interactions, possibly complementary to each other (under a Taylor rule assumption)

- One: Christiano Eichenbaum and Rebelo emphasize the strong effects of fiscal stimulus when $i = 0$. The transmission mechanism is via $E_t \pi$. Public demand counteracts the deflationary effects of a falling private demand, lowering the long-term rate.

- Two: Kuester, Meier and Mueller and myself (CKMM), emphasize future fiscal consolidation: if public demand is expected to be cut after exit from the ZLB, future real interest rates are expected to be correspondingly low (with fiscal contraction, the central bank keeps interest rates low). This drives down the long-term interest rate today.

Fiscal-monetary interaction in a liquidity trap

$$D = -a \cdot r = -a \cdot E_t \Sigma_{s=0}^{\infty} \left(i_{t+s} - \pi_{t+s+1} + R_{t+s} \right)$$

- Three: CKMM assess possible negative effects of postponing consolidation, via a rise in risk premium, reflecting debt accumulation, with spillover to the private sector.
- Here is the message: not only risk premia raise the likelihood of hitting the ZLB. they also greatly enlarge the area of the parameters over which there is indeterminacy (expectations become unanchored), especially when public demand cuts are expected to occur in the near future.

A quick look at the CKMM results

Initial debt: 60% (top), 90% (middle), 110% (bottom)
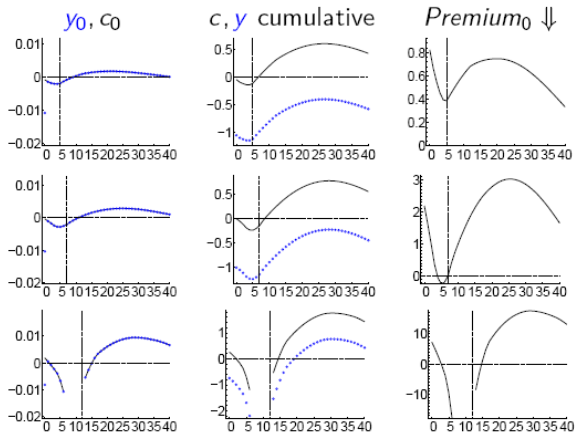
Indeterminacy

- Intuitively, at ZLB, monetary policy cannot respond (by conventional policy means) to adverse shift in expectations. Say, agents expect lower output for some non-fundamental reason. Lower output means higher fiscal deficit, in turn raising risk premium. If risk premium rises sharply, this confirms expectations of lower output
- On indeterminacy, see also Mertens and Ravn, Leeper and co-authors among others.

A general important lesson

- ▶ A striking feature of policy developments around the crisis is the apparent disconnect between two phases:
    - ▶ 2008-2009: the call was for a large stimulus, under the emergency of the looming recession, with little debate on the medium-term fiscal outlook
    - ▶ 2010: budget consolidation becomes the new emergency
- ▶ Obviously, stimulus and budget consolidation cannot be treated as independent. Together they shape the private sector response to policy!
- ▶ In our models, we should end of the asymmetry in modelling monetary and fiscal policy, the first rule- based and carefully crafted, the second typically approximated by means with autoregressive shocks to spending followed by adjustment via lump-sum taxation

More on fiscal-monetary interaction

- ▶ Need to add more pieces to the puzzle.
- ▶ Not only it is important to recognize the importance of monetary and fiscal interactions at all horizons, To close the model, we also need a consistent theory of risk premia, and a map from fiscal stress into inflation (see Leeper, Cochrane, Sims).
- ▶ We also need a theory of fiscal and monetary policy in response to shocks to uncertainty.
  - ▶ Buffer stock models after Chris Carroll, where agents react to a rise in uncertainty by increasing the cash-on-hand target via saving (consumption cuts).

A workbench: transfers and tax cuts in a recession

- ► With no uncertainty considerations, tax cuts are effective if failure of Ricardian equivalence.
- ► If a recession is driven by rising uncertainty, tax cuts providing extra cash on hand, reduce the need for cutting consumption demand.
  - ► agents do save the tax cut, but they would cut consumption without it
- ► Intriguing empirical evidence from micro-data on consumption around a natural disaster in Italy (joint work with Acconcia and Simonelli).
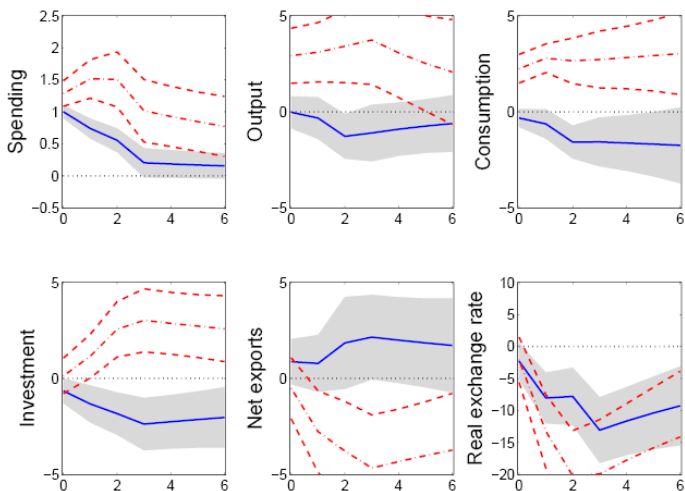
The empirical case for fiscal policy is weak looking at spending multipliers from SVAR
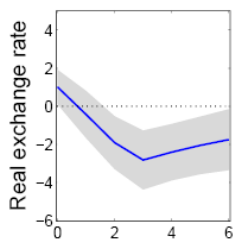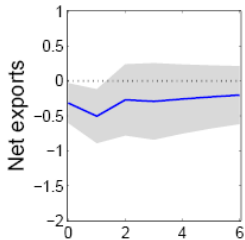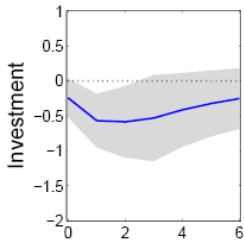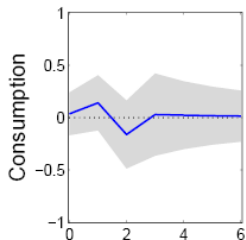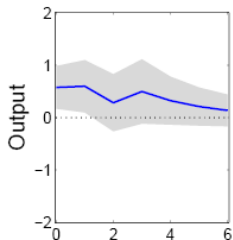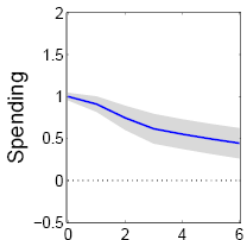
What about conditional estimates?

Baseline scenario vs financial crisis

Conclusions

What is right in macroeconomics? A lot, especially compared to the railways system from London!