What causes banking crises? An empirical investigation

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Introduction

- Much criticism of DSGE macroeconomics since the banking crisis: models could not analyse banking crisis because a) no banking element b) no mechanism (apart from stationary shock) to model crisis; yet crisis seems to produce permanent ('trend') effects on GDP c) was unable to 'predict' events.

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- Criticism ill-founded in some ways: a) banking models widely in use in which asymmetric information creates a risk premium; b) in macro models nonstationary shocks enter in principle even if ignored usually in practice; c) the models seem to be accurate in saying that 'crisis' cannot be predicted- noone predicted it except for 'doomsayers' who predicted crisis regularly years before it actually occurred. Yet basic point well taken: models being used for macro (such as Smets-Wouters) did not predict the *possibility* of banking crisis of sort we had..

Introduction (cont.)

- Here we add the generic banking model of Bernanke et al to the Smets- Wouters model of the US, we test it against US data and find estimated parameters for which it fits, and add shocks derived from the unfiltered data (so some shocks nonstationary). Our claim is that it gives a coherent account of banking crises and of this crisis in particular.

The model we use

- We take Smets-Wouters model of US (2007) as modified by Le et al (2012) to have a competitive sector as well as an imperfectly competitive one: this heterogeneity allows the model to fit the data whereas imp. comp. with one homogeneous Calvo parameter does not, rather as found by Dixon and coauthors in recent work. The weight on the two sectors adjusts in different samples, mimicing the degree of price/wage rigidity which seems to vary with the environment- eg in Great Moderation rigidity is higher than before.

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- To this SW model we add the Bernanke, Gertler and Gilchrist (1999) 'generic' banking model, in which entrepreneurs borrow externally up to their net worth from the banks which charge a risk premium giving them an expected yield equal to their deposit rate. Net worth is accumulated through profits subject to a firms' death rate with replacement by new firms entering.

The model we use (cont.)

- We first test a calibrated version of this SWBGG ('Synthesis') model on stationary (HP-filtered) data; this fails on our main criterion, the joint behaviour of output, inflation and interest rates. The Wald test checks whether the model's simulated behaviour statistically could e generating the actual behaviour as represented by a VAR- so-called Indirect Inference (or simulation-based testing method). le et al (2012) show that the method has substantial power and is accurate in small samples.

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- We re-estimate the model by Indirect Inference, using Simulated Annealing algorithm; we get parameters for which the model passes the test comfortably. We then extract the shocks implied by the raw data and this newly-parameterised model and apply these to the model to give an explanation of events during the crisis.

Model behaviour

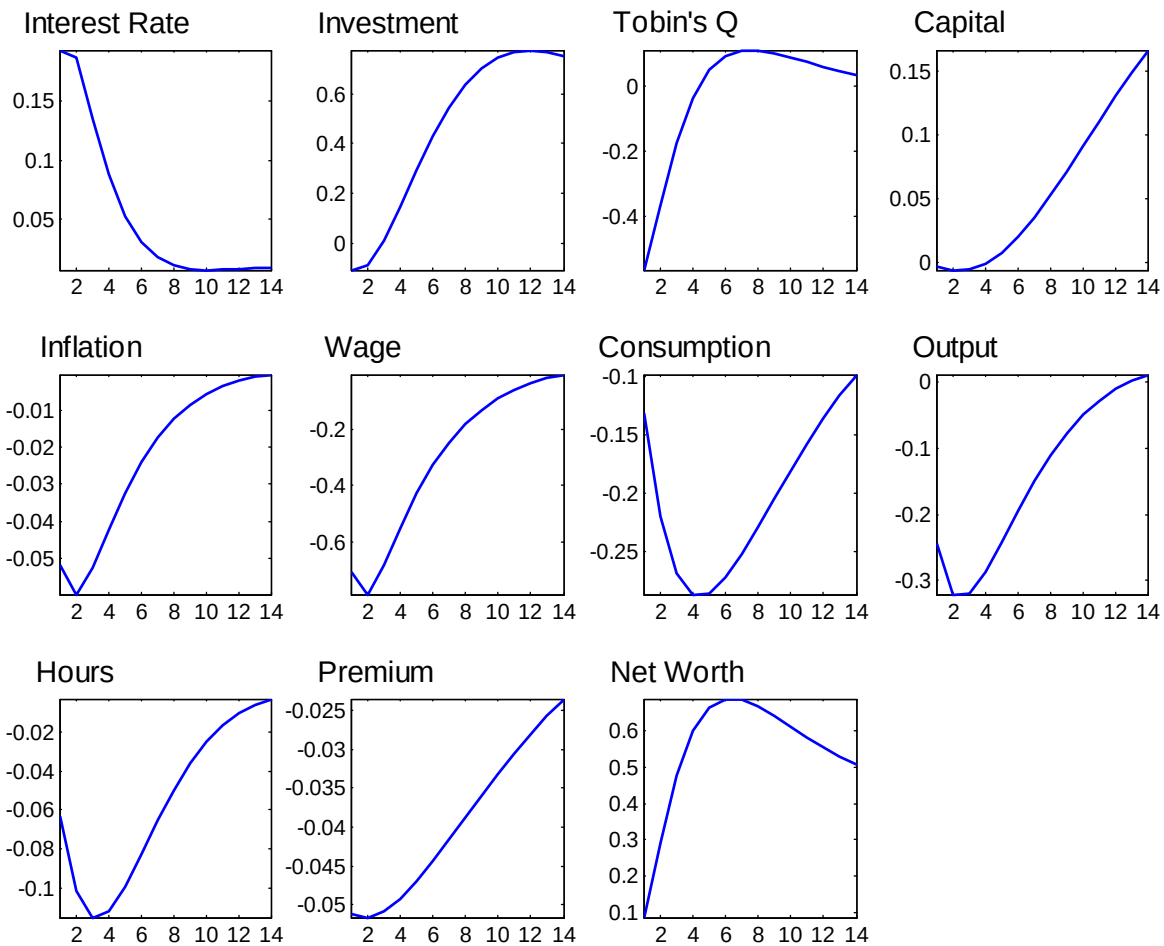

Figure: IRFs for a Monetary Shock

Model behaviour

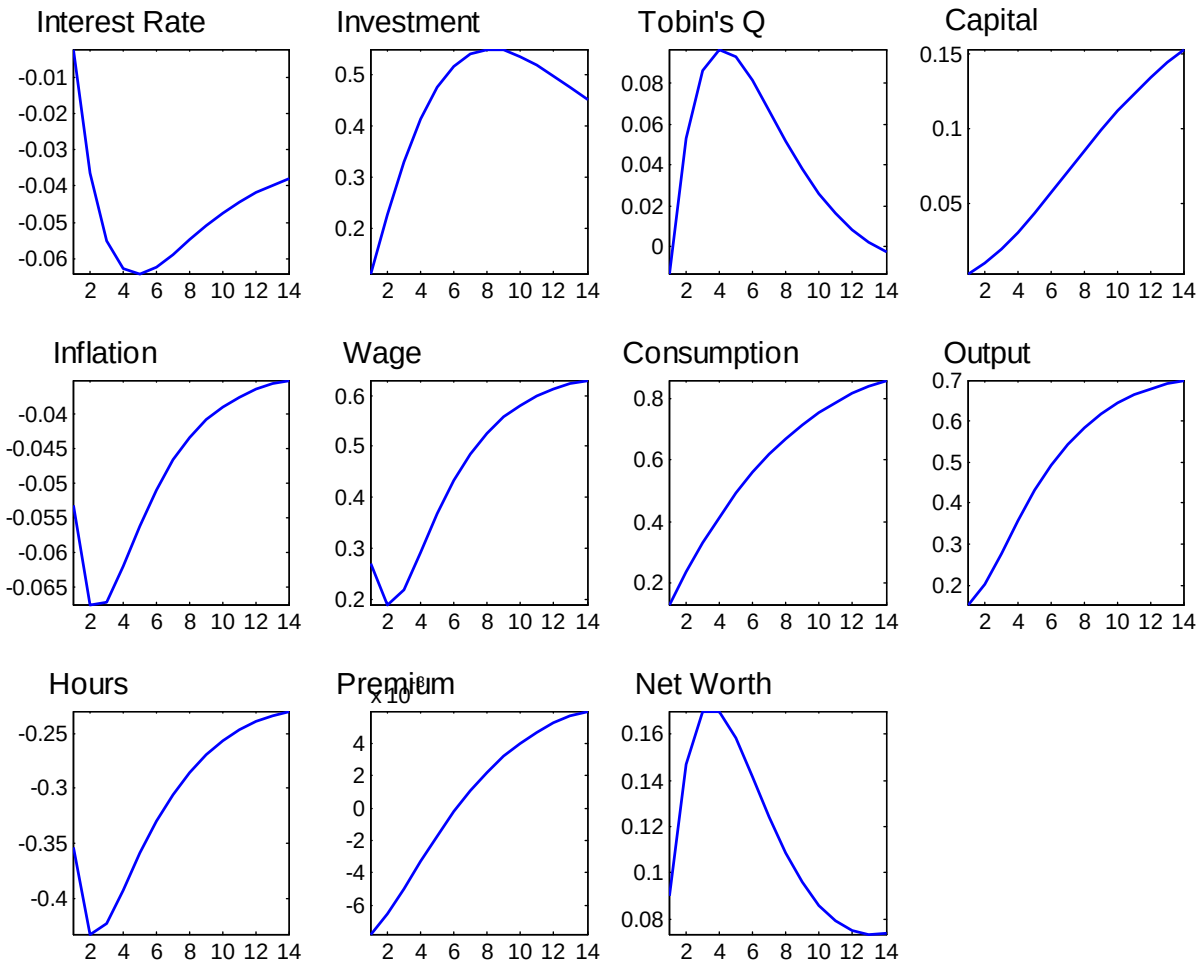

Figure: IRFs for a Productivity Shock

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- Example below of an Impulse Response Function and its 95% bounds; the IRFs lie within the bounds because these come from the VAR coefficients which lie within the 95% bounds of their joint distribution according to the Wald test.

IRFs with Bounds

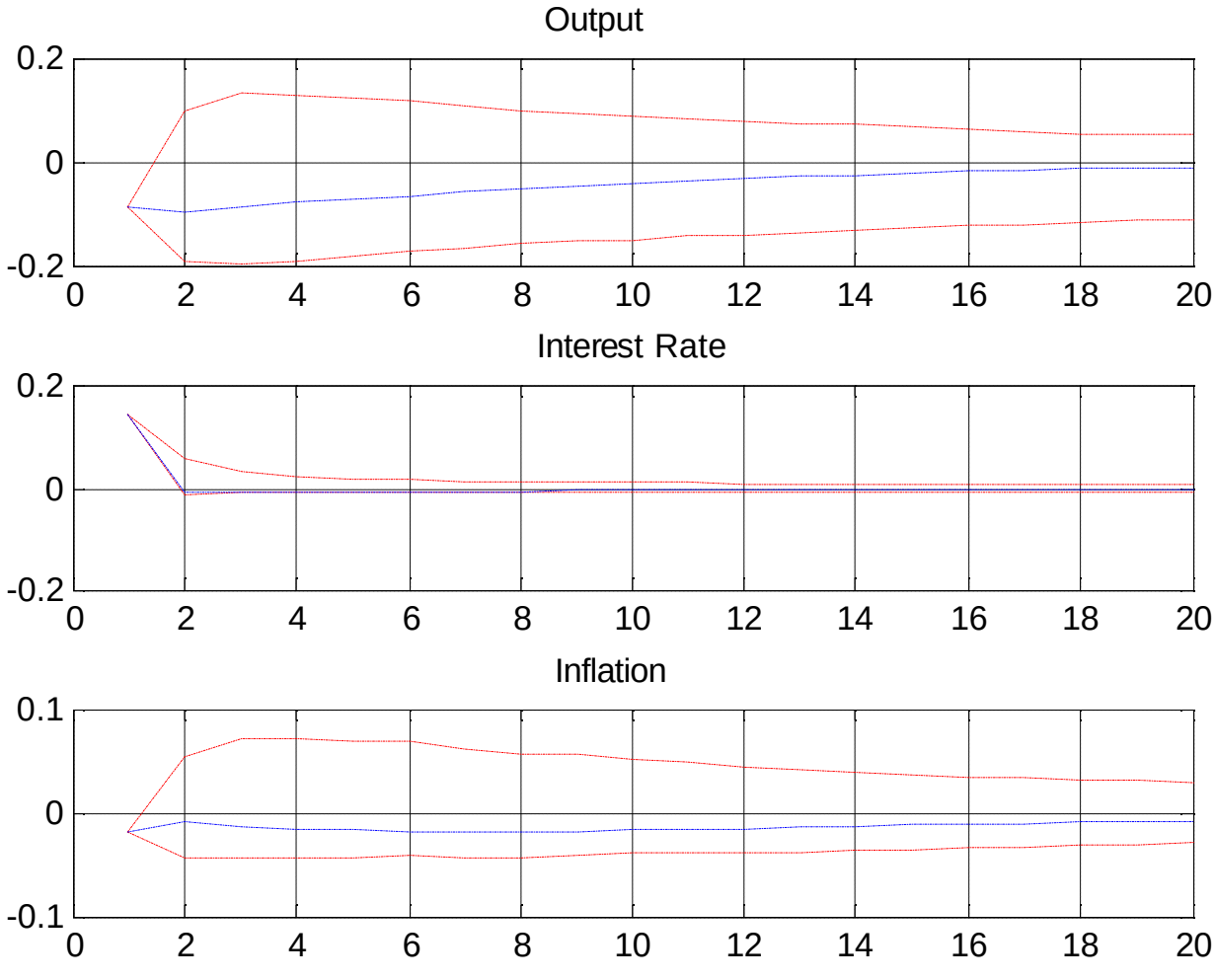
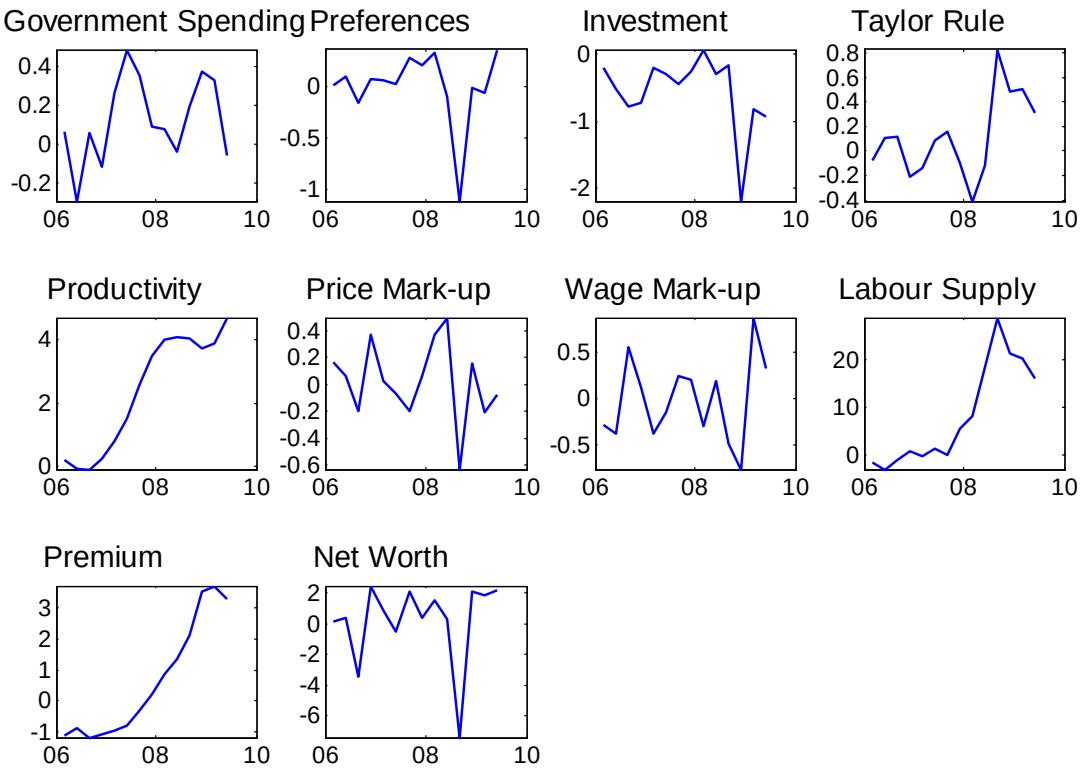


Figure: VAR IRFs for a Monetary Shock

Shocks during the crisis period

- Extract shocks from (unfiltered) data and model over 1984-2009. Of these productivity clearly non-stationary; external premium trend-stationary but has close to unit root. Other all stationary or trend-stationary.



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- Wage 'push' possible reasons: oil/commodity price rises reduce wages abnormally and produce intertemporal substitution; Obama programme boosting union power and health care reform causing uncertainly higher costs for employees.
- External premium: subprime loans unravelling. Role of government pressure in building up subprime loans exploiting rising house prices. Lehman collapse causes premium to peak as government is sucked into a fiscal bail-out. Hence this shock includes government action both in building the subprime problem and in ultimately defusing it.

House prices

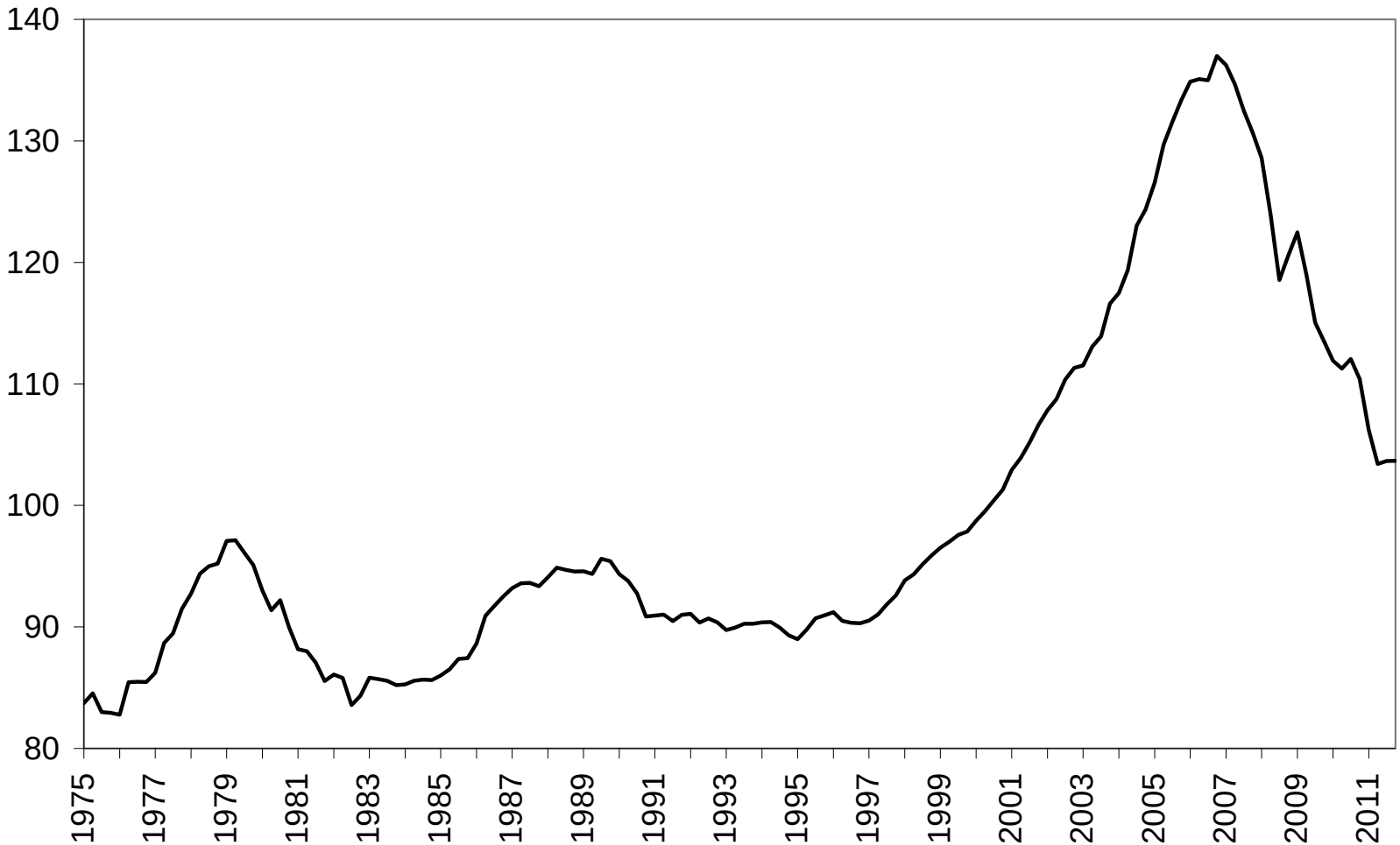

Figure: US Real House Price Index (2000=100): 1975-2009 (Federal Housing Finance Agency)

Government intervention building up the subprime shock

Political and Legislative Targets
1) 1996 HUD target for F and F: 42% of mortgages to go to borrowers with income below area median (50% 2000; 52% 2005).
2) 1996 HUD target for 'special affordable' (borrowers with less than 60% of area median) was 12% (20% 2000; 22% 2005).
3) Community and Reinvestment Act of 1977 (Carter) strengthened in '95 for ordinary banks. F&F securitised $394bn of CRA loans 2000-2002.
4) Taxpayer Relief Act increased CGT exclusion band on houses

Source: Nunes (2009).

Table: Evidence of Political Effect

Government intervention building up the subprime shock

Effects on Home Ownership
1) 1994-2006, US home ownership rate up 9.4% (to 70% of population). Hispanics up by 20.2%; Asians 17.2%; African Americans 14%; non-Hispanic Whites 8.2%.
2) Hispanic population 44% Pacific; 30% South; Asian population 49% Pacific. African; American 45% South.
3) Prices in these two regions both take off from 1992 but differentially due to extra supply response in South (less zoning tightness).
Source: Nunes (2009).

Table: Evidence of Political Effect

Variance decomposition of typical crisis episode

SHOCK	Int. rate	Inflation	Output
Investment	17.1	0.7	9.7
Taylor Rule	9.4	1.1	2.9
Productivity	4.5	3.1	24.0
Price Mark-up	15.9	85.4	1.0
Labour Supply	21.8	8.7	36.3
Premium	17.1	0.5	15.0
TOTAL	100	100	100
Banking Shocks	20.9	0.6	17.9
Non-Banking Shocks	79.1	99.4	82.1

Table: Variance Decomposition for Crisis Period

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- Inflation was not much affected by the banking shock.

Crisis period real time-line

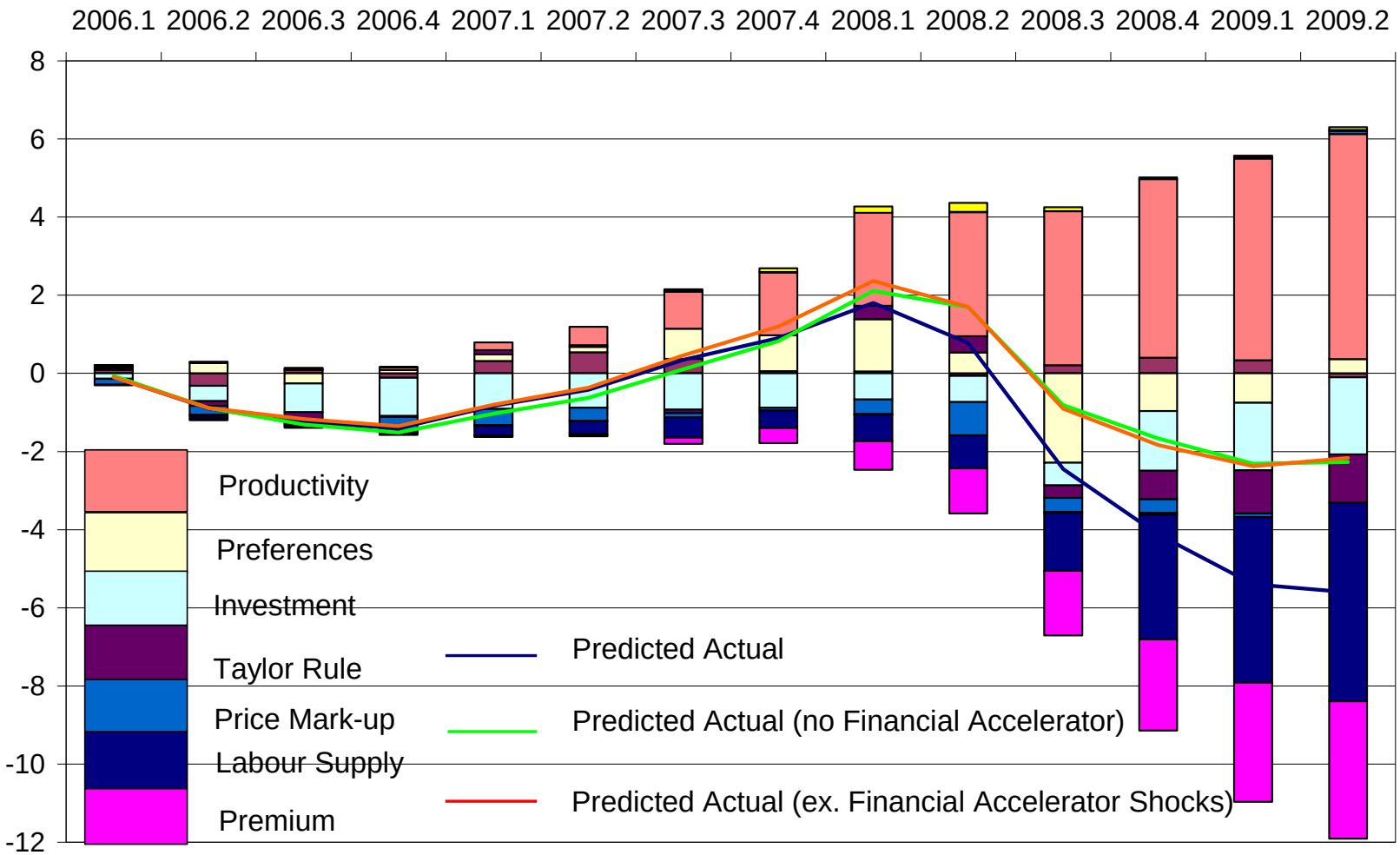

Figure: Shock Decomposition for Output During the Banking Crisis Episode

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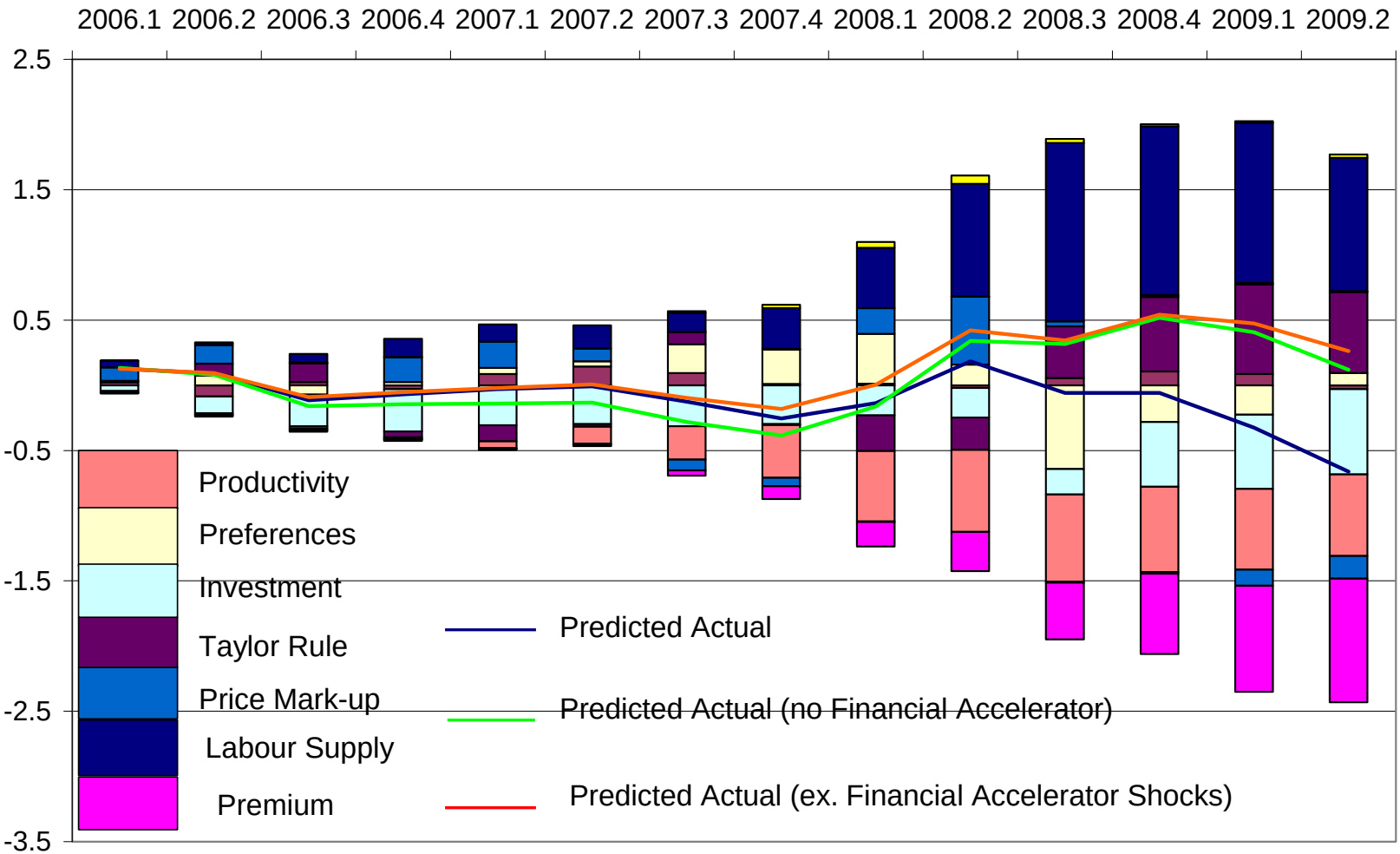

Figure: Shock Decomposition for Interest Rate During the Banking Crisis Episode

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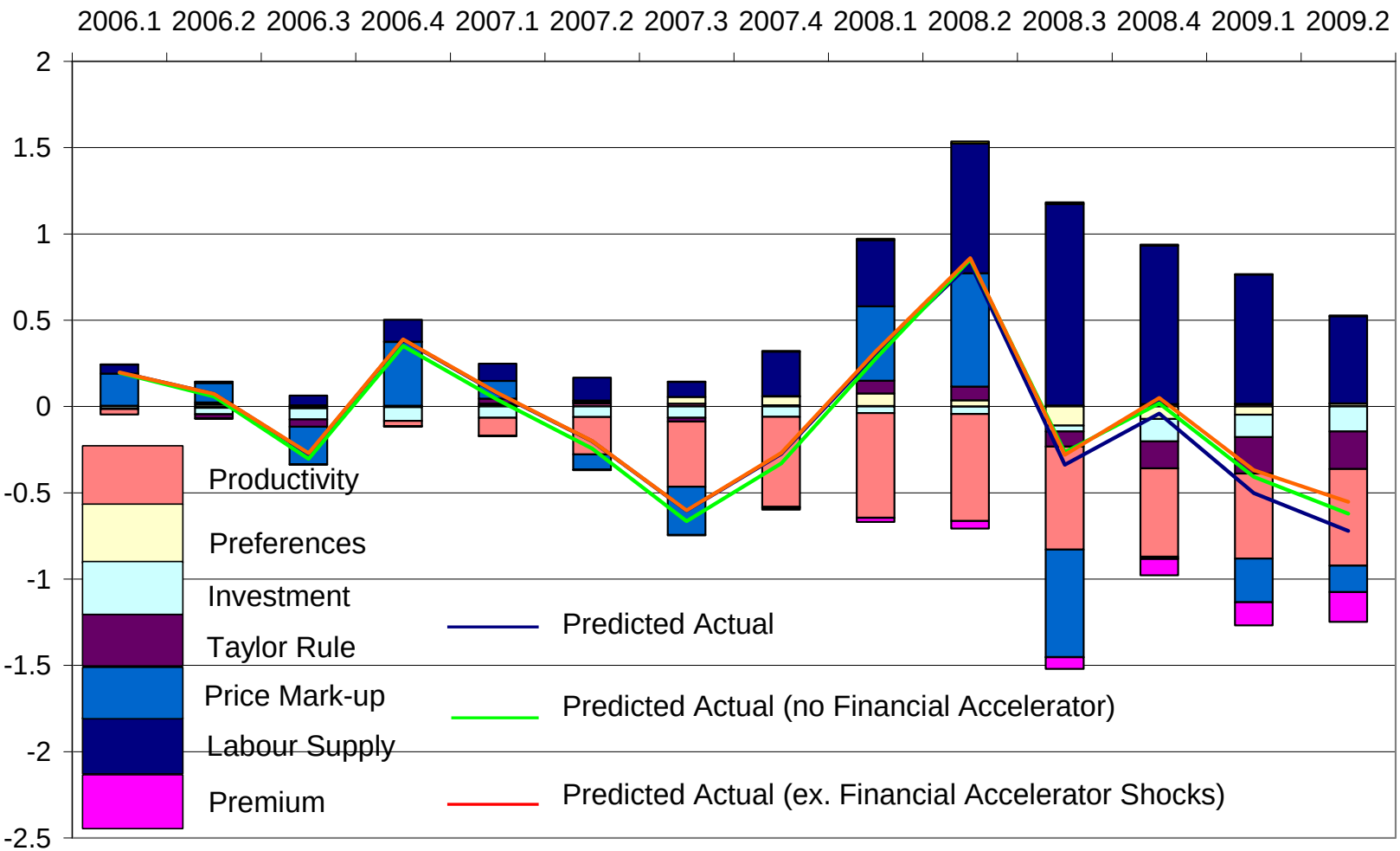

Figure: Shock Decomposition for Inflation During the Banking Crisis Episode

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- Inflation: fluctuates + and - 0.5% (2% per annum) around target. By end is at bottom of this range as commodity price shock goes into reverse; productivity offsets labour supply; premium and Taylor Rule add to downward pressure.

Crisis and financial crisis

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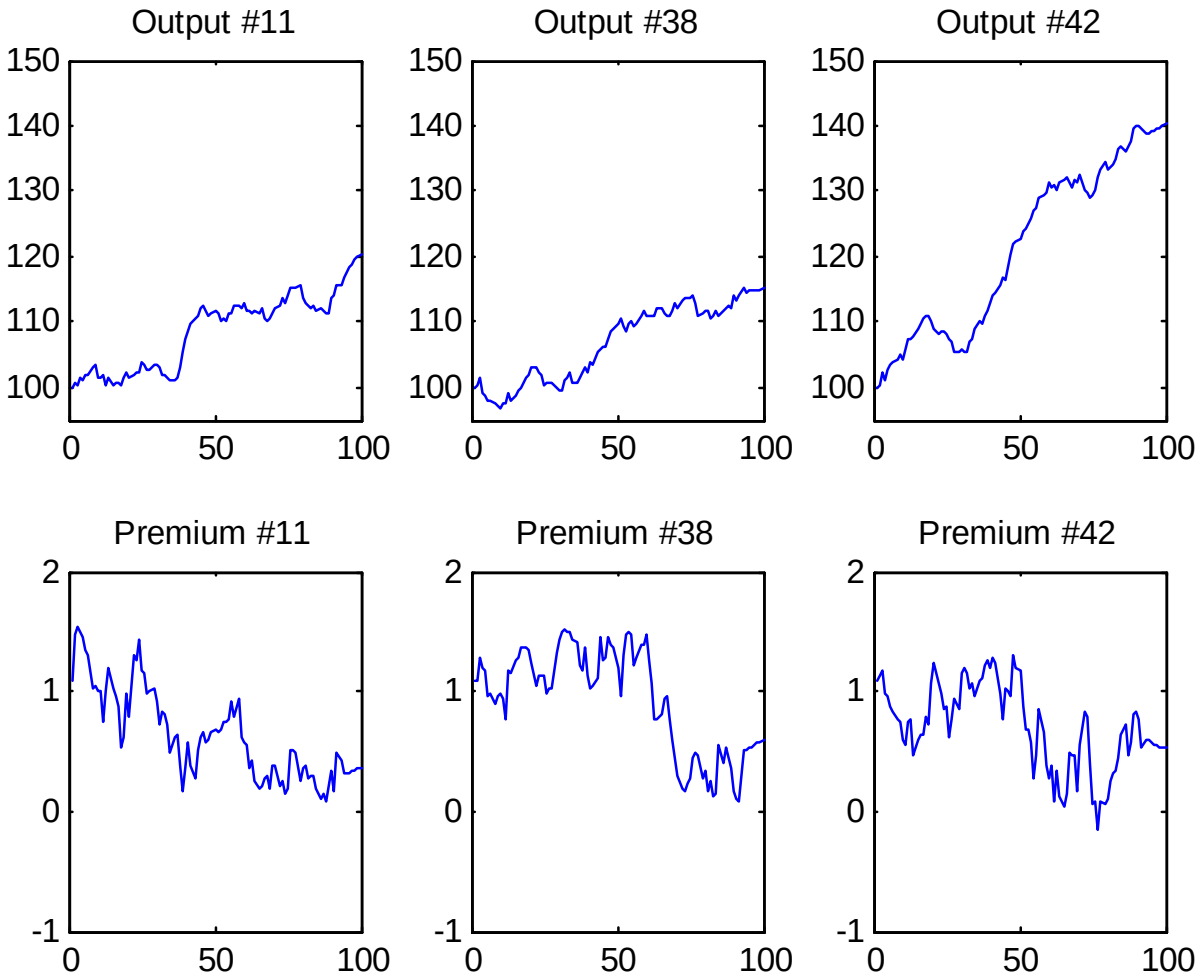
- Extreme financial shocks not required to generate financial crisis- see last set of charts which came from normal financial shocks.
- Extreme financial shocks do not on their own generate financial crises- see charts of bootstraps generated by financial shocks only 1984-2009 (including extreme values in crisis). Only get bad recessions (and premium rises); no crises.

Crises Not Accompanied by Financial Crisis



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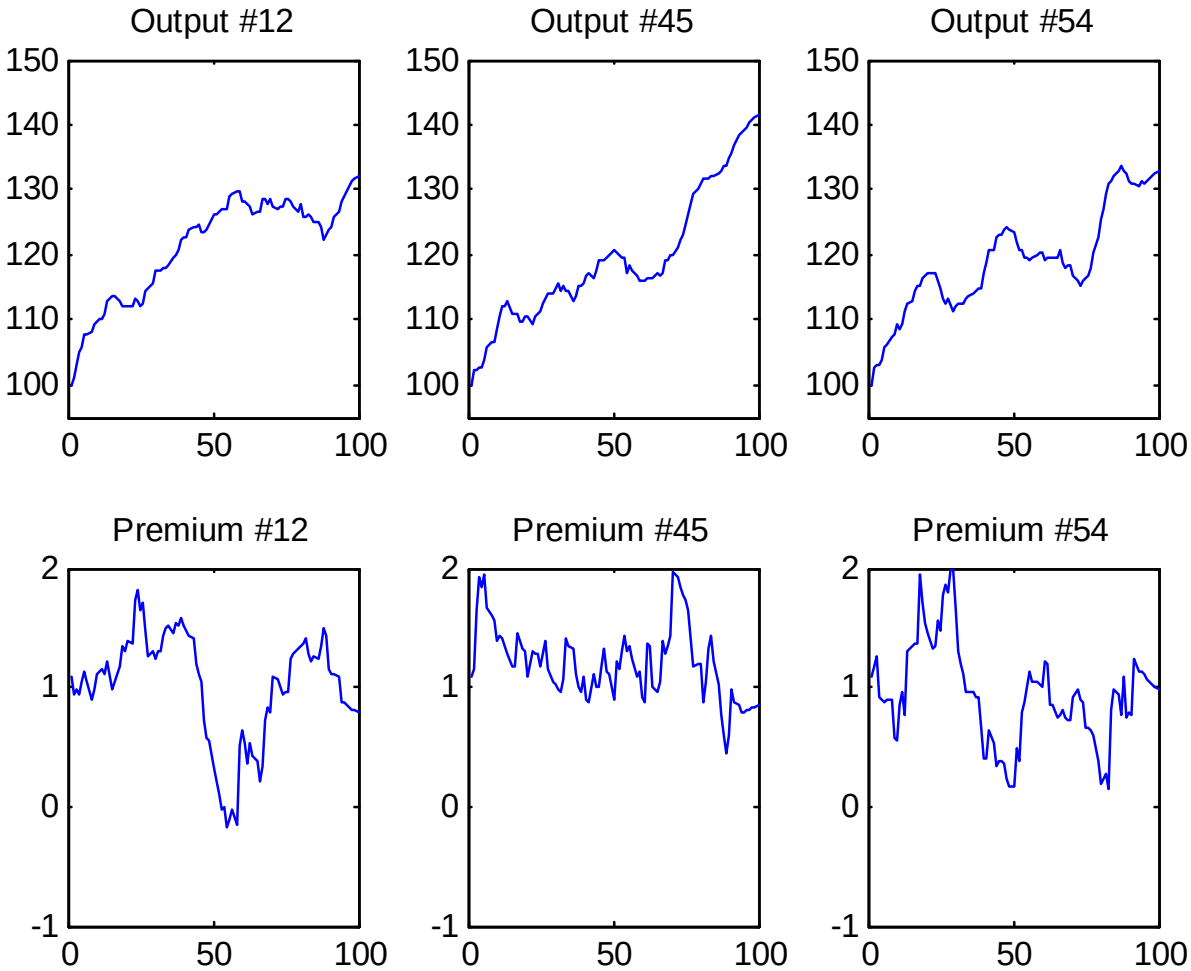

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No Crises with only Financial Shocks

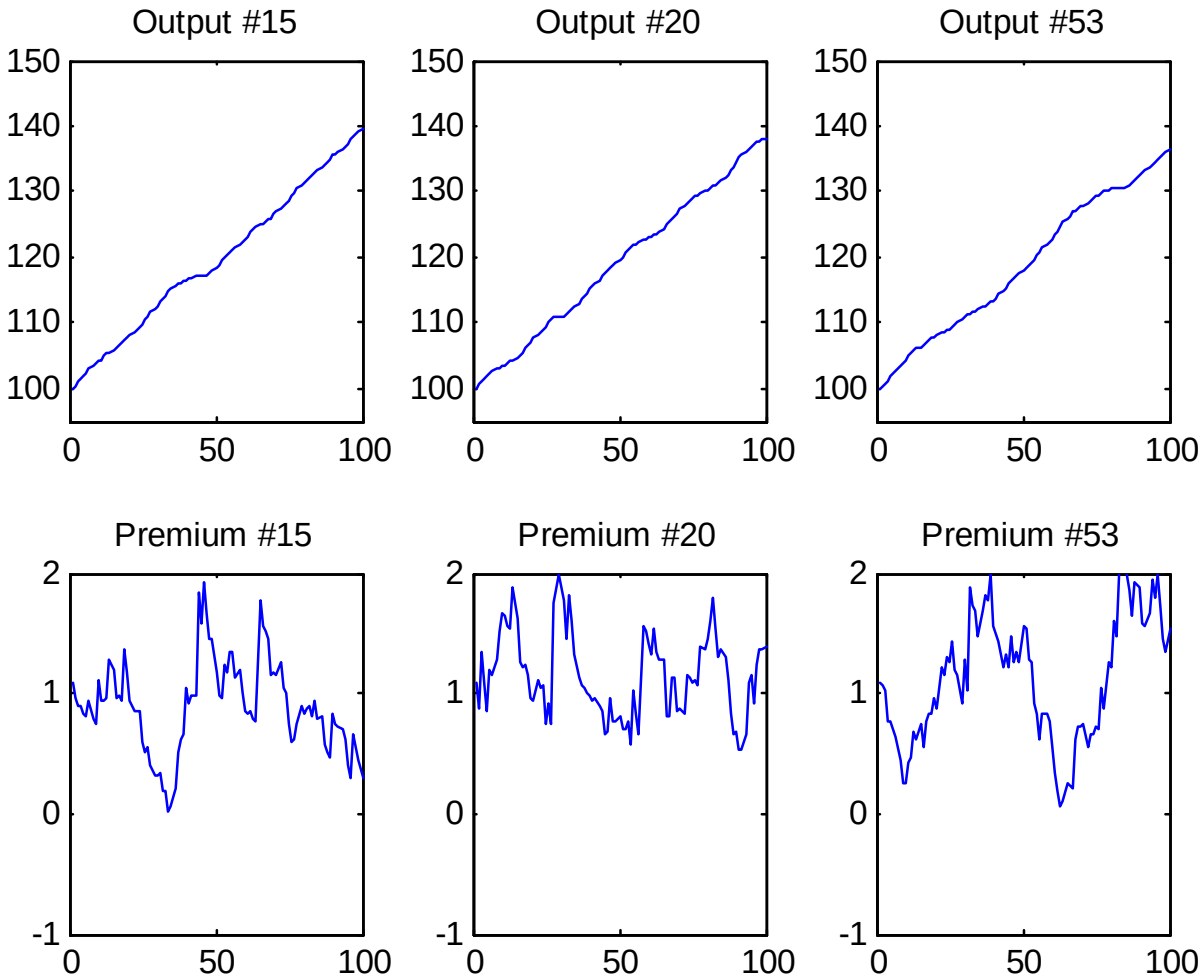

Figure: Simulation with only Financial Shocks

Policy and other Conclusions

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- Regulation of banking unlikely therefore to prevent crises or banking crises that result; regulation of government would have been more effective! But- quis custodiet ipsos custodes? Cf South Sea Bubble and role of UK government.
- Experience of other countries (eg Australia, Spain) that prevented banking 'special purpose vehicles' suggests that limited prudential limits on banks helpful- prevented them buying toxic sub-prime package.

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- Zero Bound not a big element- price level targeting could help, to extent it was.
- Fiscal policy shows up in moderating the premium shock via bail-out (taxpayer credit provision) but not otherwise. QE effect may also be found from end-2008 in the moderating of the premium.