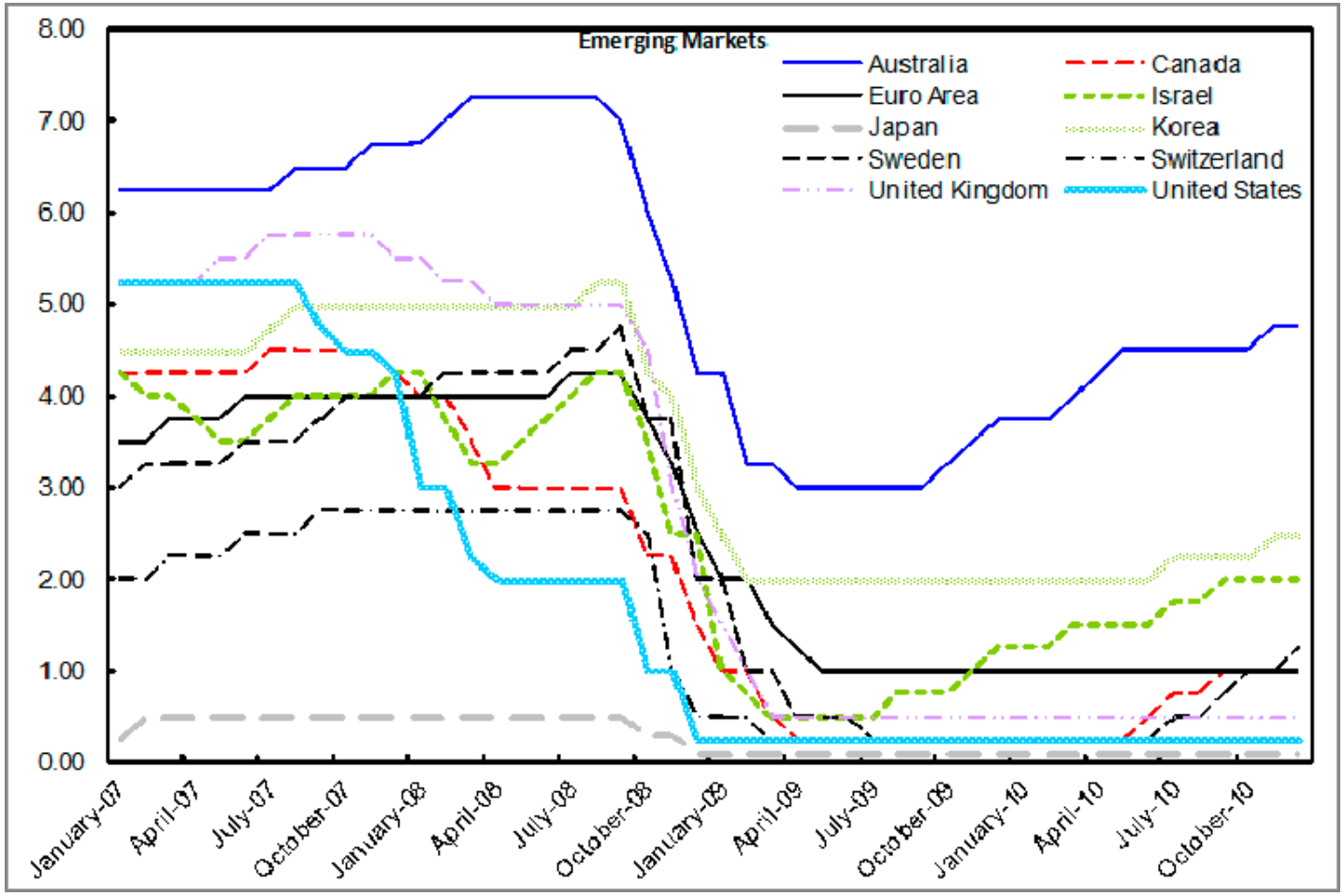
The zero bound to nominal interest rates

Lectures to MSc Advanced Macro, Bristol, Spring 2014

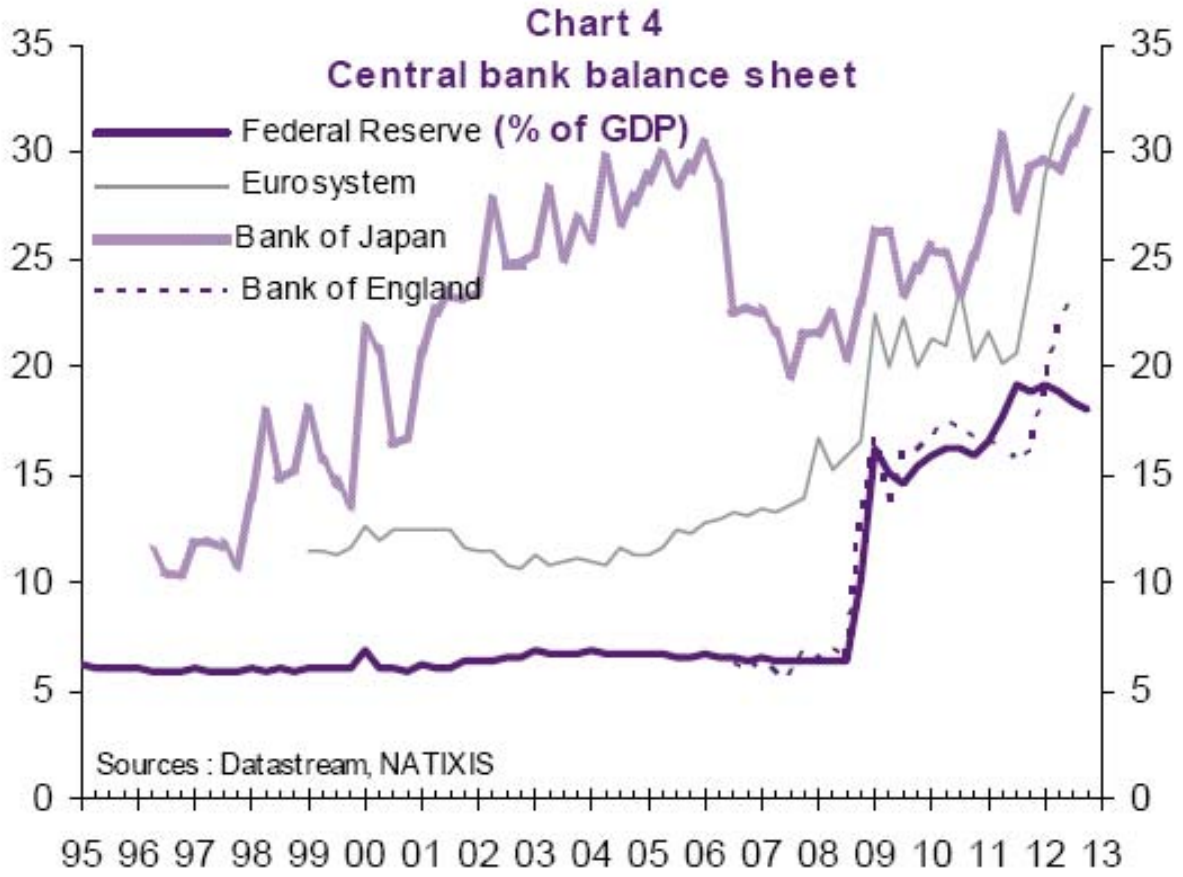
Tony Yates

1. Zero bound: introduction

Policy rates across the world



Source: Stone *et al*, IMF, 2011



Source: Natixis special report by Sylvain Broyer, Feb 27, no 30.

As room for conventional stimulus ran out at the zero bound...
Central banks bloated their balance sheets as they engaged in unconventional stimulus of one sort or another.

Overview: 4 examinable topics

- Why does the zero bound exist?
  - Analytical study of money demand
- What computational challenges does it pose for us as economists?
  - Multiple non linear rational expectations equilibria
- What have central banks done about it?
  - Forward guidance
  - Quantitative and credit easing
- What else could they do about it?
  - Currency reform to allow negative interest rates

Useful sources and reading

- McCallum, 'Theoretical analysis regarding the ZLB…'
- Brendon et al 'The pitfalls of speed-limit interest rate rules at the ZLB'
- Miles Kimball blog [various besides this link]
- Yates 'The zero bound…': BoE version, ECB version
- Goodfriend: 'Overcoming the zero bound…'

Useful sources/ctd…

- Walsh's text book
- Eggertson and Woodford
- New monetarist economics surveys on models and methods [linked to later in slides]
- Willem Buiter on –ve rates
- 'Unconventional monetary policy: lessons from the past 3 years', FRBSF, speech.

Useful sources/ctd…

- 'Methods of policy accommodation at the interest-rate lower bound', [Jackson Hole lecture]
- 'The central bank balance sheet as an instrument of monetary policy' [with Curdia]
- 'Macroeconomic effects of FOMC forward guidance', Charles Evans *et al*
- "The other imbalance and the financial crisis", Ricardo Caballero (2009), http://www.nber.org/papers/w15636
- 'A model of the safe asset mechanism: safety traps and economic policy', Caballero and Farhi (2012)
- The aggregate demand for Treasury debt, Vissing-Jorgensen and Krishnamurthy
- 'A Modigliani-Miller theorem for OMOs', Wallace

Even more useful sources.

- ‘The effects of QE on long term interest rates’, Vissing-Jorgensen and Krishnamurthy
- ‘The UK’s QE policy’, Joyce *et al*...
- ‘QE and unconventional monetary policy – an introduction’, Joyce, Miles, Scott, Vayanos [EJ conference volume].

2. Money demand and the existence of the zero bound

Why the zero bound exists: McCallum

$$\max \sum_{t=0}^{\infty} \beta^t u(c_t)$$

Consumer's objectives

$$f(n_t, k_t) - tx_t = c_t + k_{t+1} - (1-\delta)k_t + (1+\pi_t)m_{t+1} - m_t + \frac{(1+\pi_t)}{1+R_t} b_{t+1} - b_t$$
$$+ w_t(n_t - 1) + \varphi(c_t, m_t)$$

Sequence of constraints faced by consumers.

Function determining transactions costs associated with consumption.
Crucial part of the story of the zero bound.

Existence of zero bound/ctd…

$$L = \sum_{t=0}^{\infty} \beta^t \{u(c_t) - \lambda_t [tx_t - f(n_t, k_t) + c_t + k_{t+1} - (1-\delta)k_t + (1+\pi_t)m_{t+1}$$
$$- m_t + \frac{(1+\pi_t)}{1+R_t} b_{t+1} - b_t + w_t(n_t - 1) + \varphi(c_t, m_t)]\}$$

The Lagrangian.
We will differentiate wrt real balances, m, and bonds, b.
FONCs are application of Kuhn-Tucker.

Existence of zero bound/ctd…

Write out two elements in the infinite Lagrangian sum, to trace out where *m_t* and *b_t* enter.
Presence of dated 't+1' elements means, eg, that *m_t* enters the time t and the time t-1 elements in this infinite sum….

$$\ldots+\beta^{t-1}\{u(c_{t-1})-\lambda_{t-1}[tx_{t-1}-f(n_{t-1},k_{t-1})+c_{t-1}+k_t-(1-\delta)k_{t-1}+(1+\pi_{t-1})m_t$$
$$-m_{t-1}+\frac{(1+\pi_{t-1})}{1+R_{t-1}}b_t-b_{t-1}+w_{t-1}(n_{t-1}-1)+\varphi(c_{t-1},m_{t-1})]$$
$$+\beta^t\{u(c_t)-\lambda_t[tx_t-f(n_t,k_t)+c_t+k_{t+1}-(1-\delta)k_t+(1+\pi_t)m_{t+1}$$
$$-m_t+\frac{(1+\pi_t)}{1+R_t}b_{t+1}-b_t+w_t(n_t-1)+\varphi(c_t,m_t)]\}$$

FOCs for *m_t,b_t*

$$m_t : -\lambda_t(1+\pi_t) + \beta\lambda_{t+1}[1-\varphi_m(c_{t+1}, m_{t+1})] = 0$$

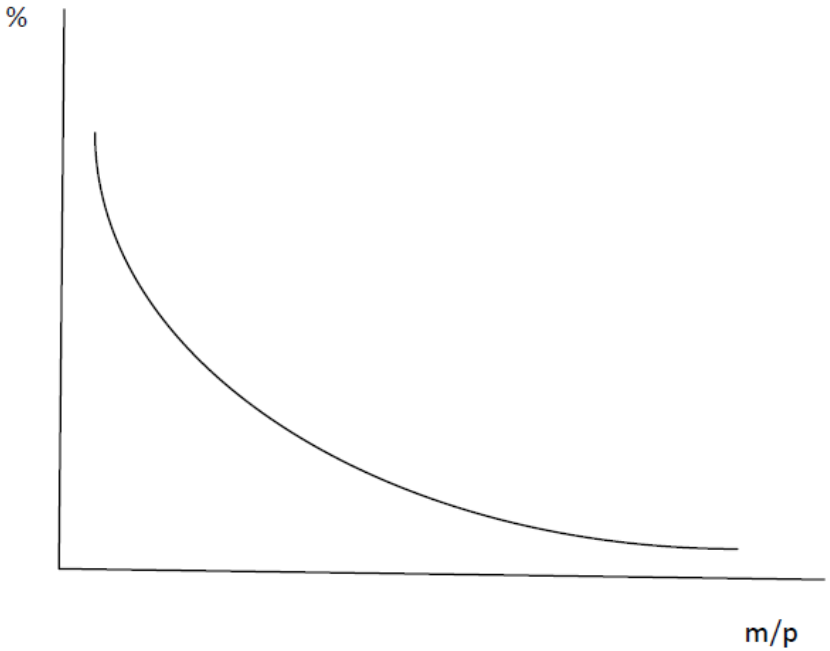
$$b_t : -\lambda_t \frac{(1+\pi_t)}{1+R_t} + \lambda_{t+1}\beta = 0$$

We combine these two equations to get the one below, linking the nominal rate to the partial derivative of this transactions function.

$$R_t = -\varphi_m(c_{t+1}, m_{t+1})$$

Since the p.d. is assumed to be always<0, the RHS is always >0. However, if at some point there were resource costs of 'storing' real balances, this p.d. could turn positive [more balances are counterproductive] and therefore the nominal rate cd be <0.

Money demand and the zero bound



- Liquidity services value of real balances declines as liquidity increases;
- To persuade people to hold larger real balances, opportunity cost [the nominal interest rate] has to fall.
- Zero bound arises because cash, which earns zero interest, dominates any –ve interest rate investment
- At the zero bound, OMOs involve the swap of one zero interest, default risk-free asset for another

The tragedy and the bliss of the zero bound

- At the zero bound, if it exists, we have squeezed the marginal reduction in transactions costs associated with holding money to zero. This is good. This is the Friedman Rule.
- But, we have also run out of room to use interest rates to counter-act negative shocks to the natural rate of interest.

Tragedy and bliss of the zero bound/ctd…

- How costly this is depends on how costly are fluctuations in inflation and real variables.
- And how effective are substitutes to interest rate policy, for example:
  - Traditional fiscal policy
  - Unconventional monetary policy
- Usually given as a reason to choose positive steady state inflation rates. Absent shocks, optimal inflation rate in NK model determined by Friedman Rule vs price stickiness.

Money demand and the zero lower bound

- We used ‘transactions costs’ formulation of money demand.
- Elsewhere [eg McCallum and Goodfriend] referred to as ‘shopping-time’ model of money demand
- Equivalent in most respects is ‘money in the utility function’: Woodford’s NK model is the limit of this model as the MIU parameter tends to zero.
- All *assume* the value of holding or using money.

New monetarist economics

- Kiyotaki-Wright, Lagos-Wright, Williamson-Wright and others.
- Derive valued money in search equilibrium.
- View NK MIU/ST/CIA models as suspect. Assumed value of money contradicts otherwise fricitonless trade model.
- Some common results, eg optimality of Friedman Rule.
- See methods and models surveys.

3. A baby, nonlinear rational expectations, perfect foresight model of interest rates at the ZLB

REE, the zlb, computation, nonlinearities, multiplicity

- Zero bound makes policy rule nonlinear, invalidating linear RE methods.
- Full nonlinear RE tricky, computationally challenging, sometimes infeasible for rich, realistic models.
- Because rates are fixed, there is the spectre of multiplicity [maybe you encountered this with the ‘Taylor Principle’ in Engin’s course?]

In brief

- 'Speed-limit' rule:

$$\widehat{R}_t = \max\left\{\alpha_\pi \widehat{\pi}_t + \alpha_y \widehat{y}_t + \alpha_{\Delta y}(\widehat{y}_t - \widehat{y}_{t-1}), \widehat{R}_L\right\}$$

- Self-fulfilling recessions at the ZLB
- Two examples:
  - Feeding back on growth, in a simple NK model
  - ...house price growth in Iacoviello (2005)

Why are speed-limit rules of interest?

- Implement/mimic commitment policy
  - Walsh(2003a), Giannoni and Woodford (2003), McCallum and Nelson(2004), Stracca (2007), Leduc and Natal(2011)
  - Blake (2011)
- Insurance against measurement error
  - Orphanides and Williams [various])
- Some evidence they fit time series for central bank rates
  - Mehra (2002)

Speed limit rules and commitment

- Optimal policy involves history-dependence
- Responding to rates of change confers that history dependence

Speed limit rules and measurement error

Figure 1: Changes in trend growth

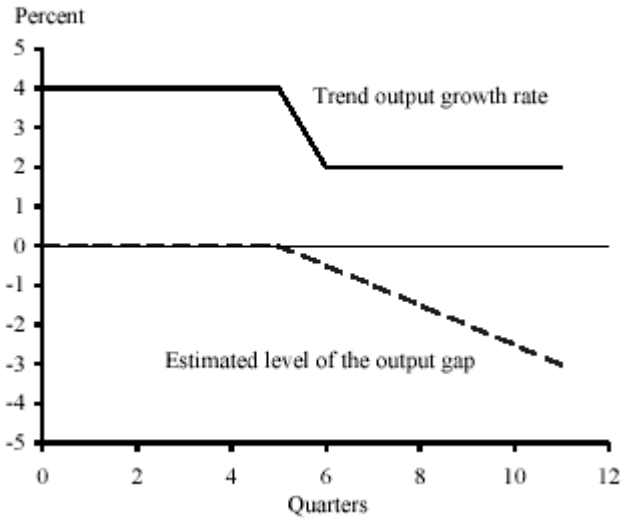
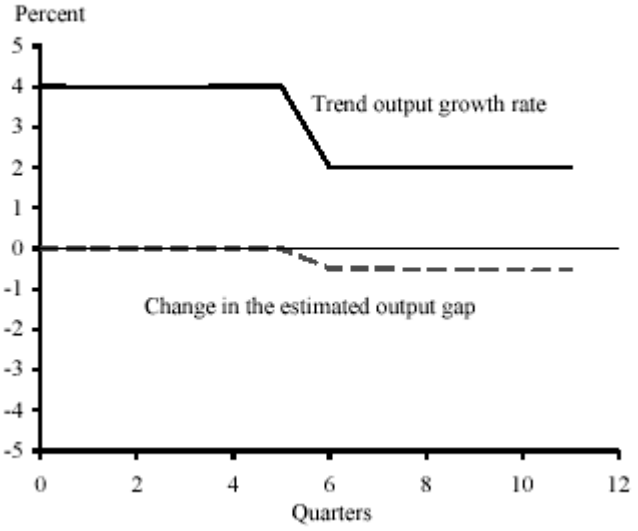


Figure 3: Changes in trend growth



[Stolen from Walsh FRBSF Economic Letter, 2003]

Example 1: feeding back on growth in the simple NK model

$$\widehat{\pi}_t = \frac{(1-\theta)(1-\beta\theta)(\sigma+\varphi)}{\theta}\widehat{y}_t + \beta E_t\widehat{\pi}_{t+1}$$

$$\widehat{y}_t = E_t\widehat{y}_{t+1} - \frac{1}{\sigma}\left(\widehat{R}_t - E_t\widehat{\pi}_{t+1}\right)$$

$$\widehat{R}_t = \max\left\{\alpha_\pi\widehat{\pi}_t + \alpha_y\widehat{y}_t + \alpha_{\Delta y}(\widehat{y}_t - \widehat{y}_{t-1}), \widehat{R}_L\right\}$$

Calibration of simple NK model

σ	elasticity of intertemporal substitution	1
β	discount rate	0.99
θ	Calvo hazard parameter	0.67
φ	inverse Frisch elasticity of labour supply	2
α_π	weight on inflation in policy rule	1.5
α_y	weight on output in policy rule	0
$\alpha_{\Delta y}$	weight on change in output in p.r.	2

$$\widehat{R}_t = \max\left\{\alpha_\pi \widehat{\pi}_t + \alpha_y \widehat{y}_t + \alpha_{\Delta y}(\widehat{y}_t - \widehat{y}_{t-1}), \widehat{R}_L\right\}$$

Solution method

- ‘Piecewise-linear’, perfect foresight RE
- Jung, Teranishi and Watanabe (2005), Eggertson and Woodford (2003)
- Simple, not optimal policy
- Guess period at which ZLB binds; solve resultant, 2 part linear system, verify whether we have an REE

RE solution concepts

- Perfect foresight means: agents literally see the future, exactly.
- RE: agents can't anticipate future shocks, but can 'solve the model' for expectations, and use the reduced form to forecast future variables conditional on already observed shocks.

Pros and cons of perfect foresight

- Pros:
  - Greatly simplifies solution method. Can solve larger, more realistic models [ie aside from assumption about expectations] and more quickly and accurately.
  - For some questions perhaps it's ok to assume perfect foresight. Eg agents indifferent to risk, or studying some pre-announced policy.

Pros and cons of perfect foresight

- Cons
  - Few questions for which agents literally can see the future.
  - And agents probably do care about risk enough for it to matter. Uncertainty about future weighs down on current spending.
  - Zero bound likely a time of heightened risk, and high risk intolerence?

Solution algorithm

1. Guess ZLB binds at t=0, but not thereafter.

2. Conventional RE solvers give us:

$$\begin{bmatrix} \hat{\pi}_t \\ \hat{y}_t \\ \hat{R}_t \end{bmatrix} = \begin{bmatrix} a_1 \\ a_2 \\ a_3 \end{bmatrix} \hat{y}_{t-1}, t \geq 1$$

3. Now solve for initial period, substituting out expectations using 2.:

$$\hat{\pi}_0 = k\hat{y}_0 + \beta a_1 \hat{y}_0$$
$$\hat{y}_0 = a_2 \hat{y}_0 - \frac{1}{\sigma}\left(\hat{R}_L - a_1 \hat{y}_0\right)$$

4. Given initial values, use 2. to solve recursively for t=1 onwards...

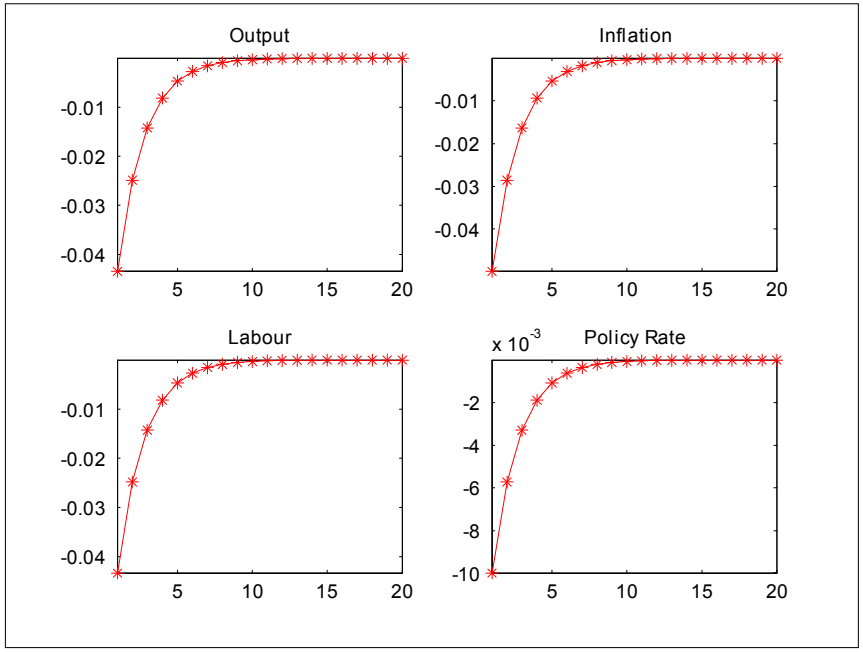
5. Verify:

$$\hat{R}_0^{shadow} < \hat{R}_L$$
$$\hat{R}_t^{shadow} > \hat{R}_L, t \geq 1$$

Recap on nonlinear ZLB solution method in words

- Make a guess at the number of periods for which the zero bound binds.
- Use undetermined coefficients or similar to solve for linear REE in terms of state from this period on.
- Use this solution form to eliminate the expectations terms in the equation system for the initial period.
- This leaves you with a 2-equation 2 unknown system for the initial period, which you can solve. Remember that the interest rate rule is replaced by the assumption that interest rates are zero (from the initial guess).
- Having solved for the initial period, use the solution form for the post zero bound period to simulate forwards step by step.

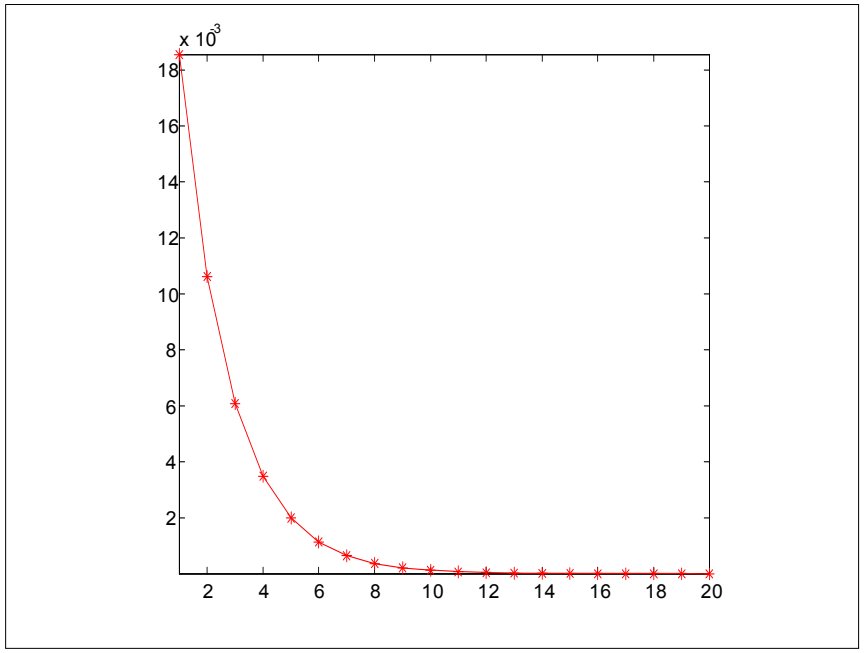
Dynamics under self-fulfilling recession



Self-fulfilling crisis: a simple New Keynesian model

- Inflation and output >4% from ss
- Rates at the ZLB

Real rate under self-fulfilling recession



The real interest rate during the crisis episode

Real rate high in period 2, sustaining forecast of low inflation and output.

Intuition for self fulfilling recession

- Rates at the ZLB implies inflation and output low
- Inflation and output low implies forecasts of () low
- Forecasts low implies policy forecast to be tight tomorrow
- Policy tight tomorrow if speed limit motivates preventing a bounce back in activity

Why we need ZLB and speed limits

- Without ZLB, Taylor principle rules out initial fall in output as an REE
- Without concern for growth rates, forecast of future policy too loose to sustain low values for inflation and output in the future...
- Therefore initial values for inflation and output not low enough to take rates to the ZLB.

Analytical conditions for sunspots

When we set $\alpha_y = 0$:

$\frac{1}{\sigma}\alpha^{\Delta y} > \alpha^{\pi}$ gives sunspots

For $\alpha^{y} > 0$

Necessary but not sufficient condition for sunspots is $\frac{1}{\sigma}\alpha_{\Delta y} > \alpha_{\pi} + \alpha_y \frac{(1-\beta)}{\gamma}$

Eg $\alpha_{\pi} = 1.5,\ \alpha_{\Delta y} = 2$

Sunspots occur provided $\alpha_y < 0.5$

Conditions for sunspots

When we set $\alpha_y = 0$:

$\frac{1}{\sigma}\alpha^{\Delta y} > \alpha^{\pi}$ gives sunspots

For $\alpha_\pi = 1.5,\ \alpha_{\Delta y} = 2$

Sunspots occur provided $\alpha_y < 0.5$

Example 2: feeding back off house prices in the Iacoviello model

- Why bother with this example?
  - How general is pathology of speed limit rules?
  - Central banks have been urged to pay more attention to asset prices
  - Measurement error/commitment logic applies to asset prices too

$$\widehat{R}_t = \max\left\{\alpha_\pi \widehat{\pi}_t + \alpha_y \widehat{y}_t + \alpha_{\Delta y}(\widehat{y}_t - \widehat{y}_{t-1}) + \alpha_{\Delta p}\left(\widehat{p}_t^h - \widehat{p}_{t-1}^h\right), \widehat{R}_L\right\} : \alpha_y = \alpha_{\Delta y} = 0$$

$$\alpha_y = \alpha_{\Delta y} = 0$$

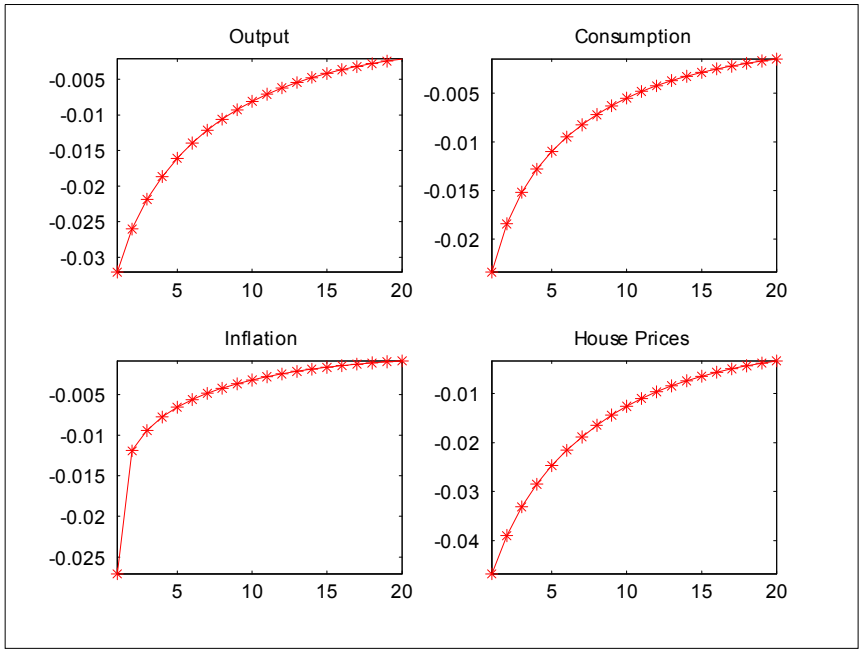
Iacoviello (2005)/[KM, 1998]

- Consumers:
  - patient,
  - consume goods and housing services,
  - supply labour to entrepreneurs
- Entrepreneurs:
  - Impatient
  - Produce, using commercial property as a factor
  - Borrow against value of property, up to a fixed fraction

Calibration of Iacoviello (2005)

β	household discount factor	0.993
β^e	entreprener discount factor	0.95
σ	inverse elasticity of intertemporal substitution	1
ϑ	weight on housing utility	0.11
φ	inverse Frisch elasticity of labour supply	2
ε	elasticity of substitution across final goods	6
ω	measure of household sector	0.979
ν	elasticity of output with respect to CRE	0.05
θ	Calvo hazard rate	0.67
m	steady state permitted collateral ratio	0.85

Self-fulfilling recessions in Iacoviello's model



A self-fulfilling crisis

- Moderate recession in output, >3pp below ss
- House prices around 5pp below ss

Feeding back from credit growth in Iacoviello's model

- Crisis has raised credit growth as a concern, so plausible candidate for inclusion in a policy rule
- These rules also generate self-fulfilling recessions.
- Eg: $\alpha_\pi = 1.5 \Rightarrow \alpha_{\Delta c} = 0.05$

...is sufficient to deliver self-fulfilling recessions

Indeterminacy: discussion

- Benhabib, Schmitt-Grohe and Uribe (2002):
  - Global indeterminacy
  - 2 steady states: good one, liquidity trap
- Mertens and Ravn (2011)
  - Shocks to expectations *functions*
  - Switches in beliefs about ss to which economy is converging
  - Liquidity trap provoked by belief that there will be one
- Our paper
  - *local* indeterminacy
  - Convergence to desirable steady state
  - Only 2 equilibria, not many. Either recession, or nothing.

Remarks

- Can we get persistent ZLB episodes?
  - Yes and no
- Allowing for interest rate inertia
  - Still get sunspots
- Only ‘2’, not infinite numbers of self-fulfilling expectational equilibria
- Survives analysis of the full nonlinear model, not just the quasi-linear approximation used here.

Recap [on speed limits]

- Speed limit rules can lead to self-fulfilling recessions
- Examples with output, house price and credit growth
- Weighs against other motives for these rules (measurement error, mimicking commitment)
- Property only of RE models; requires that other instruments can’t circumvent ZLB

Recap [on conceptual learning points in speed limits paper]

- Perfect foresight, 'quasi-linear' RE.
- Benefits: tractability, cd handle big model.
- Costs: realism. We don't see the future.
- Analagous method used by EgWd to solve for optimal monetary policy.
- Multiplicity=multiple links between observables and fundamentals.

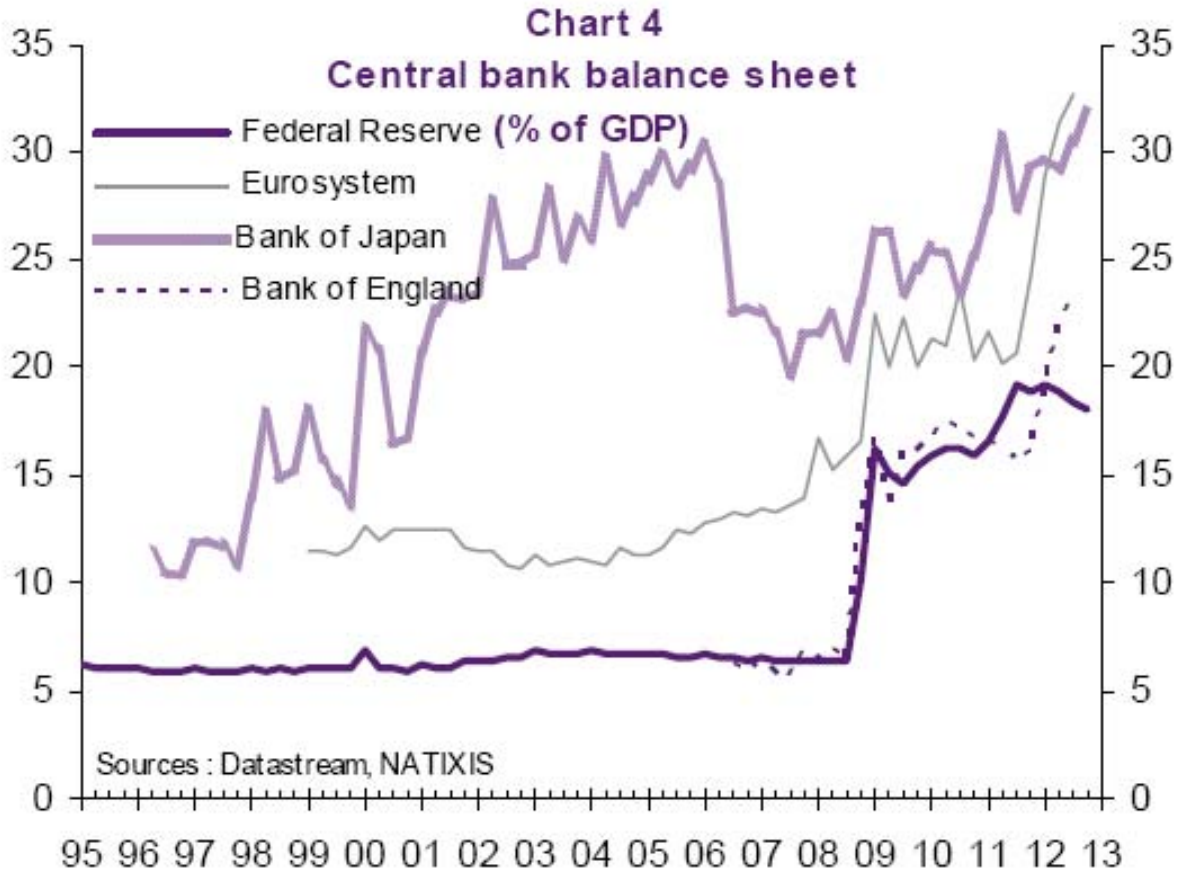
Recap on zero bound lecture

- Analytical derivation of the conditions under which zero bound exists.
- Demonstration of computational challenge posed by the ZLB, and the economic pathologies it can generate.

What we haven't yet covered that you may be examined on

- Quantitative easing; effects and criticisms
- Eggertson and Woodford's optimal monetary policy at the ZLB, and how it compares to central bank 'forward guidance'.
- Credit easing.
- Other options at the zero bound – eg currency reform to allow negative interest rates.
- These topics may come up as essay questions I the exam or resit.
- Some of these topics may be recapped on in an open lecture to you and undergrads.
- With essay topics, don't assume that a good answer can confine itself to what we do in the lectures.

4. Quantitative easing



Source: Natixis special report by Sylvain Broyer, Feb 27, no 30.

As room for conventional stimulus ran out at the zero bound...
Central banks bloated their balance sheets as they engaged in unconventional stimulus of one sort or another.

QE vs conventional OMOs

- Conventional open market operations to implement monetary policy: electronic reserves created and traded for short term government securities.
- Quantitative easing: same as above, but the trade is for longer-term government securities.
- In simple NK model, no difference, as only 1 period government securities.

QE motivation 1: increase money

- This was part of early MPC communication about QE
- Loose idea: can't have more money without inflation, so with IR at ZLB, just print more money
- Still part of the rhetoric used by some, eg Congdon at Lombard St Research
- Also part of the US conservative critique of Fed QE.
- As Woodford explains, this is inconsistent with modern monetary models.

Woodford money neutrality, or only via effects of future interest rates

$$1.\, i = i_{ZLB}, M = M_{ZLB}$$

$$2.\, i = i_{TR}, M = M_{TR}$$

When rates at the ZLB, money supply can be anything and still consistent with money demand, and not affect anything.
Provided rates are consistent with what the Taylor Rule would predict [or whatever is predicted for interest rates] money supply will then be whatever money demand dictates is required to leave rates consistent with the TR.

$$\text{If } M > M_{TR}, i < i_{TR}$$

QE motivation 2: push people into saving in riskier assets

- Idea harks back to Tobin's 'portfolio balance model'.
- Make it costly to save in safe assets, bid up the price (or lower the yield/interest rate) on risky assets.
- Those rich with funds, low m.p.c. lose, those short of funds, with high m.p.c. gain.
- Note: in simple NK model, there is no risk, and there are no risky assets!

Critique of motivation 2

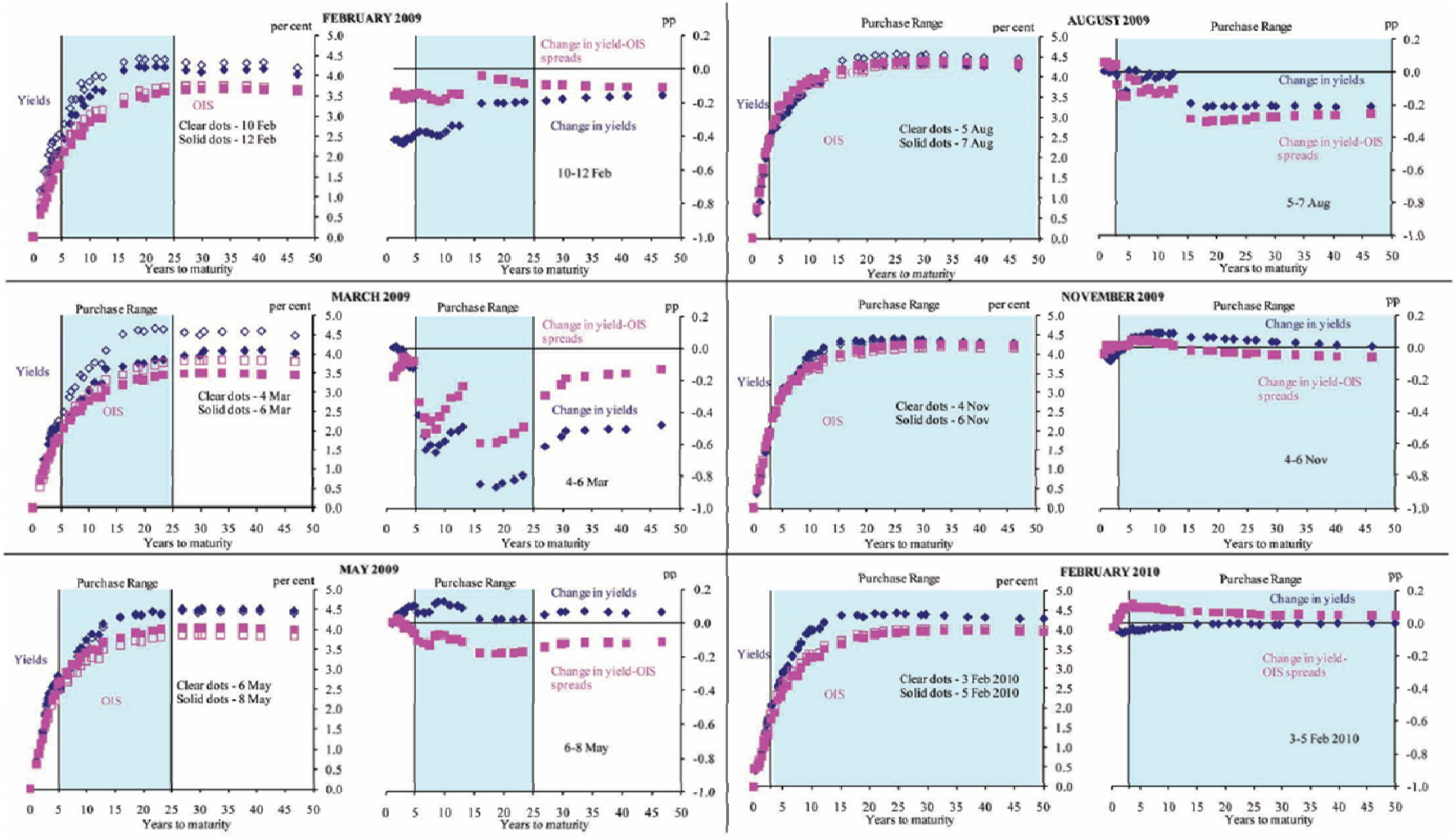
- ‘Higher order Ricardian Equivalence’.
- RE implies a tax cut will be saved, anticipating a tax rise later to balance the books.
- CB buys risky asset today, anticipate more uncertain path for spending and taxes tomorrow, to balance the books.
- As if risk has not been taken away from the balance sheet.

Breaking higher order Ricardian Equivalence

- Recall analysis in Christiano and Ikeda. Also see Curdia and Woodford.
- Anything that breaks 'first order' RE breaks this 'higher order' RE too.
- Like failure of RE; existence of frictions that create borrowing constraints and wedges between private and social costs / prices.

Empirical evidence on quantitative easing

Figure 4. Gilt Yield to Maturities and Corresponding Duration-Matched Zero-Coupon OIS Rates (Left Panel) and the Changes in Those Yields and the Yield-OIS Spread (Right Panel) Before and After Announcements Relating to QE Purchases



Sources: Bloomberg and Bank of England.

Source: Joyce *et al*, BoE QB, 2010

Table 1: Empirical Estimates of LSAP Effects

Study	Sample	Method	Estimated Effect of $600 billion LSAP (±2 std errs if avail.)[a]
Modigliani-Sutch (1966, 1967)	Operation Twist	time series	0 bp (±20 bp)
Bernanke-Reinhart-Sack (2004)	Japan, U.S.	event study	400 bp (±370 bp), 40 bp (±60 bp)
Greenwood-Vayanos (2008)	postwar U.S. (pre-crisis)	time series	14 bp (±7 bp)
Krishnamurthy-Vissing-Jorgensen (2010, 2011)	postwar U.S., QE1, and QE2	time series	15 bp (±5 bp)
Gagnon-Raskin-Remache-Sack (2011)	QE1	event study, time series	30 bp (±15 bp), 18 bp (±7 bp)
D'Amico-King (2010)	QE1 Treasury purchases	security-specific event study	100 bp (±80 bp)
Hamilton-Wu (2011)	QE2	affine no-arbitrage model	17 bp
Hancock-Passmore (2011)	QE1 MBS purchases	time series	depends, roughly 30 bp
Swanson (2011)	Operation Twist	event study	15 bp (±10 bp)
Joyce-Lasaosa-Stevens-Tong (2011)	U.K. LSAPs	event study, time series	40 bp
Neely (2011)	effect of U.S. QE1 on foreign bond yields	event study	17 bp (±13 bp)

[a]Source: Modigliani-Sutch (1966, Sections 3-4), Bernanke-Reinhart-Sack (2004, Table 7, Figure 6, and author's calculations), Greenwood-Vayanos (2008, Table 2), Krishnamurthy-Vissing-Jorgensen (2011, Section 4), Gagnon et al. (2011, Tables 1-2), D'Amico-King (2010, Figure 3), Hamilton-Wu (2011, Figure 11), Hancock-Passmore (2011, Table 5), Swanson (2011, Table 3), Chung et al. (Figure 10), Joyce et al. (2011, Figure 9), Neely (2011, Table 2). Almost all of these estimates involve author's calculations to renormalize the effect to a $600 billion U.S. LSAP.

Source: Williams, 2011, FRBSF speech

Sceptical reading of the evidence on QE

- Can't tell if the effects were persistent
- Much evidence (except for the bonds in or out stuff) consistent with effect of signalling about future rates
- Doesn't indicate that rates people pay fell (Vissing-Jorgensen and Krishnamurthy)
- Could indicate a social cost, not a benefit [Caballero and Farhi]
- If people think it will work, yields may fall, even if the TM claimed by central banks is not there
- What explains the radical differences between the Fed [rate of change] and BoE [level] QE policies?

What about studies demonstrating QE effects on wider economy

- Event-study analysis not appropriate; transmission likely protracted, if any
- Time series studies struggle to establish counter-factual
- Requires isolating QE reaction function, but over a very limited period
- And one in which propagation may be changing (eg because of banks, or fiscal policy).
- Therefore, central bank claims on this (eg by BoE) are just not remotely credible.
- John Taylor made same remark at Dallas Fed conference.

Comments on the UK's QE program

- No aforethought despite BoJ crisis.
- UK version of QE [focused on gilts] reckless at the outset. All eggs in unpromising basket.
- Remember then we had only damning evidence on impact of QE [op twist, BoJ].
- BoE exec expropriated right to decide which assets.
- Based initially on flawed logic that it was just about getting money out there.
- Comms changed later to reflect more promising rhetorical avenue that it was yields that mattered.
- Emphasis on yields initially avoided because didn't want to be pinned to a yields target.

Institutional failings in the UK

- Fiscal backing was and still is discretionary; a problem that didn't bite but might have. And may. And did in the US.
- Institution of counter-cyclical fiscal policy weak. Maybe too loose before crisis, too tight afterward.
- What should be bought, and who can decide: vagueness in institution hampered eventual choices.

QE and 2 inflation scares, one false, one possible but unlikely

Scare 1: QE will be hyper or at least very inflationary

- No. PT=MV always, but V falls at the zero bound.
- The Fed has tried and tested instrument of interest rates to curtail inflation; expectation that this will happen will tie down inflation now.
- And the Treasury could tighten fiscal policy and win lots of friends.
- You might worry in principle about desired inflation rate. But Fed have consistently eschewed language about short term inflation target rise.

Scare 2: QE will mean higher inflation through fiscal problems.

- QE exit when risk free rates have normalised, and bond prices are lower.
- Capital ‘loss’.
- Fiscal theory of price level (Sims, Woodford): prices rise to revalue outstanding nominal debt to make finances sustainable.
- Central bank can’t and shouldn’t fight this.
- Hypothetical possibility.
- Sims even thought it was a useful ‘instrument’ to ward off deflation.
- Mechanism has at its heart inability of govt to raise taxes or cut spending to meet debt.
- Lack of rise in inflation expectations reassuring?

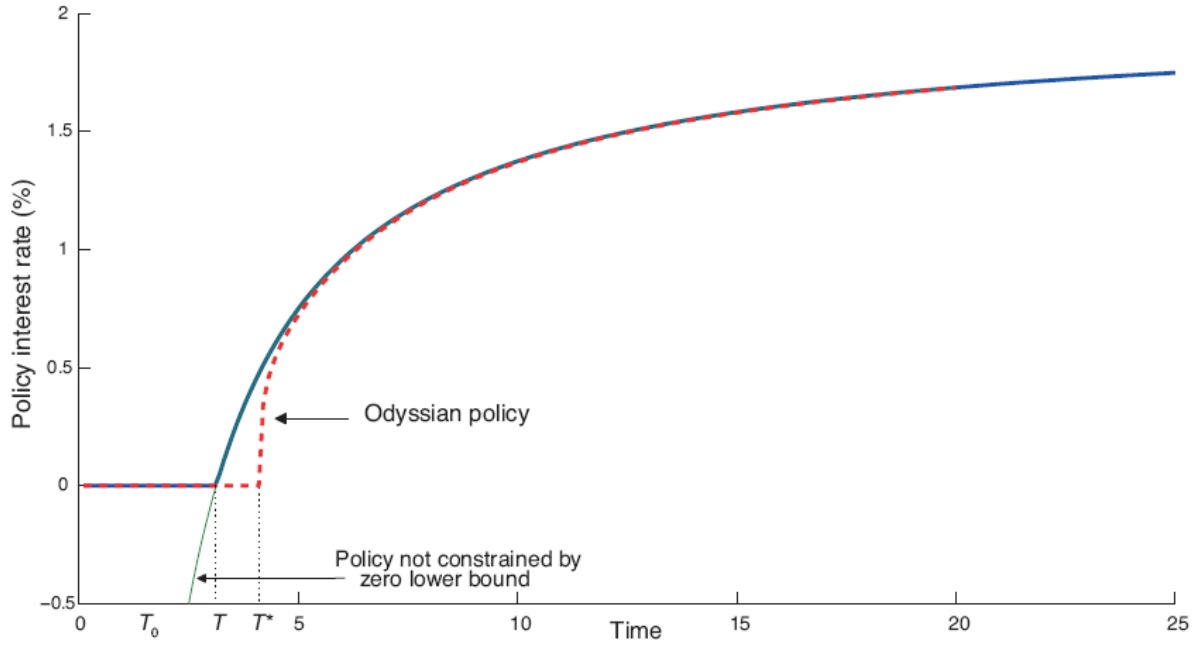
Forward guidance

Odyssian vs Delphic forward guidance

- Odyssian: commitment. Tie hands to the mast.
- Delphic: reveal what you were going to do anyway.
- Odyssian associated with practical implementation of Eggertson and Woodford's optimal commitment policy in the presence of the zero bound.
- Much confusion, most of it sewn by central banks.

Odyssian forward guidance

Figure 1 Alternative forward paths



'Odyssian Forward Guidance'

Today's interest rate at ZLB; instead lower tomorrow's.

Do this by committing to keeping rates 'lower for longer'

i.e. longer than markets would otherwise have expected given historically understood ways of behaving

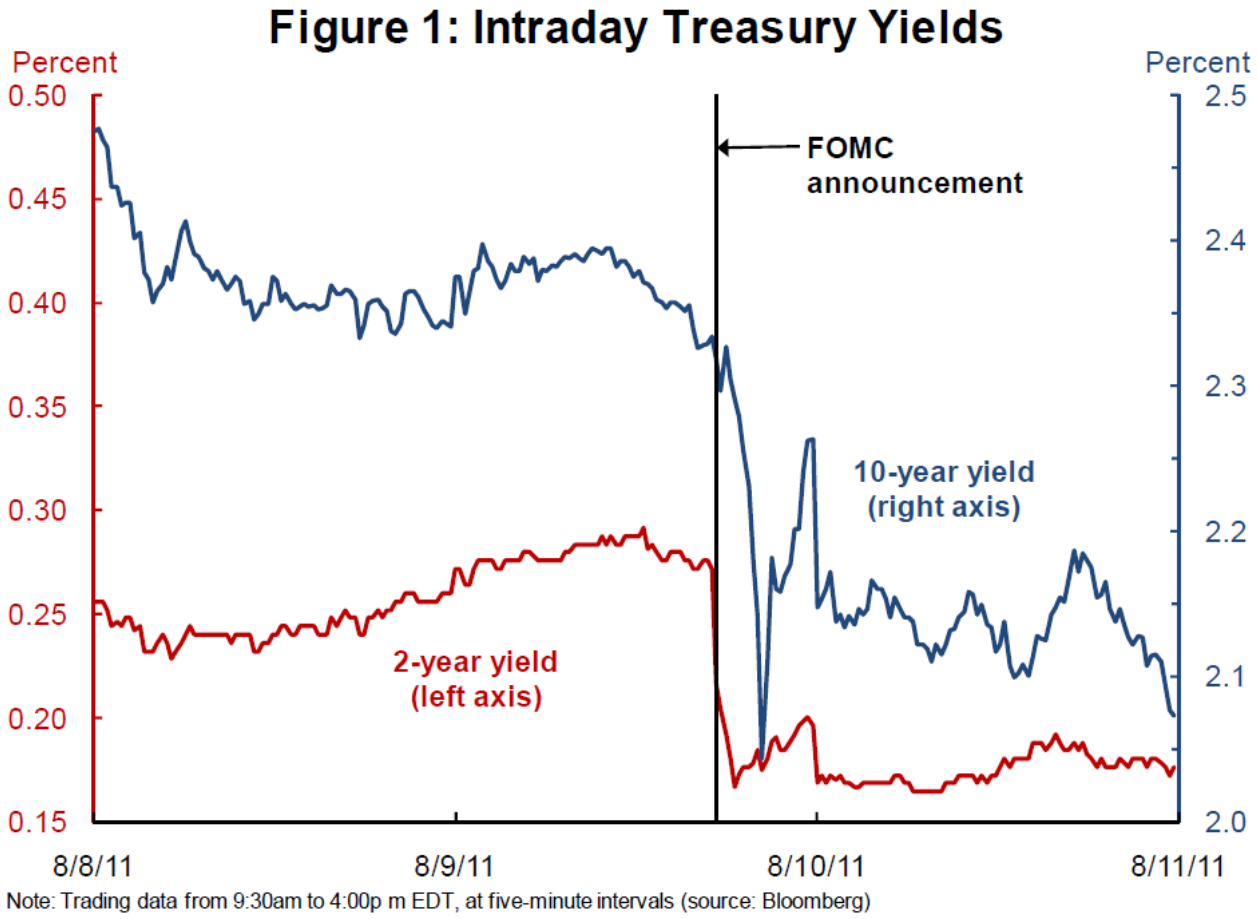
Difficulty: how to keep your hands tied from tightening when you normally would

Forward guidance at the Fed

August meeting said, "The Committee currently anticipates that economic conditions—including low rates of resource utilization and a subdued outlook for inflation over the medium run—are likely to warrant exceptionally low levels for the federal funds rate at least through mid-2013."

Source: FOMC minutes of August, 2011

Effect of Fed forward guidance

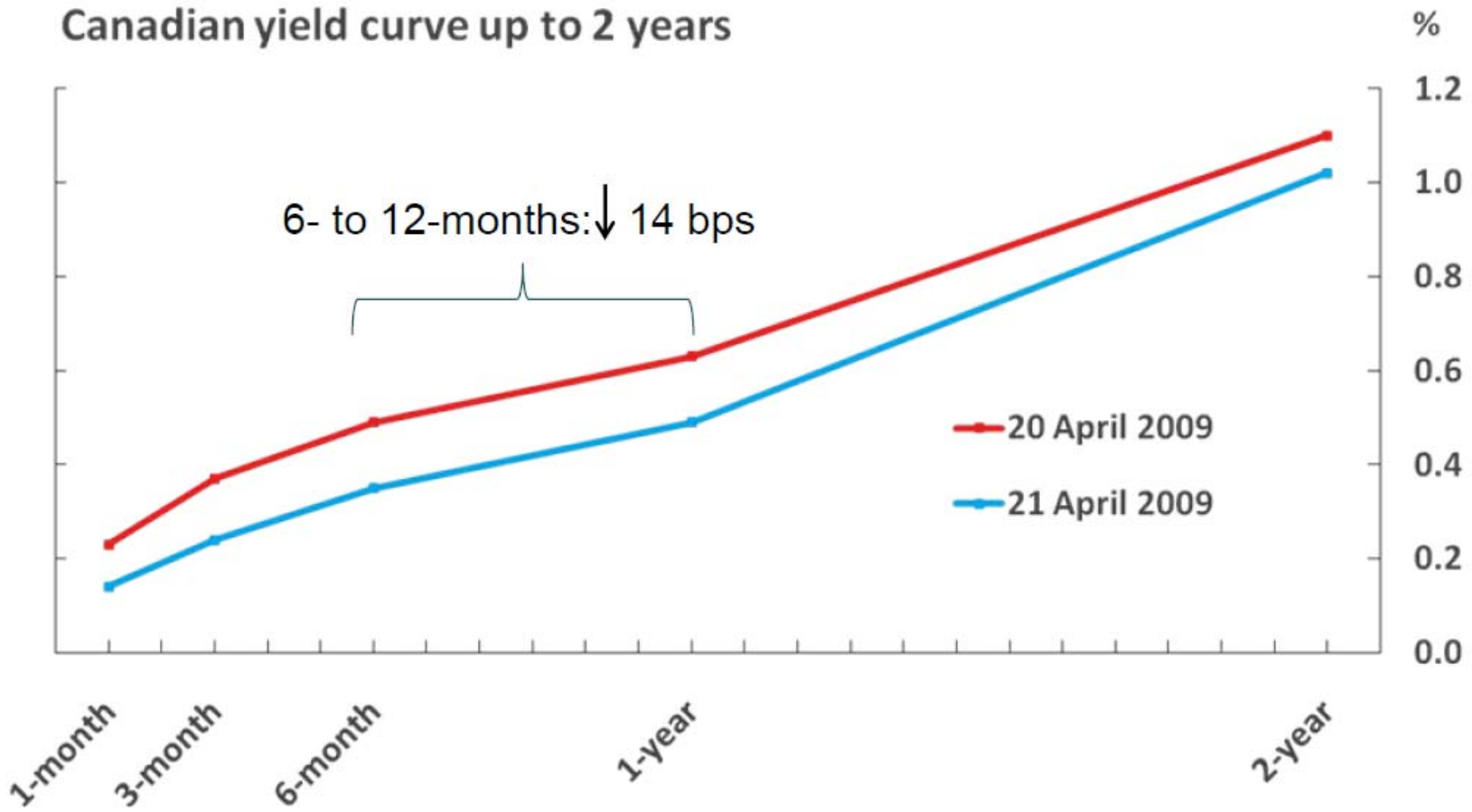


Source: Williams, FRBSF, 2011

Bank of Canada forward guidance

"Conditional on the outlook for inflation, the target overnight rate can be expected to remain at its current level until the end of the second quarter of 2010 in order to achieve the inflation target."

Effect of Bank of Canada forward guidance



BoC, Fed forward guidance vs the academic prescription

- Eggertson and Woodford: follow through on optimal commitment policy's implications for interest rates in the presence of the ZLB.
- Reality: announce a deviation from what simple policy rules would predict.
- Not necessarily a failing, since
  - Simple rules don't reduce welfare relative to optimal that much [HME, Taylor and Williams]
  - Optimal rules not 'robust'

Critical assessment of UK forward guidance

- Time for FG was before hit zero bound. [Not countenanced then]. When rates expected to tighten a lot post crisis.
- UK FG adopted language and guise of 'lower for longer'. Carney launch talked about 'securing the recovery'.
- But actually intended to inject NO more monetary stimulus....
- ...since No consensus on MPC for a stimulus.
- Face-saving for Carney, who had pre-judged it in public, and needed some kind of victory.
- Misleading benefits claimed for reduction in uncertainty.
- HMT trespassed on operational independence by commissioning review of FG.

UK forward guidance/ctd…

- MPC stood firm, so some credit due there.
- Hazardous and reckless again: don’t change policy framework unless the gains are high.
- A no-more monetary stimulus policy doesn’t meet the criterion for a change worth making.
- Risk of confusion as and when lower for longer policy needed.
- Legacy of transparency about rates will be beneficial.

More criticisms of FG

- Inherent contradiction with forward guidance and the NK model used to assess it.
- Long periods of fixed rates reveal powerful pathology at heart of NK model. Silence on this from BoE.
- No attempt to formulate alternative, more realistic model of expectations, and to figure out effects of forward guidance in those circumstances.
- ie learning.