The implications of non-conventional monetary easing and fiscal deficits for interest rates and the economy: Some scenarios based on GPM and GIMF

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1 Introduction

- Since onset of financial crisis, interest rates have behaved in very atypical fashion

- Although central banks continue to control policy interest rates, liquidity problems and solvency concerns have affected spreads

- Also, at times flight to quality while at other times concerns about the sustainability of fiscal outlook

- Result has been high and volatile liquidity premiums, term premiums and credit risk premiums

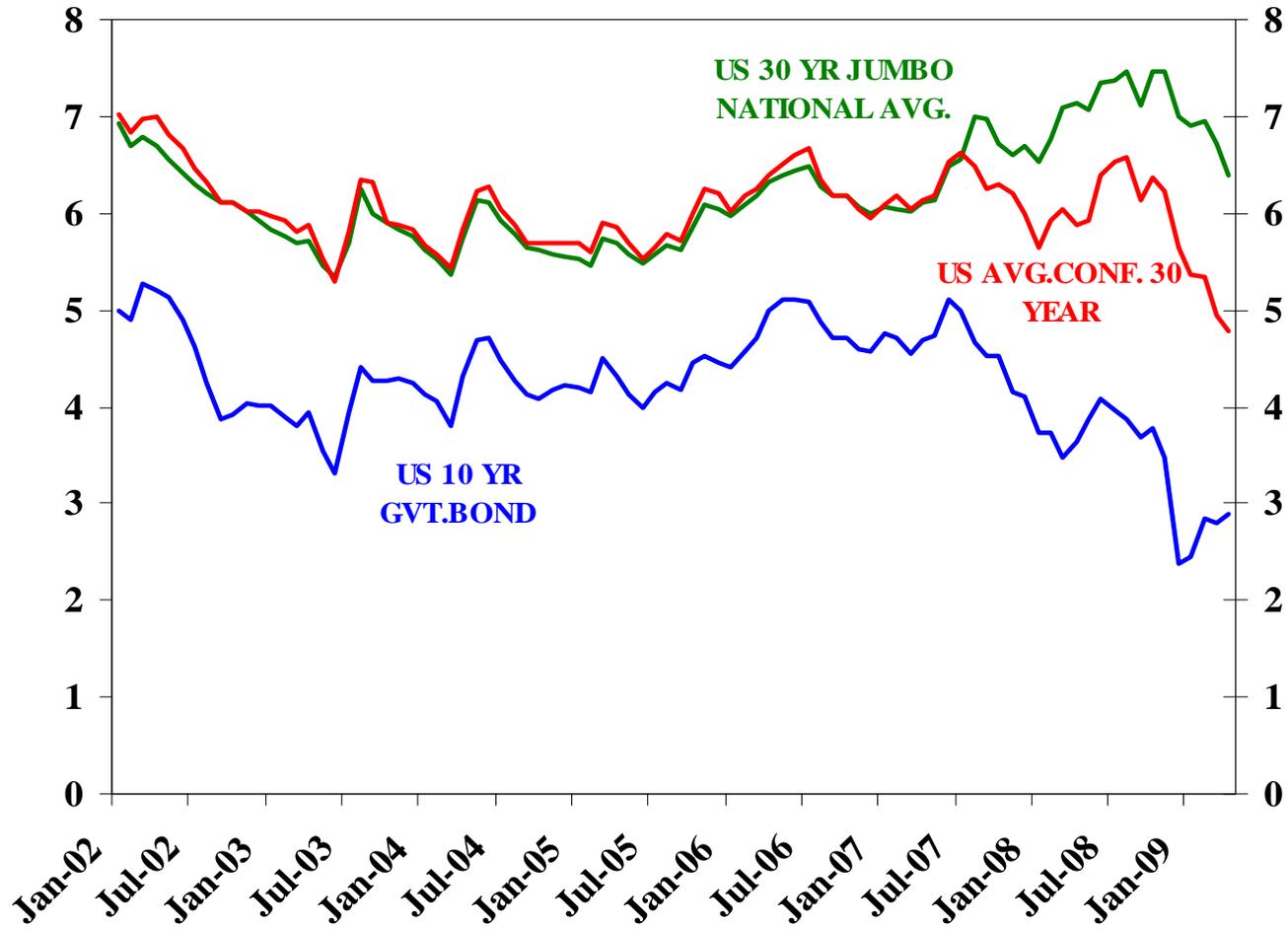Figure 1: U.S. Long-Term Rates

Figure 2: Spreads Between Conforming Rate and Government Rate, and Between Jumbo Rate and Conforming Rate
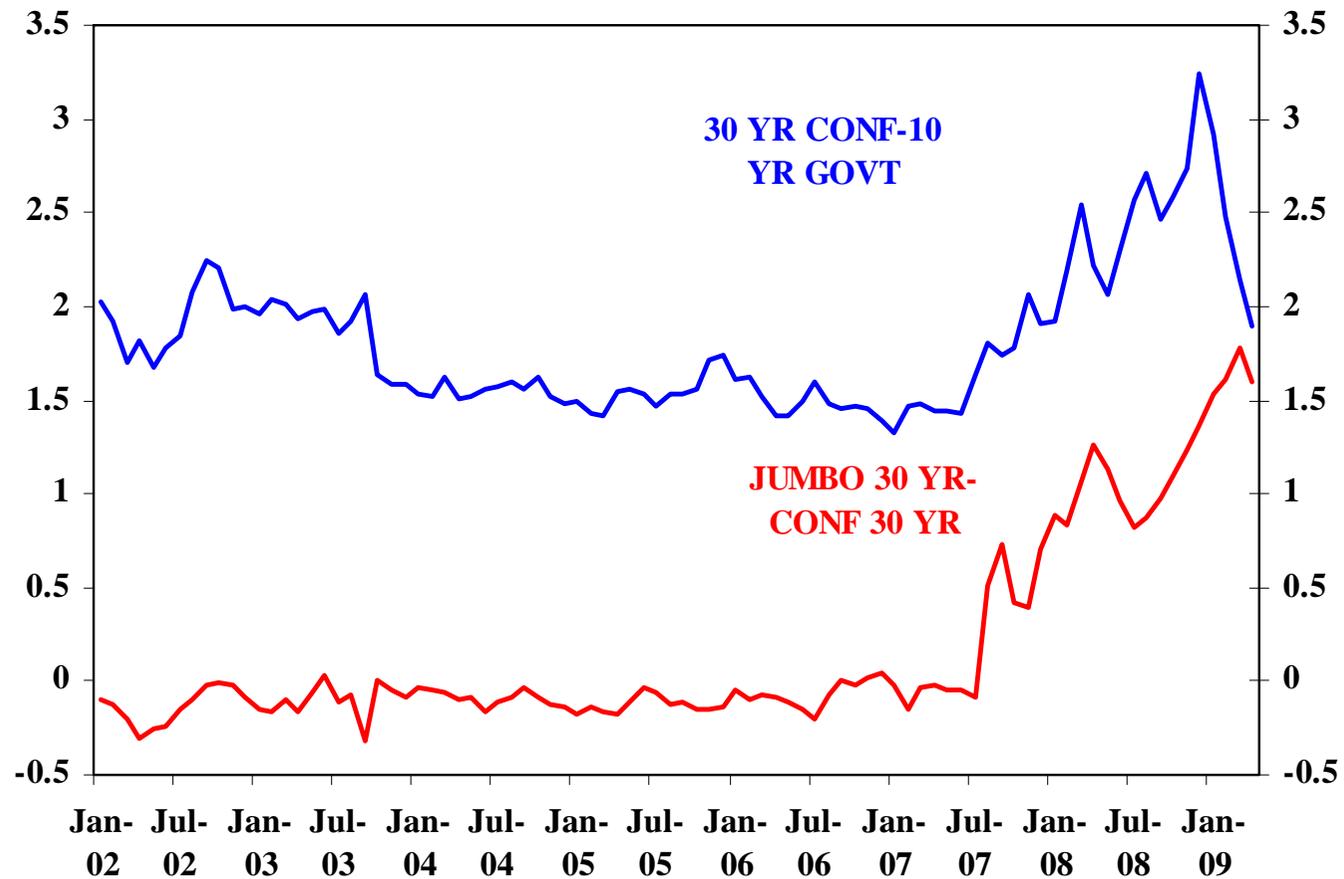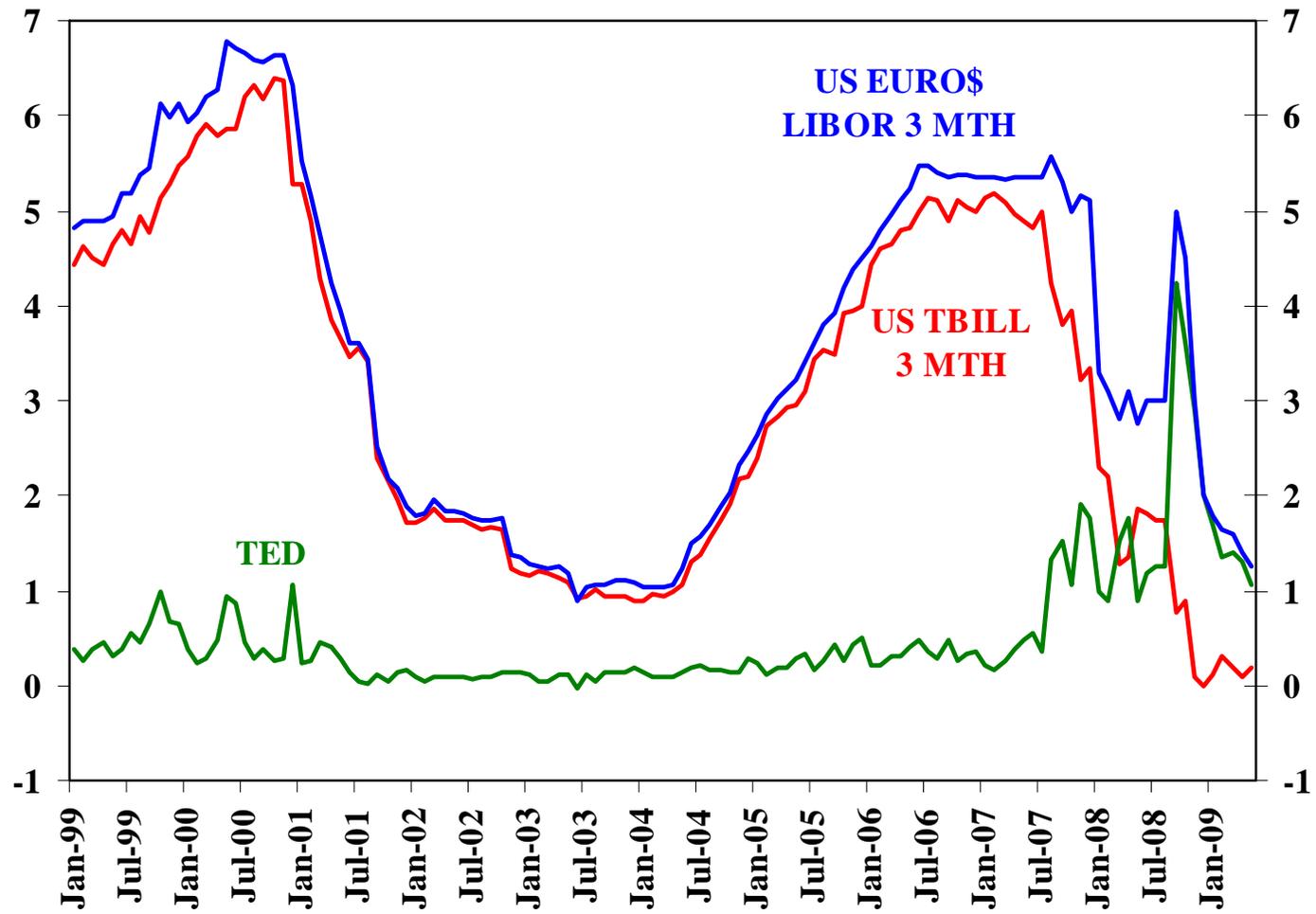
Figure 3: TED-Spread

- In response to financial crisis and economic downturn, both monetary and fiscal actions

- Central banks have reduced policy interest rates almost to zero and have announced non-conventional measures

- Fiscal authorities have engaged in large-scale stimulus

- This paper focuses on two types of issues related to actions by the authorities

    - first, the effects of the non-conventional monetary policy measures on the economy

- second, the effects of concerns about fiscal sustainability on the economy

• Uses model simulations to examine these issues

- Global projection model (GPM) for the first set of issues

- Global Integrated Monetary Fiscal Model (GIMF) for the second set of issues

• In process of adding fiscal sector to GPM, which will allow it to address fiscal issues in addition to monetary issues
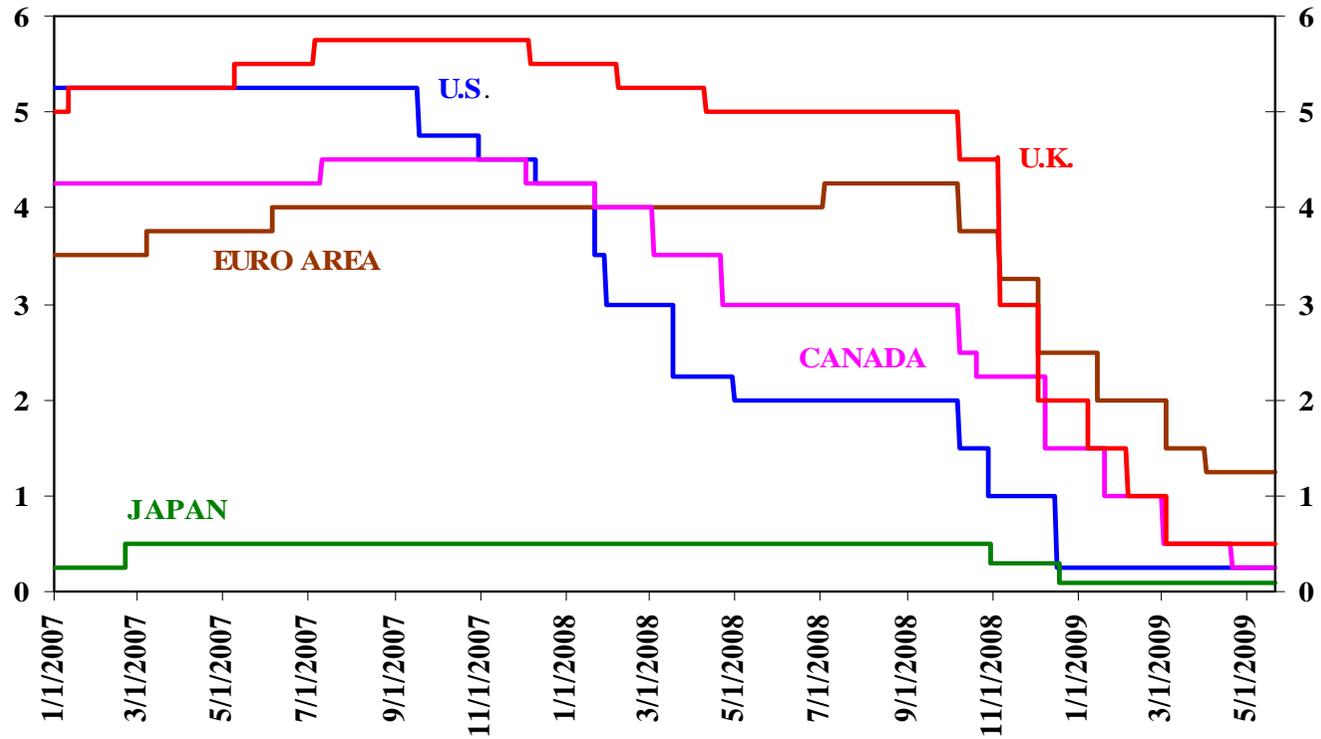
Figure 4: Central Bank Policy Rates

Figure 5: Amounts of Discretionary Fiscal Stimulus Actions for G20 Countries

(In percent of GDP, relative to 2007 baseline)

Legend: 2009, 2010

X-axis: Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Korea, Mexico, Russia, Saudi Arabia, South Africa, Spain, Turkey, United Kingdom, United States
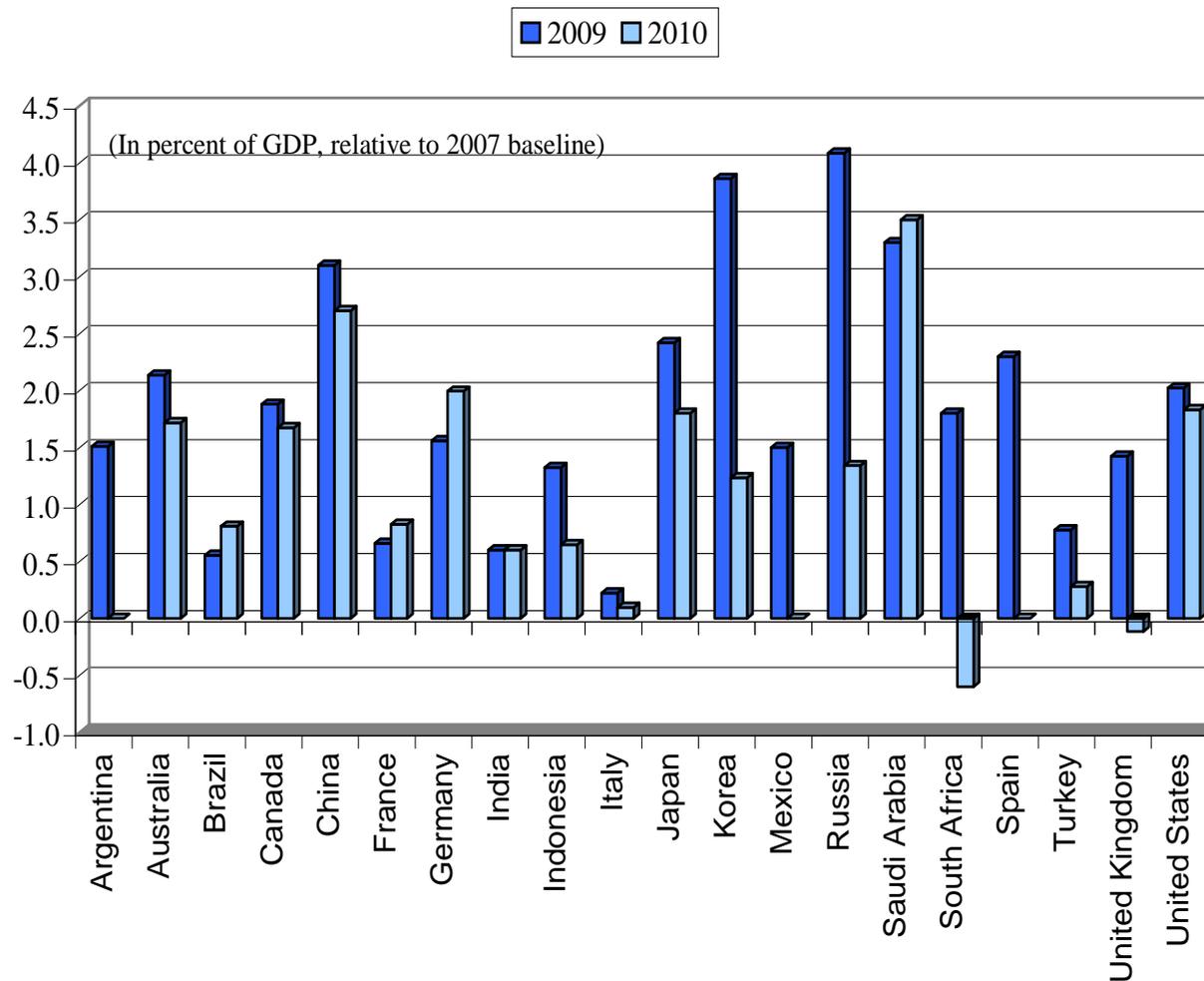
Source: IMF staff estimates.

2 Non-conventional monetary policy

- Bernanke, Reinhart and Sack (2004) discuss three types of "non-standard" monetary policies

  -communications policies to shape expectations about future path of interest
rates

  -increasing the size of central bank's balance sheet or "quantitative easing"

  -changing the composition of the central bank's balance sheet (which has since
come to be known as qualitative or credit easing)

- Buiter has similarly defined **quantitative easing** as an increase in the size of the balance sheet of the central bank through an increase in its monetary liabilities (base money), holding constant the composition of its assets and **qualitative easing** as a shift in the composition of the assets of the central bank towards less liquid and riskier assets, holding constant the size of the balance sheet and the official policy rate

2.1 Quantitative easing

- How was policy of quantitative easing assumed to work in situation without financial sector problems?

- In textbook version of transmission mechanism, increase of reserves was viewed as leading to expansion of assets of banking system as banks used excess reserves to purchase interest-earning assets and to extend loans, thereby leading to reduction of interest rates on such assets

- However, with interest rates on very short-term assets close to zero because of weakness in economy, commercial banks likely not to purchase riskier assets and extend loans, but would purchase riskless short-term assets or simply leave excess reserves at central bank

- Example of Japanese experience – zero interest rate policy in late 1990s and subsequently quantitative easing (2001-2006)

- Even more likely to be the case if financial sector not functioning well, since banks then more reluctant to purchase riskier assets

- Thus, with interest rates at zero lower bound, quantitative easing not likely to have much effect whether financial sector functioning well or not

Figure 6: Japan: Monetary Aggregates
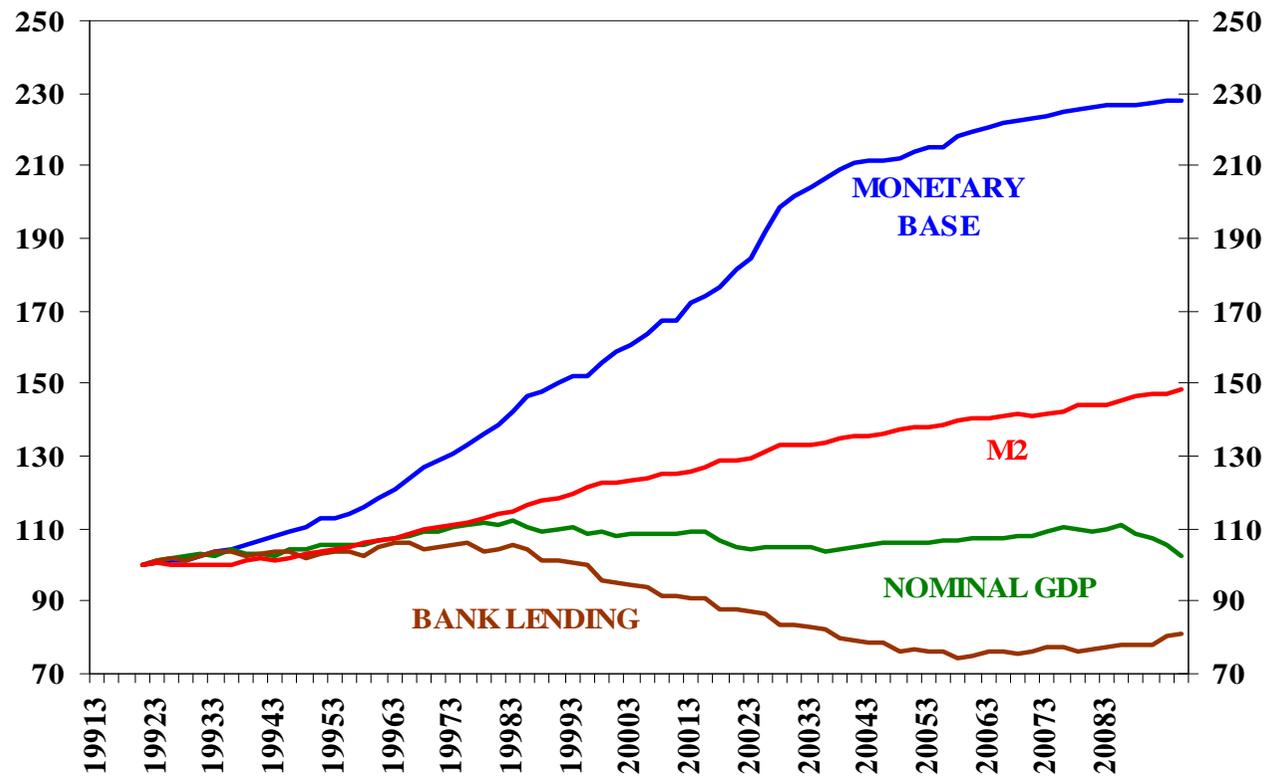
2.2 Qualitative or credit easing

- Qualitative or credit easing relies on purchases by **central bank** of specific assets or asset classes (with offsetting sales of other less-risky assets or equivalent techniques to maintain constant base) as opposed to asset purchases by **commercial banks** that play central role in quantitative easing

- In normal times, with well-functioning financial sector, effect of such actions not likely to be very large unless imperfect asset substitutability

- That is, in case of high degree of asset substitutability, volume of private-sector holdings of specific assets does not play important role in interest rate determination

- In such circumstances, expectations of future path of short-term rates most important determinant of long-term interest rates

- However, when financial sector not functioning well, qualitative easing more likely to be effective since imperfect substitutability across asset classes

- Principal mechanism is through changes in volume of holdings by public, which influence size of various types of risk premium

- Moreover, in circumstances of financial crisis, central bank actions could improve liquidity of markets that were functioning badly or had ceased functioning

- Actions by central bank might also affect risk premiums directly via expectations (e.g., purchases of longer-term assets by central bank might buttress commitment to hold policy interest rate near zero for long period of time)

- Difficult to disentangle these various factors

- Fed has introduced a number of mechanisms over crisis period

- In some, Fed buys assets directly

- In others, Fed makes loans enabling financial entities to buy specific kinds of assets

- And some facilitate sale of liabilities by financial entities (e.g., commercial paper) that permit them to buy other types of assets

- Objectives in all cases are to reduce risk premiums and to restore functioning of markets

Alphabet soup of measures

- AMLF Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility

- CPFF Commercial Paper Funding Facility

- MMIFF Money Market Investor Funding Facility

- PDCF Primary Dealer Credit Facility

- TAF Term Auction Facility

- TALF Term Asset-Backed Securities Loan Facility

- TSLF Term Securities Lending Facility

- Event studies indicate that announcement by central banks of specific types of measures have effect on those interest rates at which measures directed

- Also, some indication that such effects spill over into interest rates on other asset classes that are similar to targeted asset class

- On the surface, former result seems to indicate imperfect asset substitutability while latter seems to indicate near-perfect asset substitutability

- Can reconcile results by hypothesizing that high degree of asset substitutability in some respects but not in others

- For example, purchases of longer-term assets as direct or indirect result of Fed measures could reduce term premiums on both government bonds and private sector obligations, but would not necessarily have any effect on credit risk premiums

- Figure 7 shows effect on UK rates of March 5 announcement that authorized Bank of England to purchase up to £150 billion in financial assets (£100 billion for gilts and £50 billion for private debt instruments) and of effect on US rates of March 18 announcement by FOMC of increased purchases of agency debt and agency MBS and the initiation of special purchases of longer-term Treasury securities

Figure 7: 10-Year Government Bond Yields

(in percent)

5/5/2009
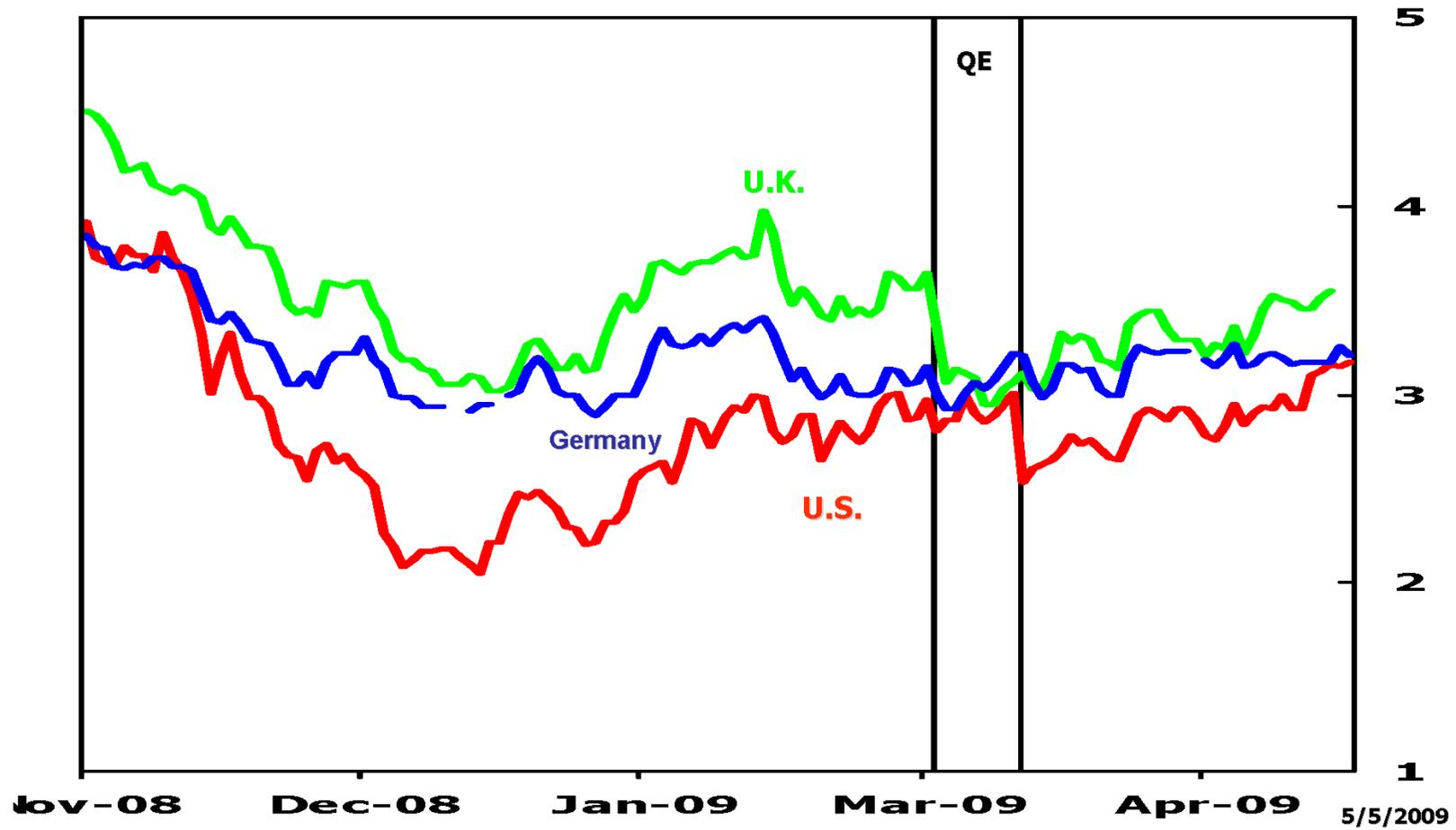
Some Fed announcements

- November 25, 2008 – Fed announces planned purchases of agency debt and agency MBS

- December 1, 2008 – Bernanke confirms plans to purchase agency MBS and agency debt and raises possibility of buying longer-term Treasury securities

- December 16, 2008 – FOMC states that it is ready to expand purchases of agency debt and MBS and that it is evaluating potential benefits of purchasing longer-term Treasury securities

- January 28, 2009 – FOMC reiterates statement regarding agency debt and agency MBS and that it was prepared to purchase longer-term Treasury securities if it seemed likely that such purchases would improve conditions in private credit markets

- March 18, 2009 – FOMC announces increased purchases of agency debt and MBS and initiation of substantial purchases of longer-term Treasury securities

Effect of Fed announcements

- Examined effect Fed announcements on rates of a number of US financial instruments

- Used simple technique – change in interest rates from day preceding announcement to day following announcement (i.e., two-day window)

- Table 1 shows the effects for each event, the sum of the effects for all five events, and the change over the full period November 25, 2008 through April 21, 2009

- All announcements except January 28 had downward effect on long-term interest rates although not much effect on short-term interest rates

- January 28 announcement may have led to marking down of market expectations of Fed purchases of longer-term Treasury securities

- Considerable degree of correlation among changes in longer-term Treasuries, MBS, and agency debt, considerable spillover medium-term corporateAA debt, even though it was not targeted

- As shown in figure 8, the announcements by the Fed affected the US 10 year government bond yields and in some cases (but not all) affected the corresponding UK and German bond yields

- Figure 9 shows that announcements resulting in declines in US long-term interest rates were typically associated with depreciation of the US dollar against the euro

- And the January 28 announcement that led to an increase in US long-term interest rates was accompanied by a small appreciation of the US dollar

Table 1: Net Interest Rate Movements, Nov.25 through April 21 (basis points)

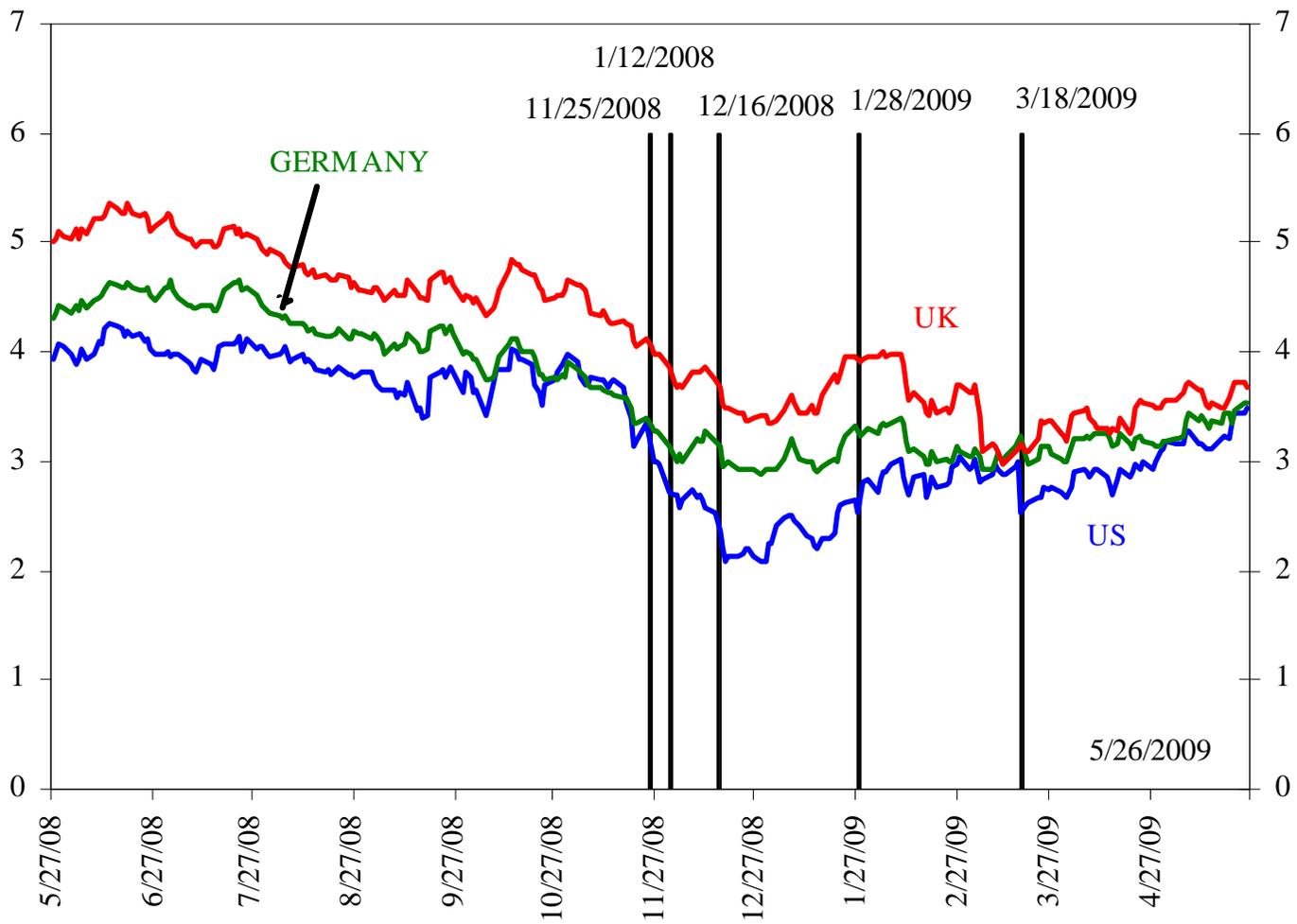|	25-Nov	1-Dec	16-Dec	28-Jan	18-Mar	event sum	full period
6-Month Treasury	3	-1	-2	1	-6	-5	-12
12-Month Treasury	-1	-14	-2	3	-11	-25	-41
10-Year Treasury	-35	-25	-32	33	-40	-99	-49
10-Year Swap	-35	-22	-36	35	-31	-89	-52
Merrill Lynch 10-Year Agency	-72	-60	-40	31	-45	-186	-136
Merrill Lynch 30-Year MBS current coupon	-64	-13	-69	49	18	-79	-151
Corp AA - 5-7 years	-35	-18	-37	19	-41	-112	-178

Figure 8: 10-Year Government Bond Yields

Figure 9: 10-Year Government Bond Yields and U.S. Dollar/Euro Exchange Rate
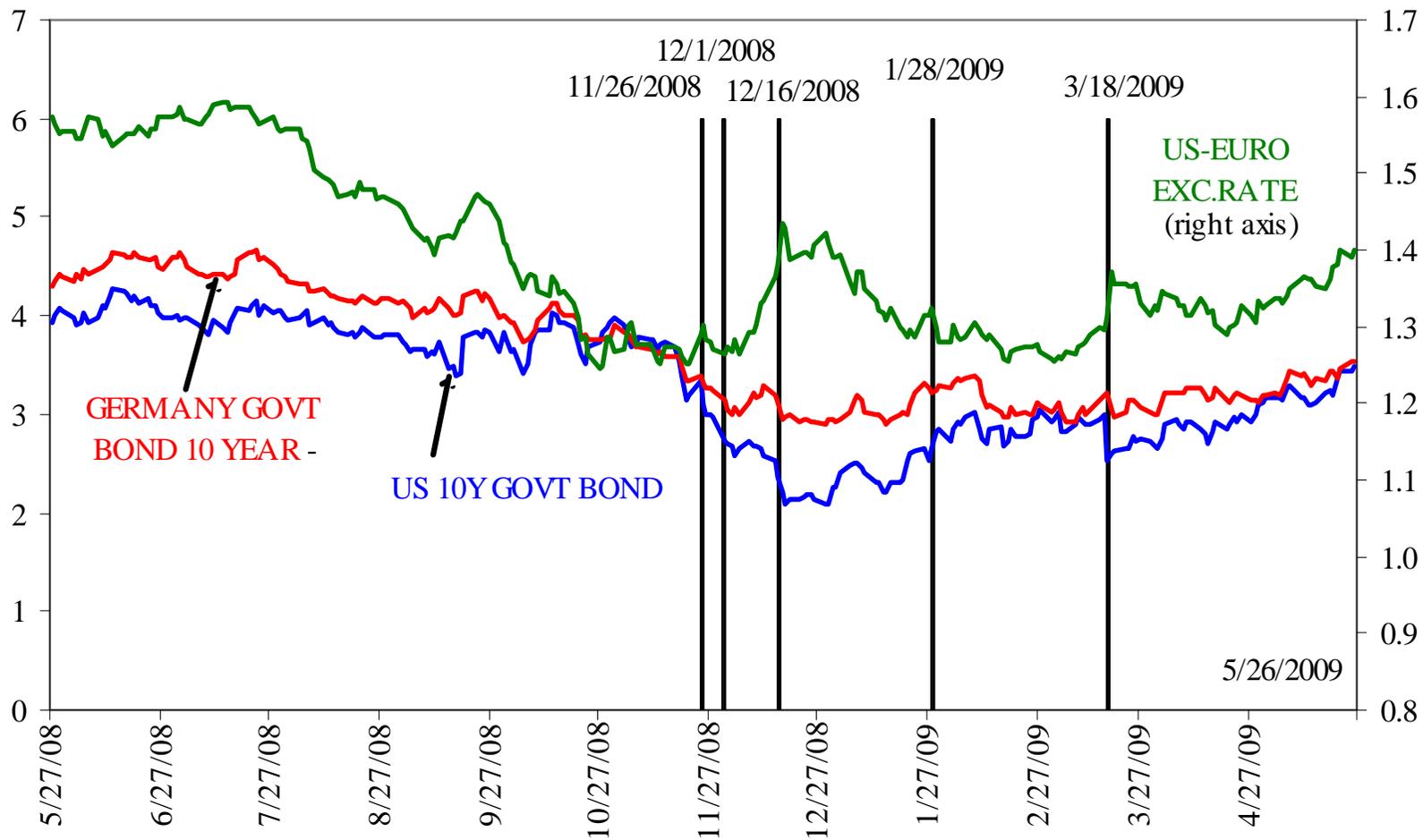
Modeling the effect of change in risk premiums

- Modeling work using QPM can examine effects of changes in risk premiums

- Simulations in this part of paper focus on changes in term premiums as the direct or indirect result of non-conventional central bank actions

- But they do not distinguish between purchases of risky assets by the central bank as part of credit easing and purchases of risky assets by commercial banks in response to quantitative easing

- Also, not yet able to estimate link between volume of central bank actions and size of changes in risk premiums, the first step in this transmission mechanism

The Global Projection Model (GPM)

- Multi-country gap model estimated with Bayesian techniques

- Began with US version, added financial variable (BLT), then euro area and Japanese economies, subsequently oil prices, then other economies

- Flexible stochastic processes and cross correlations of disturbances

- Version used for this study also adds term structure of interest rates on government and private sector debt (mortgages), thereby allowing for term and credit risk premiums

Shocks

GLOBAL PROJECTION MODEL
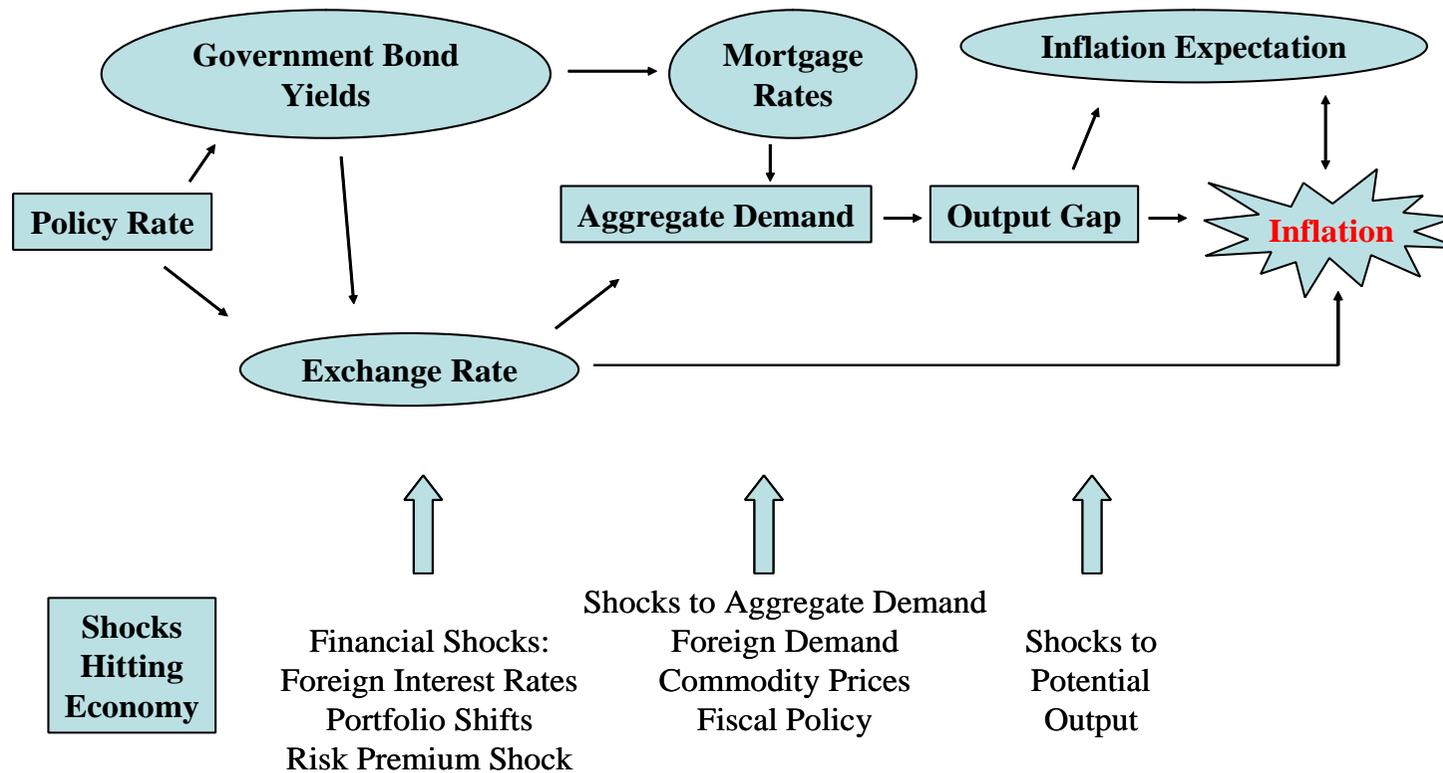
Description of GPM

- Begin description with simplest version model and then add other elements

- (See IMF Working Papers 08/278, 08/279, 08/280 and 09/85 for details of earlier versions of model.)

- Will introduce term structure of interest rates on government and private sector debt at end of discussion of earlier versions

Key endogenous variables – output gap, inflation, policy interest rate, exchange rates, unemployment rate

- *Inflation* function of: (a) backward and forward-looking components; (b) output gap; (c) change in real effective exchange rate; and (d) supply shock

- *Output gap* function of: (a) backward and forward-looking components; (b) real interest rate gap; (c) effective real exchange rate gap; (d) foreign output gap; (e) demand shock

- *Policy interest rate* function of: (a) expected 1-year-ahead Y-O-Y inflation gap; (b) output gap; (c) inertia; (d) discretionary or random component of monetary policy

- *Expected change in real exchange rate* function of: (a) real interest rate differential; (b) equilibrium risk premium; (c) risk premium shock

- *Unemployment rate gap* function of: (a) output gap; (b) inertia; (c) shock

Key stochastic processes – NAIRU; potential output; equilibrium real interest rate; equilibrium real exchange rate

- *NAIRU* function of: (a) level shocks to NAIRU; (b) shock to NAIRU growth

- *Potential output* function of: (a) level shocks to potential output; (b) persistence in deviations of potential growth from long-run growth; (c) shocks to potential output growth

- *Equilibrium real interest rate* function of: (a) persistence in deviations of equlibrium real interest rate from its steady-state rate; (b) shock

- *Equilibrium real exchange rate* random walk (for industrialized economies)

The Model with BLT

- Stronger macro-financial linkages

- Bank Lending Tightening (BLT) index

- Simple measure based on Fed's Senior Loan Officer Survey

- Unweighted average of commercial and industrial loans for large firms, commercial and industrial loans for small firms, commercial real estate loans, nad residential mortgage loans (RM_t)

# Figure 10: Bank Lending Tightening

(In percent)

— Average
— Loans to large firms
--- Loans to small firms
— Commercial real estate loans
--- Residential mortgages
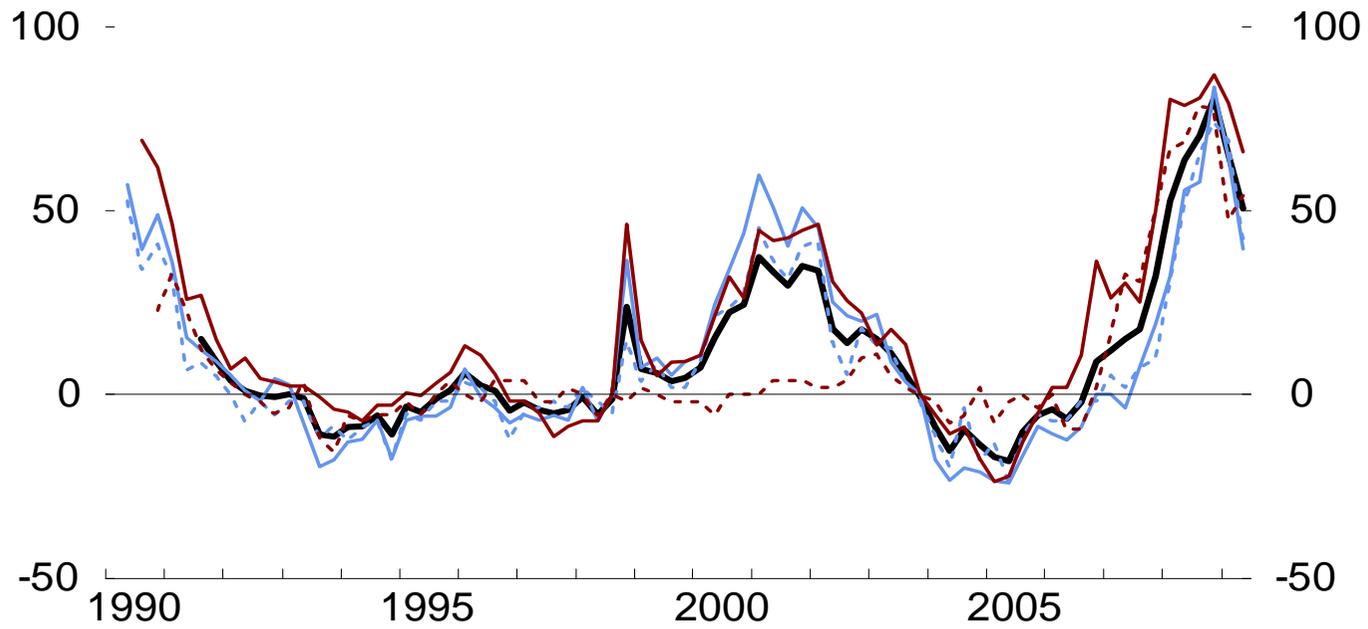
Model Extensions for Macro-financial linkages

- BLT depends on its equilibrium level and expected output gap one year ahead

- Equilibrium BLT random walk

- Distributed lag of innovations in BLT equation affects output gap

Figure 11: Bank Lending Tightening and the U.S. Output Gap

(In percent)
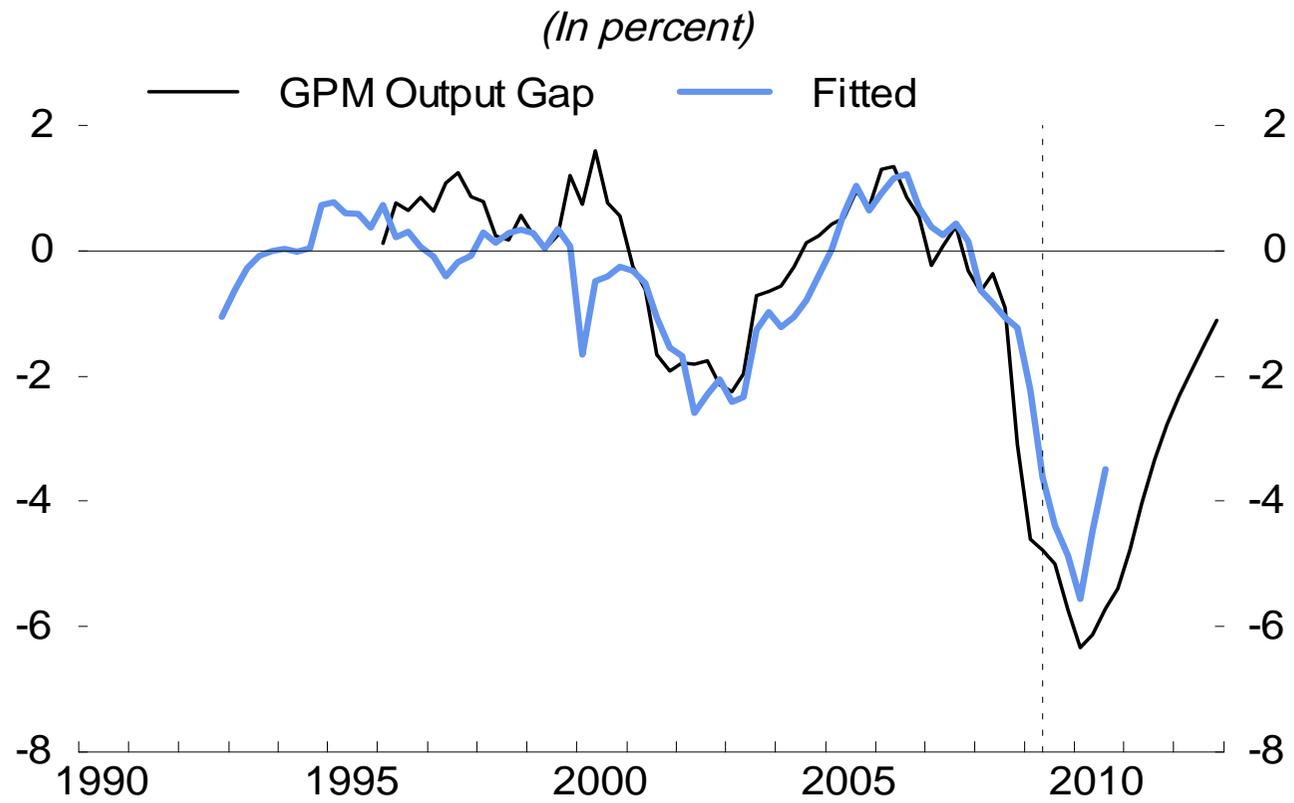
Cross correlations of disturbances

- Three types of cross correlations

- Supply shock to level of potential output negatively correlated with inflation shock

- Supply shock to potential output growth positively correlated with output gap shock (euro area, Japan)

- Supply shock to potential output growth negatively correlated with BLT shock, i.e., easing lending conditions (US)

Version of model with additional interest rates

- Developed version of model used in this paper (GPM3QE) to examine effects on output, inflation, interest rates and exchange rates of changes in risk premiums on government bond yields and private sector interest rates

- Mortgage rates used as proxy for interest rates faced by households and businesses

- Added equations for government bond yields for 4 maturities (90 day, 1 Year, 3 Years and 10 Years)

- Added equations for mortgage rates for 3 maturities (1 Year, 3 Years and 10 Years)

- Changed the output gap equation to include a weighted average of real mortgage rates (40% 1 year, 40 % 3 Years and 20% 10 Years) This is front loaded to proxy rates on consumer loans, credit cards etc.

- Recoded the Risk-Adjusted Interest Parity Equation to include 90-day goverment bond yields instead of the policy rate.

- Did not reestimate the full model (111 parameters) and all latent variables, but only the new parameters (steady-state risk premia, serial correlation in risk premia shocks, and parameters on real interest rate in the output gap equation)

New equations and changes in equations in GPM3QE

- 90-Day T-Bill Rate depends on Fed funds rate and serially-correlated risk premium shock

- Longer-term government bond rates based on expectations theory of term structure plus term risk premiums

- 1-year (4 quarter) government bond yield function of expected 90-day T-Bill rate and serially correlated process for risk premium that allows for highly persistent deviations from steady-state risk premium

- Similar equations for 3-year and 10-year bonds

- Mortgage rates in each country (1-year, 3-year and 10-year) function of government bond yields of the same maturity plus a time varying risk premium

- Gaps of weighted average of real mortgage rates (40% 1 year, 40 % 3 Years and 20% 10 Years) from equilibrium entered into output gap equation

Main GPM Results

- Estimate GPM with Bayesian techniques

- Model produces competitive medium-term forecasts and sensible IRFs

- Model had been predicting significant weakness in U.S., European and Japanese economies by September of last year—led downward revisions to growth by Consensus

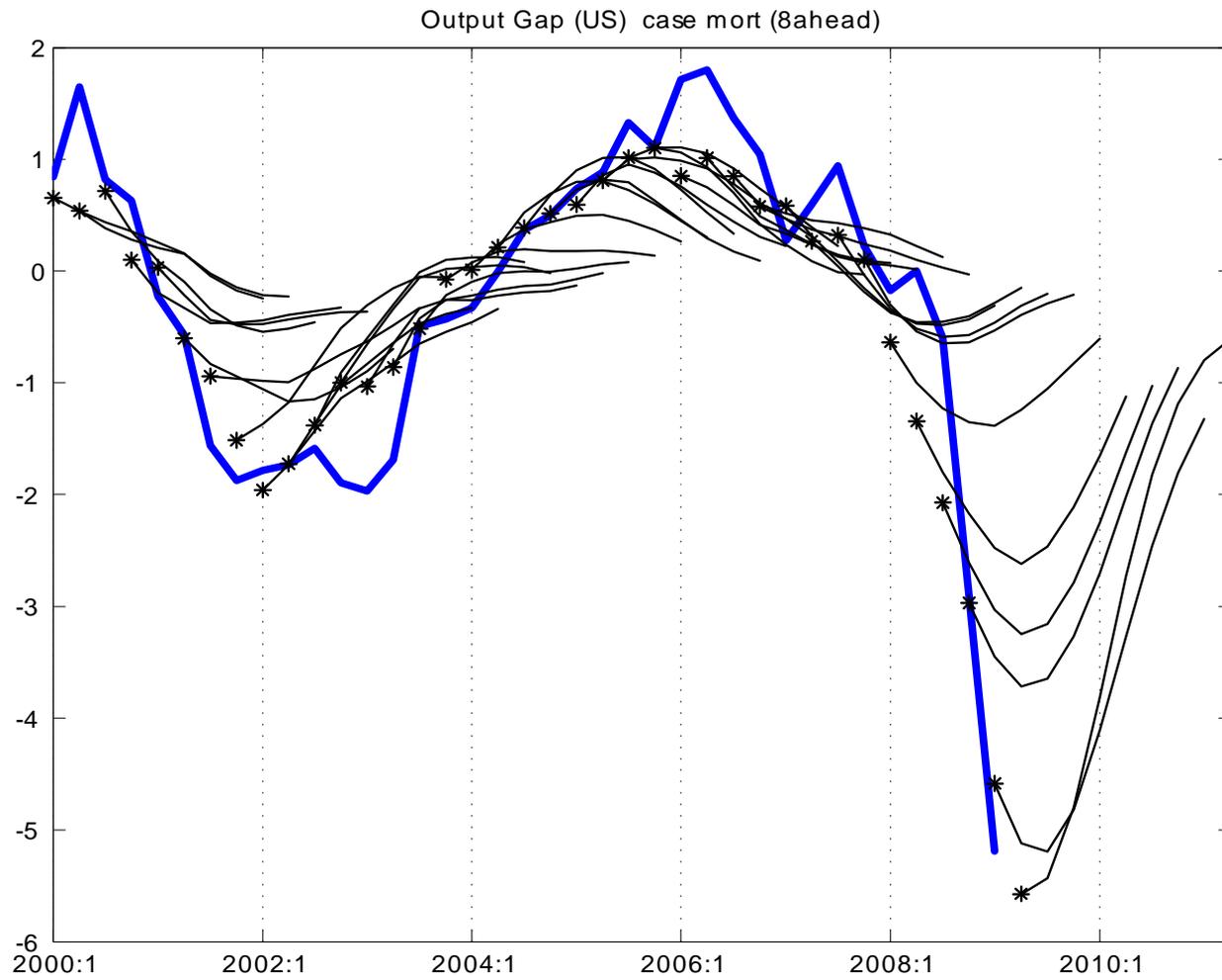- BLT very helpful in forecasts

Figure 12: U.S. Output Gap Forecasts

Output Gap (US) case mort (8ahead)
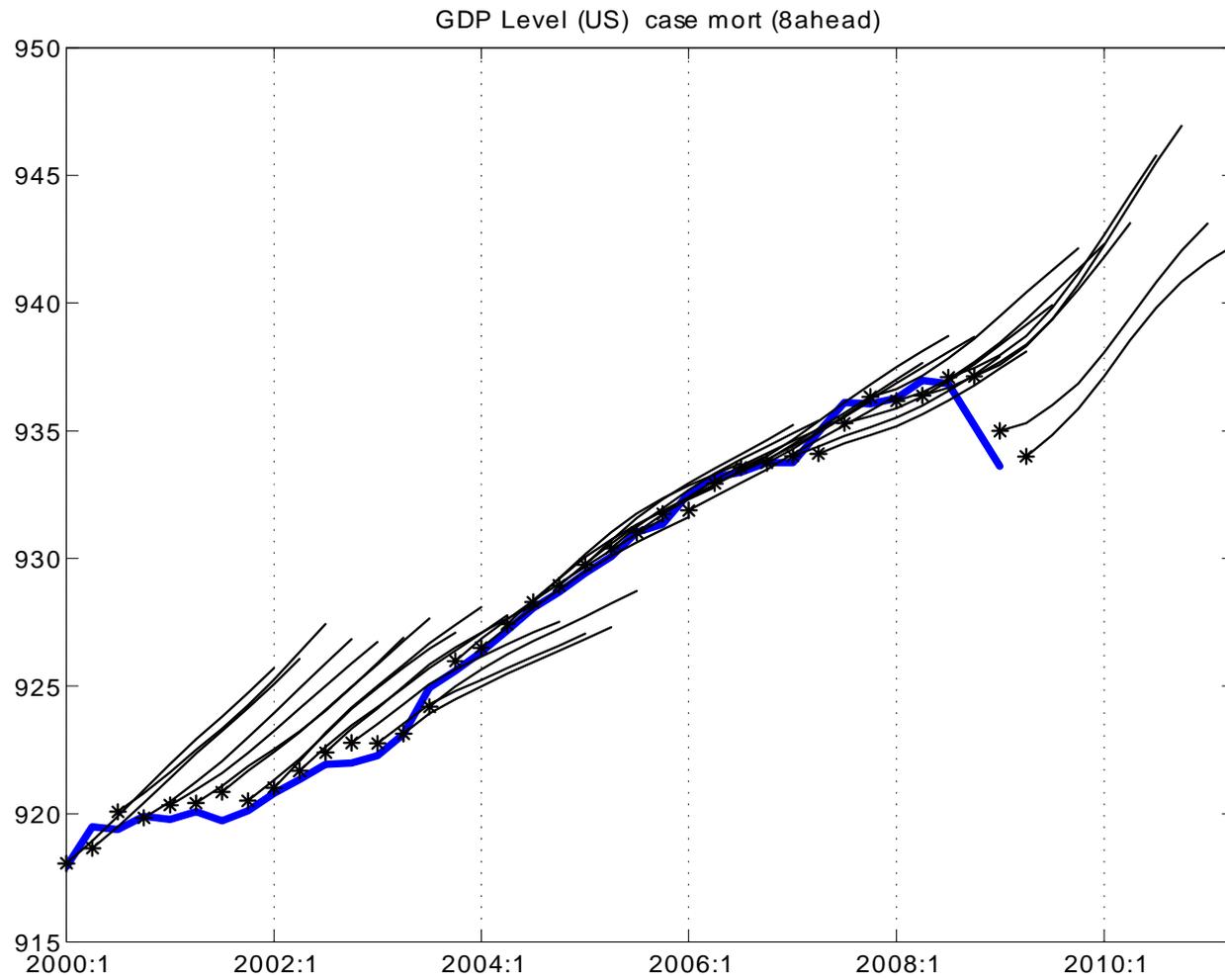
Figure 13: U.S. GDP Forecasts

GDP Level (US) case mort (8ahead)

Figure 14: U.S. Unemployment Rate Forecasts

Unemployment Rate (US) case mort (8ahead)
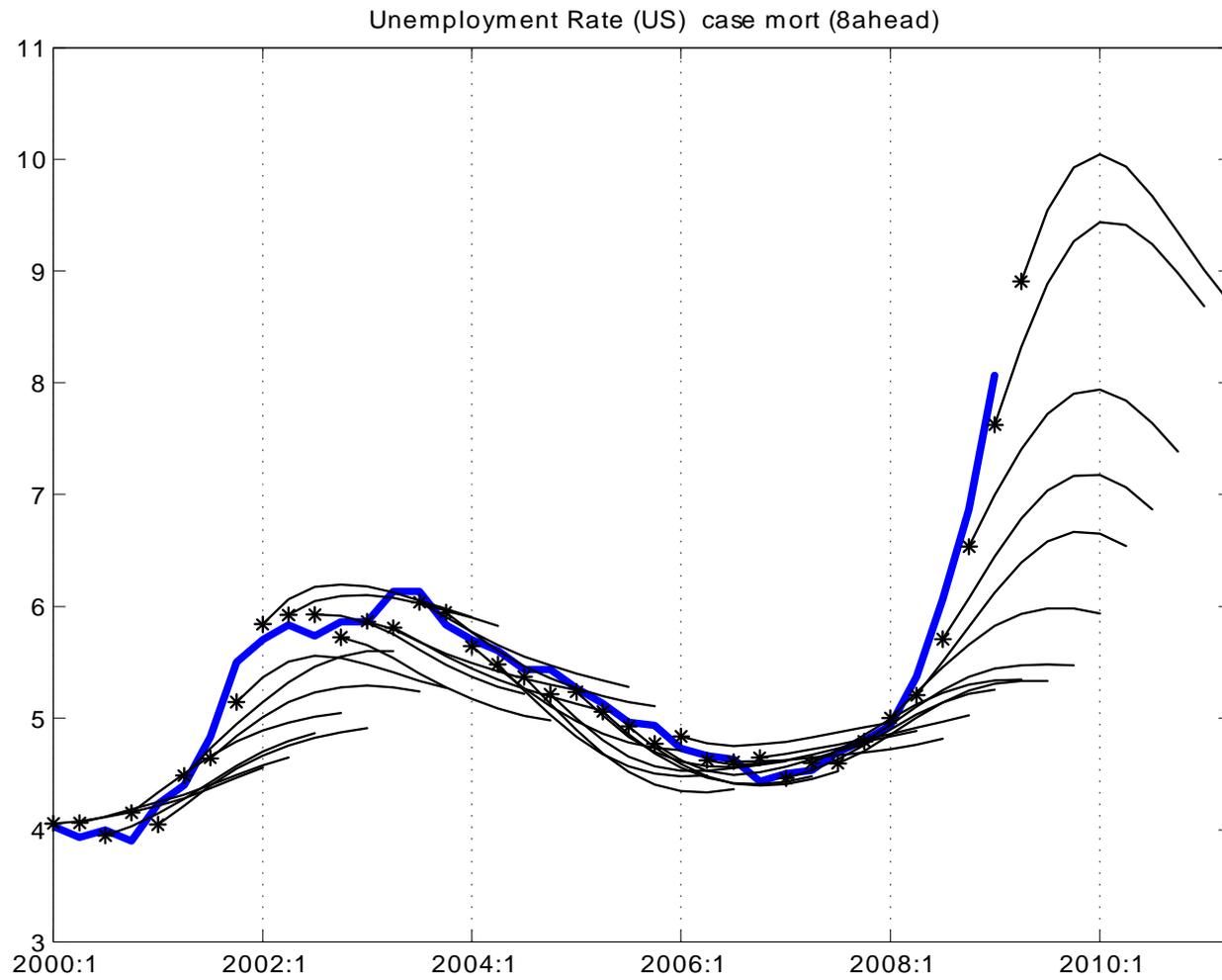
Table 2: Root Mean Squared Errors (till 2007q2)

	1 Q	2 Q	4 Q	8 Q	12 Q
Output Gap US y_{us}	0.48	0.58	0.62	1.09	1.22
GDP Quarterly Growth at annual rates US $4(Y_{us} - Y_{us,-1})$	1.91	2.07	1.98	2.53	2.60
GDP Year-on-Year Growth US $Y_{us} - Y_{us,-4}$	0.48	0.77	1.27	1.47	1.28
Unemployment Rate US U_{us}	0.15	0.23	0.35	0.63	0.70
CPI Year-on-Year Inflation US $\pi 4_{us}$	0.39	0.59	1.05	1.25	1.28
Short-term Interest Rate (RS) US rs_{us}	0.36	0.64	0.98	1.64	1.89
Bank Lending Tightening US BLT_{us}	5.95	9.03	14.40	28.62	31.47
Output Gap EU y_{eu}	0.40	0.46	0.55	0.62	0.76
GDP Quarterly Growth at annual rates EU $4(Y_{eu} - Y_{eu,-1})$	1.38	1.28	1.33	2.15	2.23
GDP Year-on-Year Growth EU $Y_{eu} - Y_{eu,-4}$	0.34	0.60	1.08	1.33	1.35
Unemployment Rate EU U_{eu}	0.08	0.15	0.32	0.70	1.02
CPI Year-on-Year Inflation EU $\pi 4_{eu}$	0.26	0.40	0.74	0.82	0.79
Short-term Interest Rate (RS) EU rs_{eu}	0.15	0.26	0.45	0.59	0.86
Output Gap JA y_{ja}	0.64	0.73	0.91	1.10	1.18
GDP Quarterly Growth at annual rates JA $4(Y_{ja} - Y_{ja,-1})$	2.63	2.27	2.31	3.60	3.75
GDP Year-on-Year Growth JA $Y_{ja} - Y_{ja,-4}$	0.66	0.99	1.32	1.69	1.69
Unemployment Rate JA U_{ja}	0.13	0.18	0.31	0.58	0.82
CPI Year-on-Year Inflation JA $\pi 4_{ja}$	0.28	0.48	0.90	1.02	0.91
Short-term Interest Rate (RS) JA rs_{ja}	0.23	0.40	0.68	1.06	1.25

Table 3: Root Mean Squared Errors (till 2008q4)

|	1 Q	2 Q	4 Q	8 Q	12 Q
Output Gap US y_{us}	0.51	0.58	0.71	1.09	1.22
GDP Quarterly Growth at annual rates US $4(Y_{us} - Y_{us,-1})$	2.27	2.39	2.55	2.53	2.60
GDP Year-on-Year Growth US $Y_{us} - Y_{us,-4}$	0.57	0.82	1.30	1.47	1.28
Unemployment Rate US U_{us}	0.16	0.27	0.43	0.63	0.70
CPI Year-on-Year Inflation US $\pi4_{us}$	0.62	0.74	1.15	1.25	1.28
Short-term Interest Rate (RS) US rs_{us}	0.40	0.69	1.11	1.64	1.89
Bank Lending Tightening US BLT_{us}	6.99	12.83	21.97	28.62	31.47
Output Gap EU y_{eu}	0.45	0.50	0.57	0.62	0.76
GDP Quarterly Growth at annual rates EU $4(Y_{eu} - Y_{eu,-1})$	1.76	1.76	1.99	2.15	2.23
GDP Year-on-Year Growth EU $Y_{eu} - Y_{eu,-4}$	0.44	0.68	1.12	1.33	1.35
Unemployment Rate EU U_{eu}	0.09	0.16	0.33	0.70	1.02
CPI Year-on-Year Inflation EU $\pi4_{eu}$	0.31	0.46	0.81	0.82	0.79
Short-term Interest Rate (RS) EU rs_{eu}	0.20	0.30	0.43	0.59	0.86
Output Gap JA y_{ja}	0.80	0.89	1.02	1.10	1.18
GDP Quarterly Growth at annual rates JA $4(Y_{ja} - Y_{ja,-1})$	3.51	3.26	3.48	3.60	3.75
GDP Year-on-Year Growth JA $Y_{ja} - Y_{ja,-4}$	0.88	1.18	1.54	1.69	1.69
Unemployment Rate JA U_{ja}	0.13	0.17	0.31	0.58	0.82
CPI Year-on-Year Inflation JA $\pi4_{ja}$	0.32	0.49	0.90	1.02	0.91
Short-term Interest Rate (RS) JA rs_{ja}	0.22	0.38	0.67	1.06	1.25

Figure 15: Growth rate shock in the US (1)
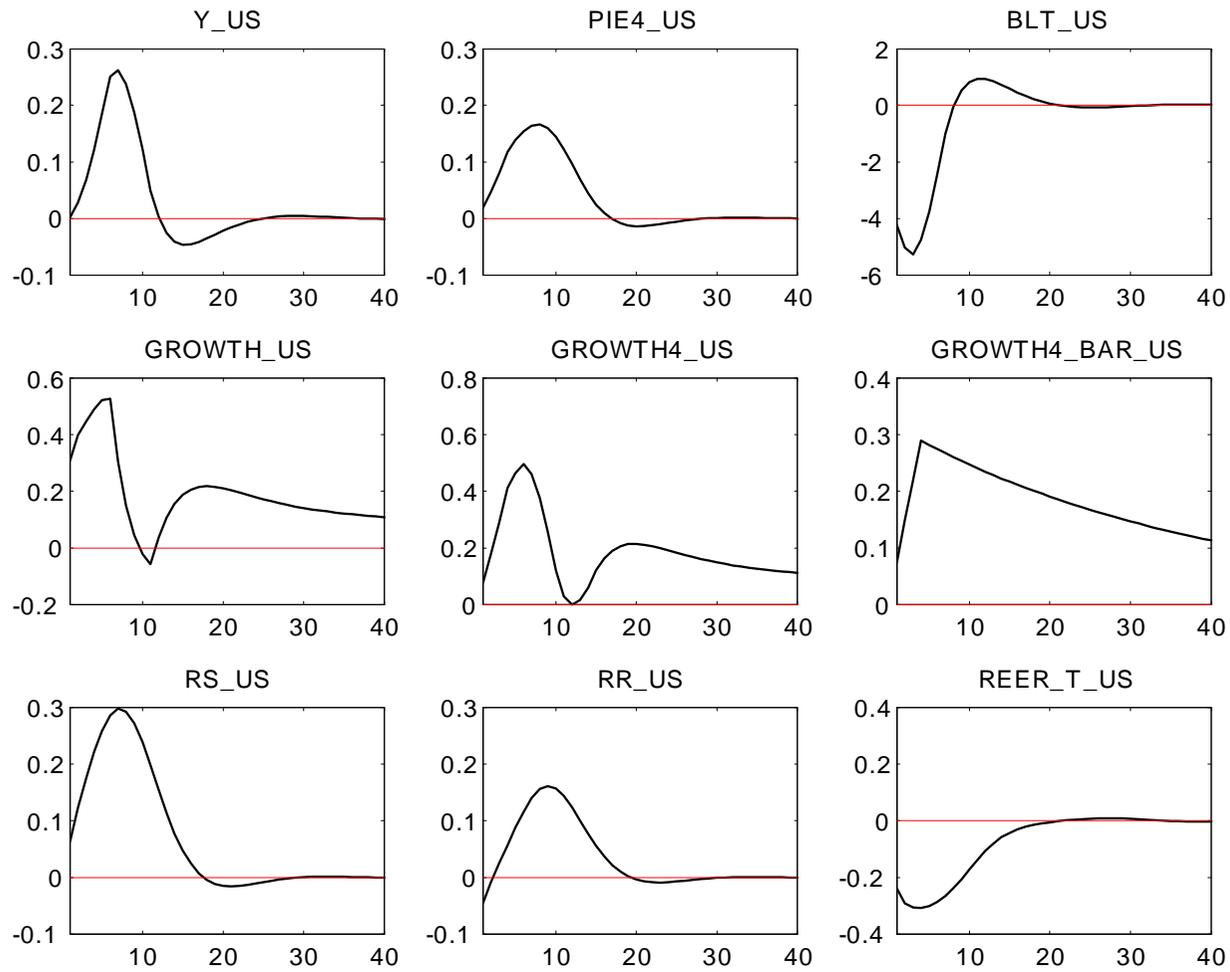
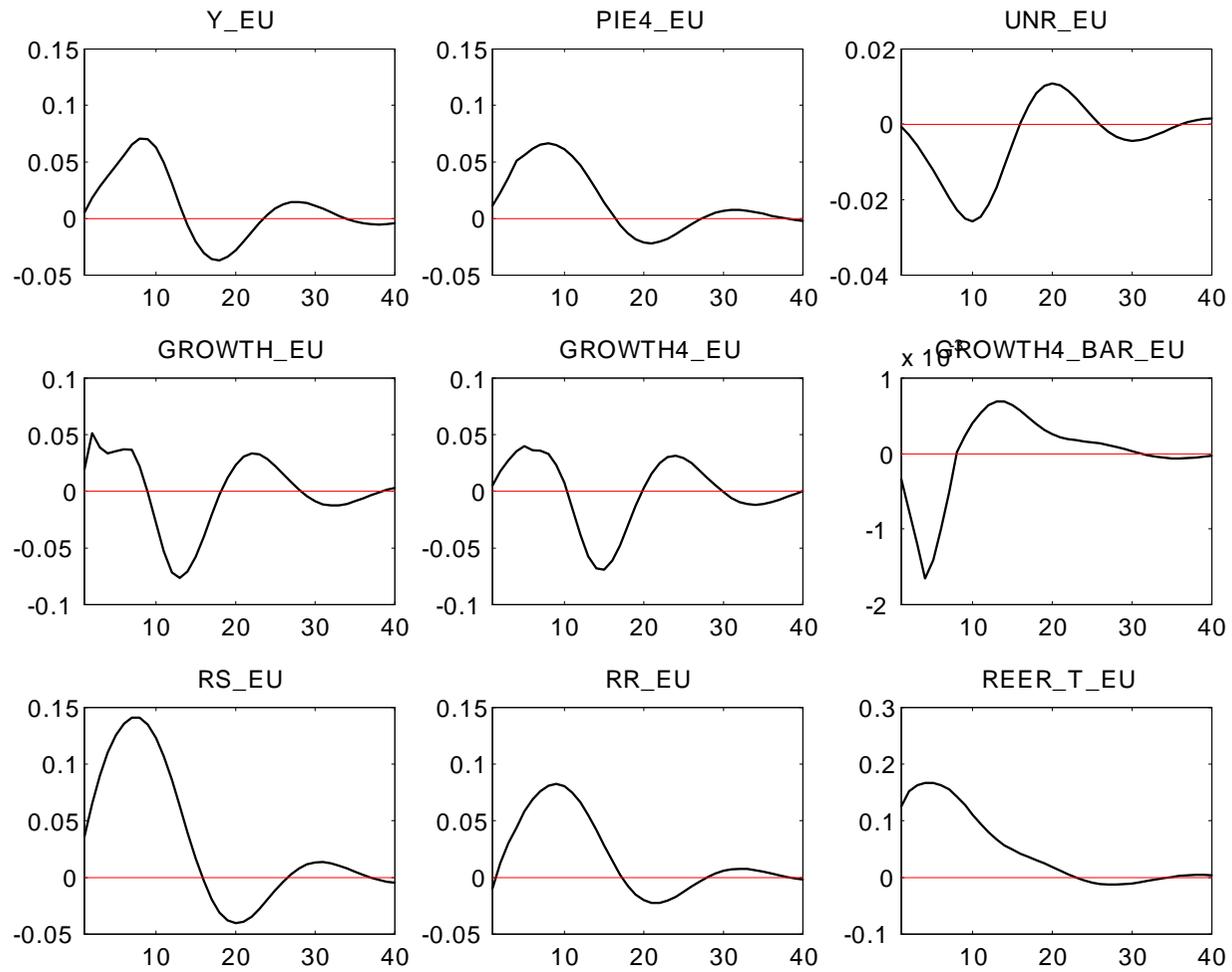# Figure 16: Growth rate shock in the US (2)

Figure 17: Growth rate shock in the US (3)

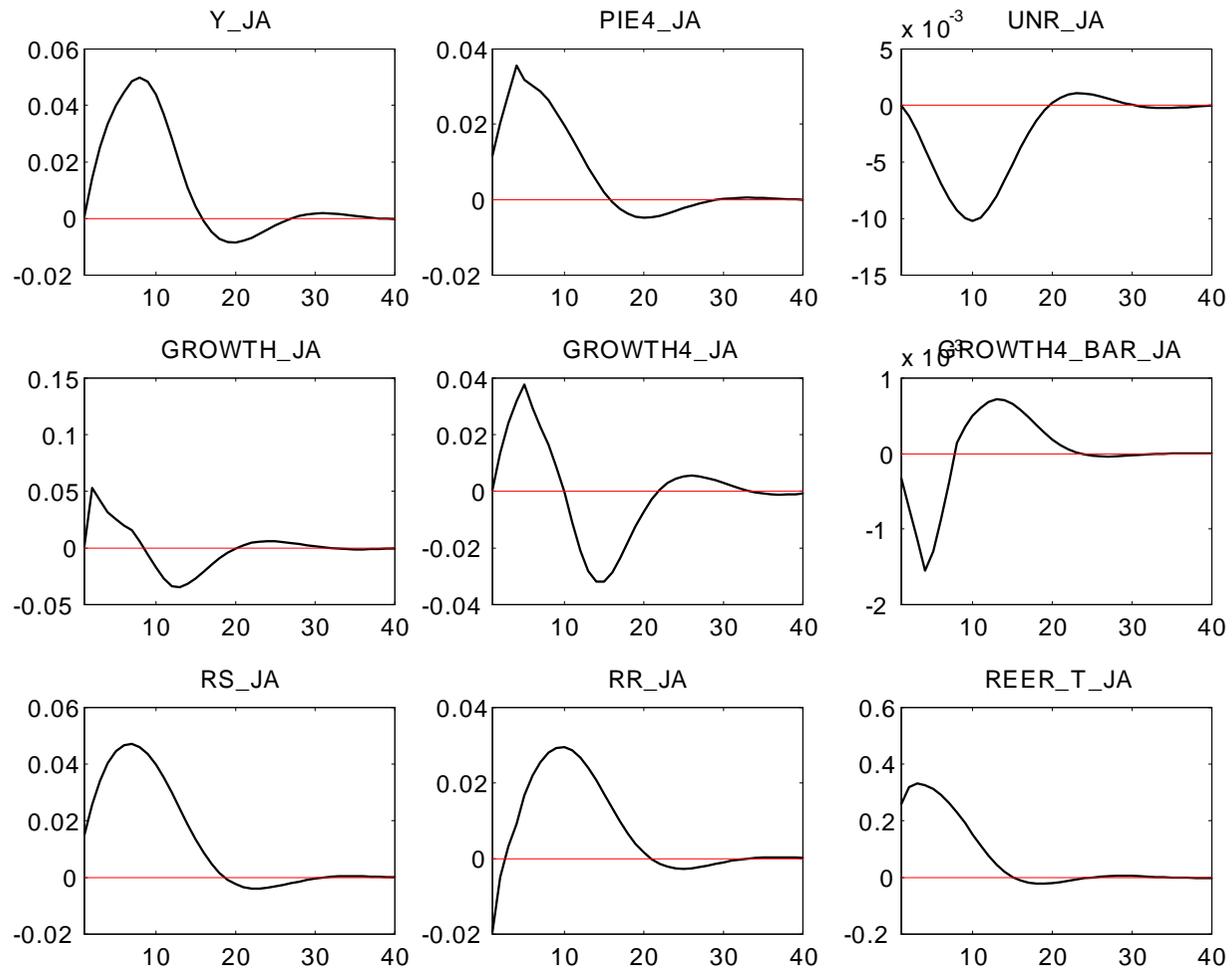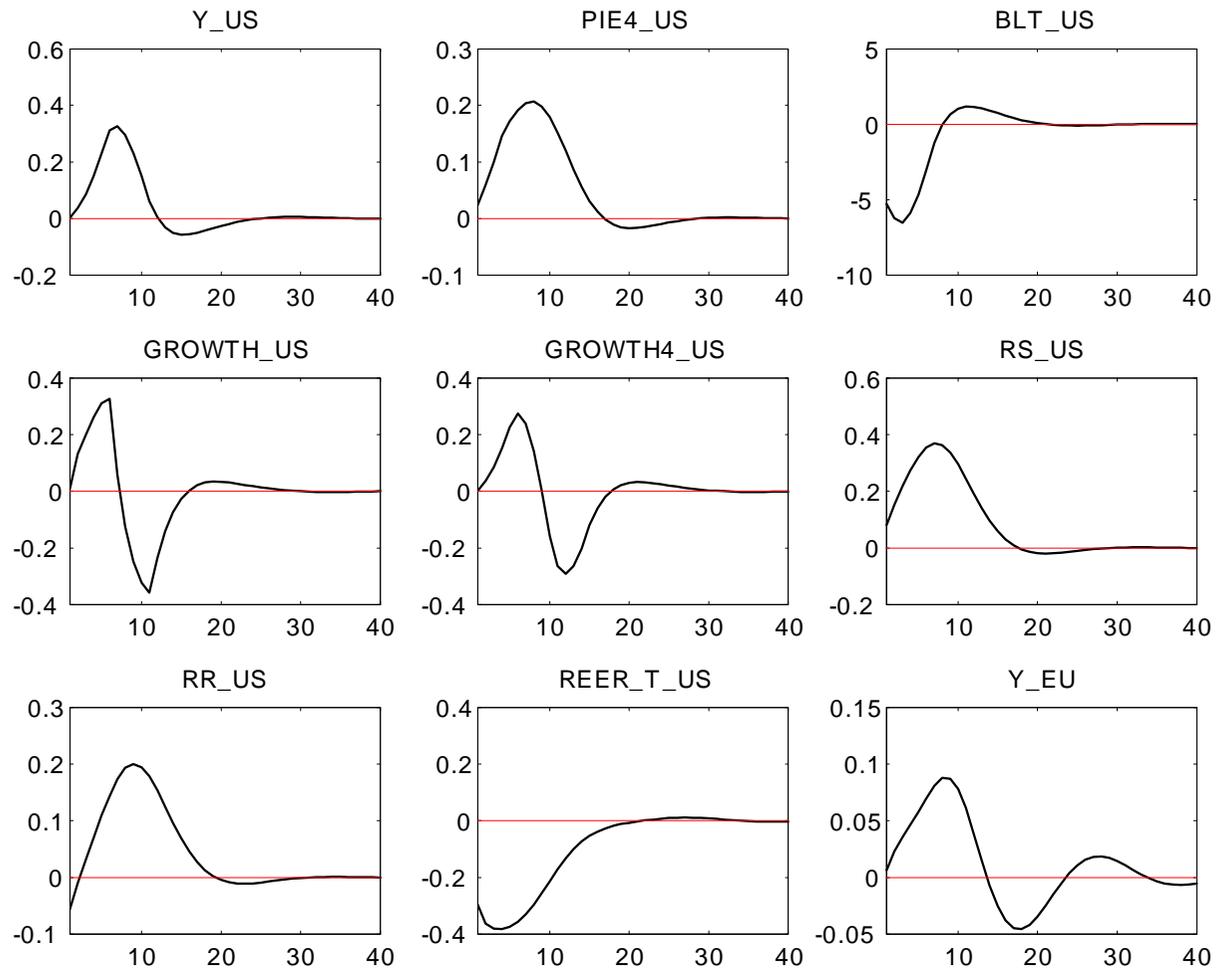# Figure 18: Financial (BLT) shock in the US (1)
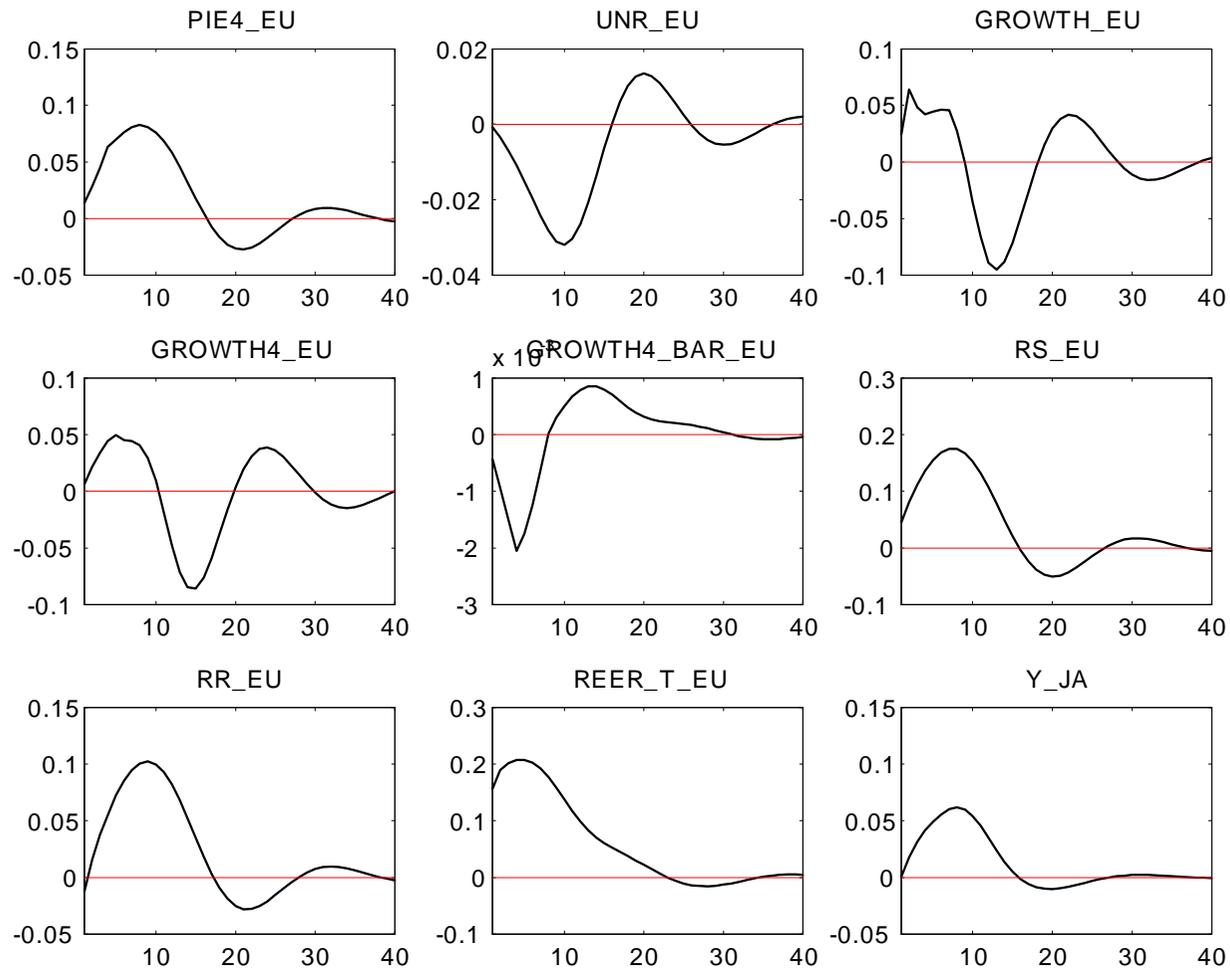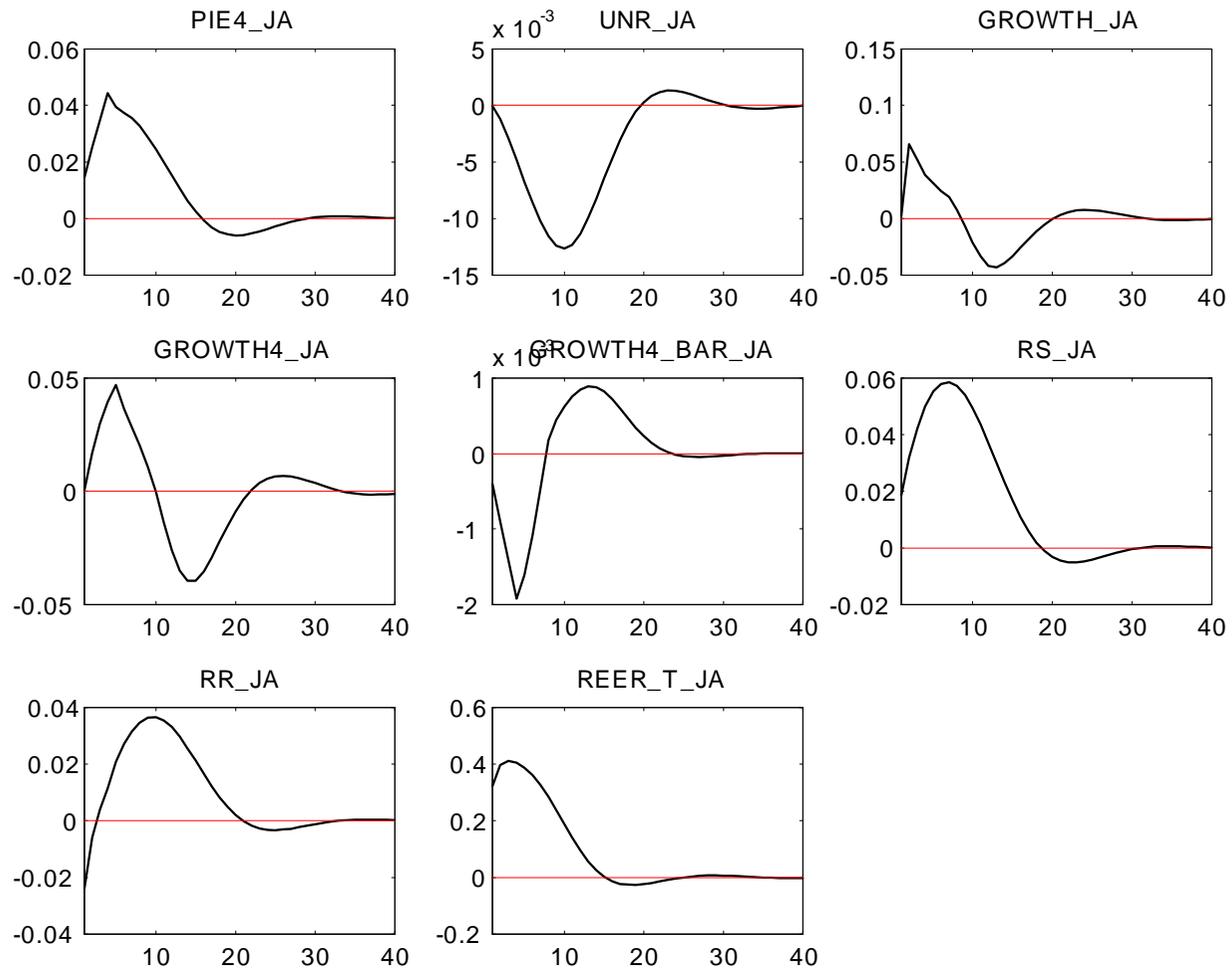
Figure 19: Financial (BLT) shock in the US (2)

Figure 20: Financial (BLT) shock in the US (3)

Historical relationships between treasury bonds and mortgages

- One-year spreads – low in mid-1990s; widened in later 1990s, especially in recession of 2001; narrowed again by mid-decade; widened markedly thereafter

- Ten-years spreads – low in mid-1990s; widened in later 1990s; narrowed again aound 2002; widened markedly thereafter

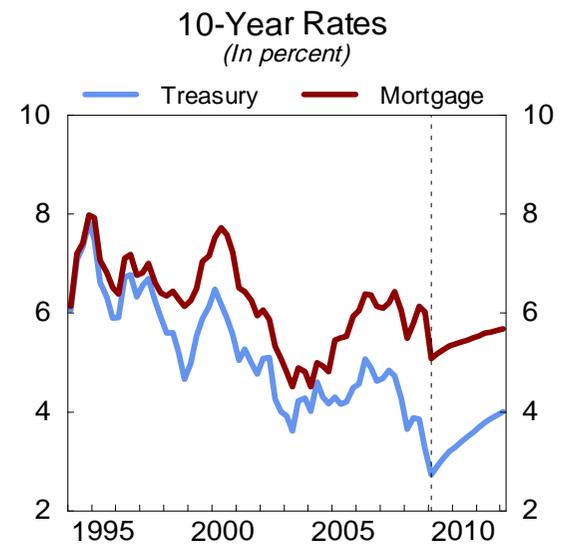# Figure 21: *Historical U.S. Interest Rates*

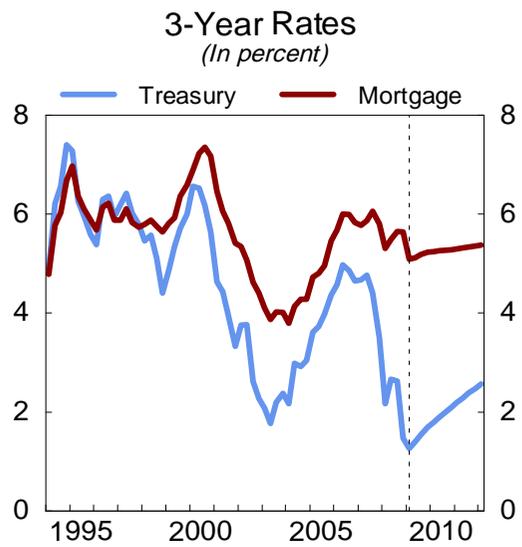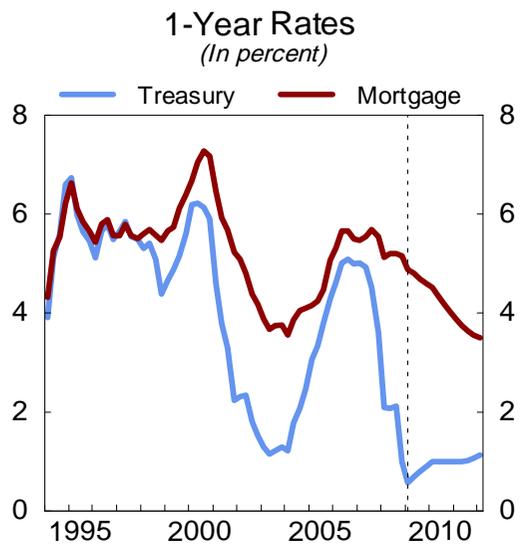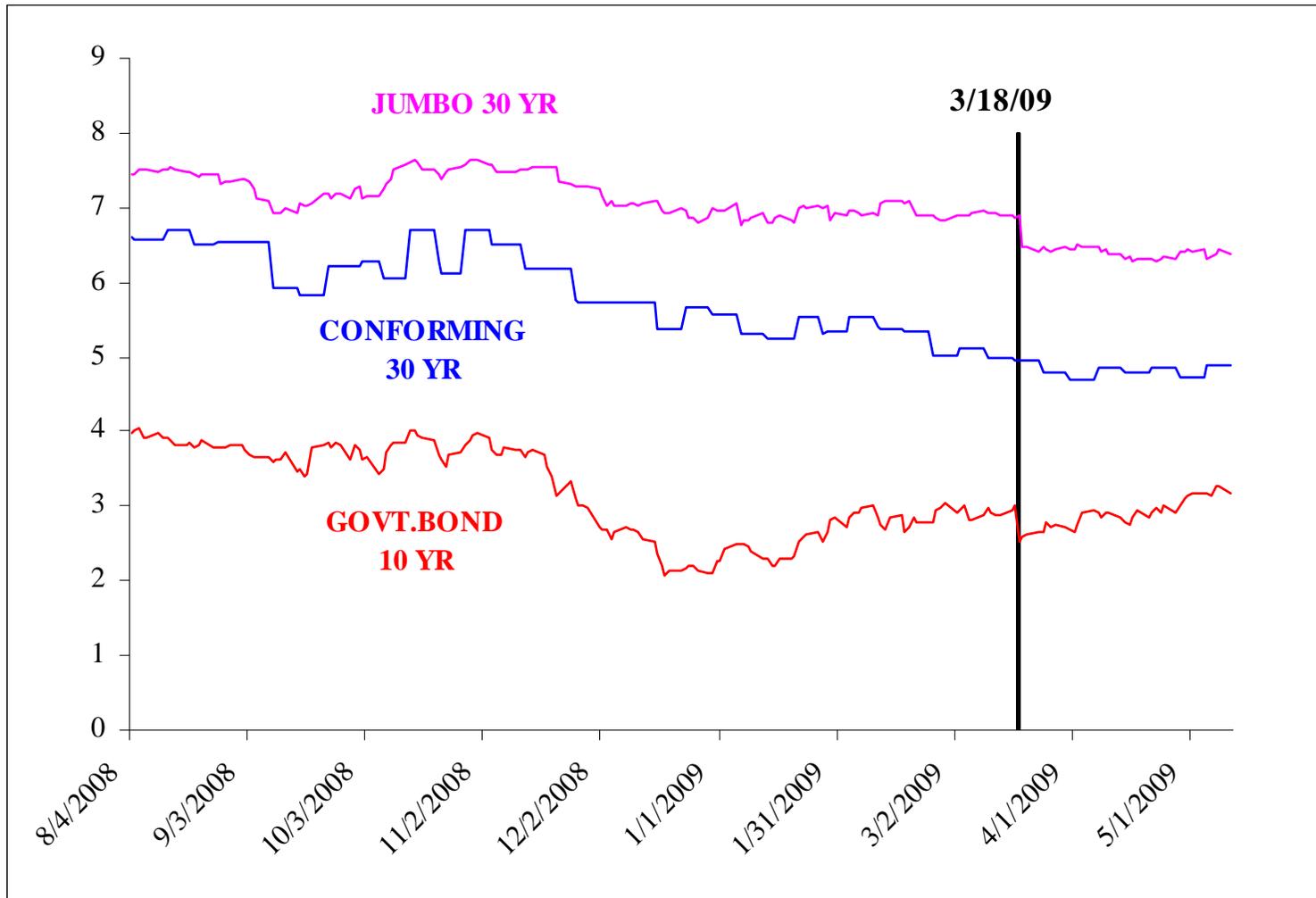| 1-Year Rates	3-Year Rates	10-Year Rates
(In percent)	*(In percent)*	*(In percent)*

Figure 22: Recent Interest Rate Developments

Scenario 1 simulations

- As discussed earlier, appreciable decline in term risk premiums as result of non-conventional credit easing actions

- Yields on government and private sector obligations declined by similar amounts

- To assess effects on economy of declines in term premiums, scenario 1 compares simulations with higher (red line) and lower (blue line) term risk premiums

- Differences are 25 basis points on three month treasury bills, 50 basis points on one-year bonds, 75 basis points on three-year bonds and 100 basis points on 10-year bonds

- Starts in 2009 Q1 and lasts through 2012Q1

- Shock is unanticipated, so in every period markets expect return to steady-state risk premiums with historically estimated autocorrelations

- Simulation with lower risk premiums shows stronger economy (output gap less negative), inflation slighter higher, little change in real effective exchange rate, and fed funds rate slightly above zero lower bound in 2011,

- Initial sharply lower term risk premiums followed by slightly faster rate of increase in 3-year yields in anticipation of stronger economy and higher path for fed funds rate

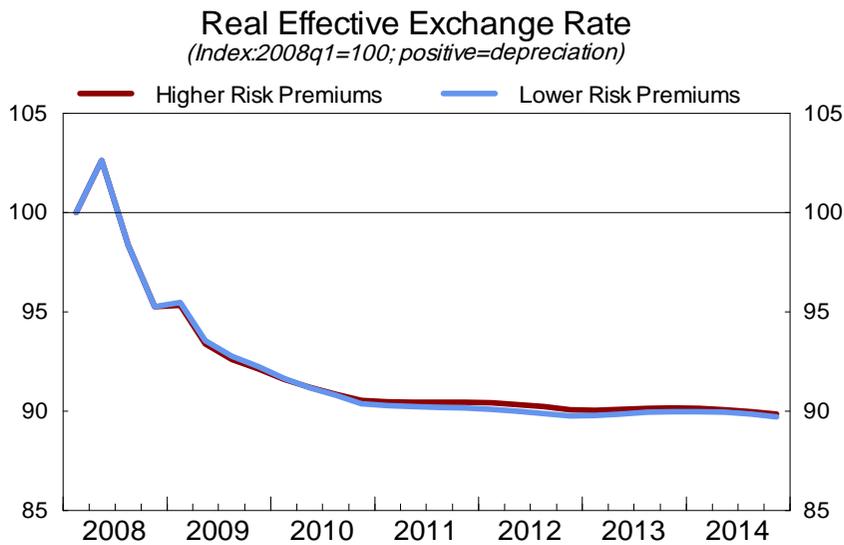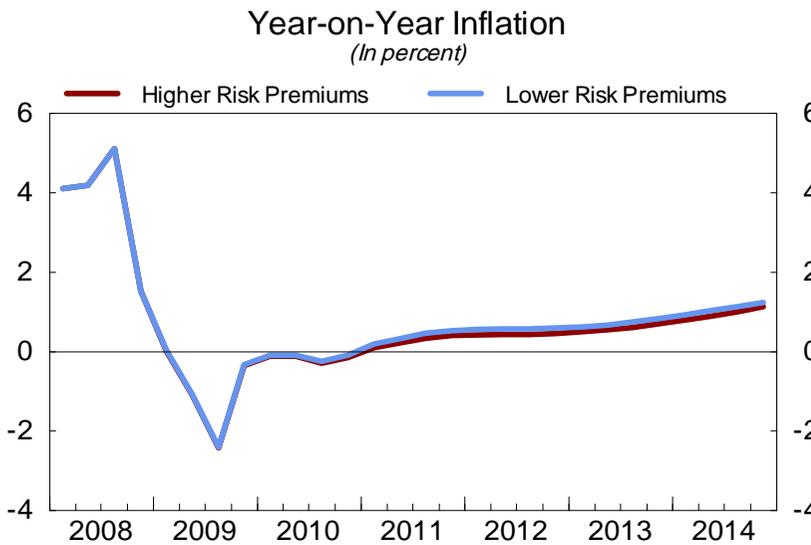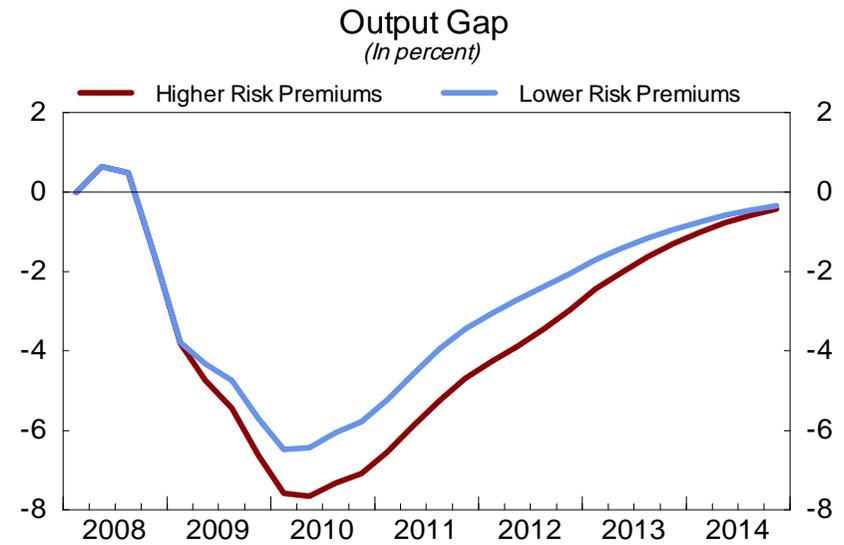# Figure 23: *Changes in Term Risk Premiums in the U.S. [1]*

Fed Funds Rate
(In percent)

Higher Risk Premiums — Lower Risk Premiums

Output Gap
(In percent)

Higher Risk Premiums — Lower Risk Premiums

Year-on-Year Inflation
(In percent)

Higher Risk Premiums — Lower Risk Premiums

Real Effective Exchange Rate
(Index:2008q1=100; positive=depreciation)

Higher Risk Premiums — Lower Risk Premiums
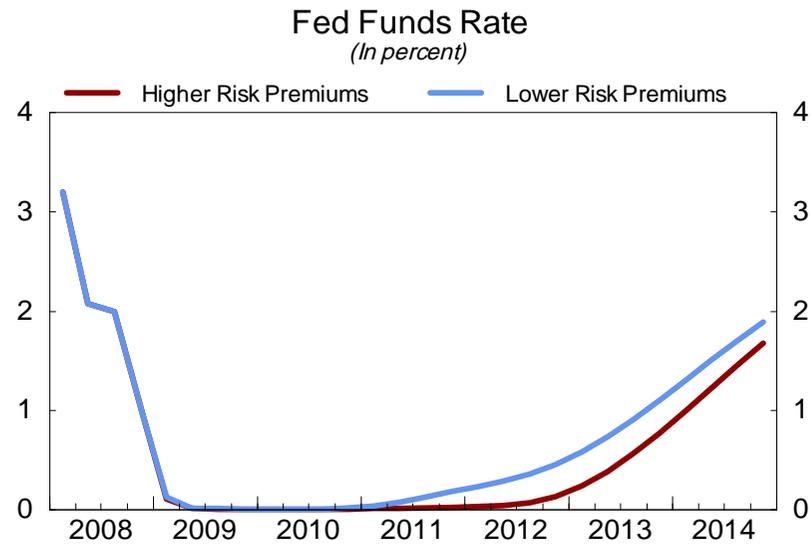
Figure 24: *Changes in Term Risk Premiums in the U.S. [2]*

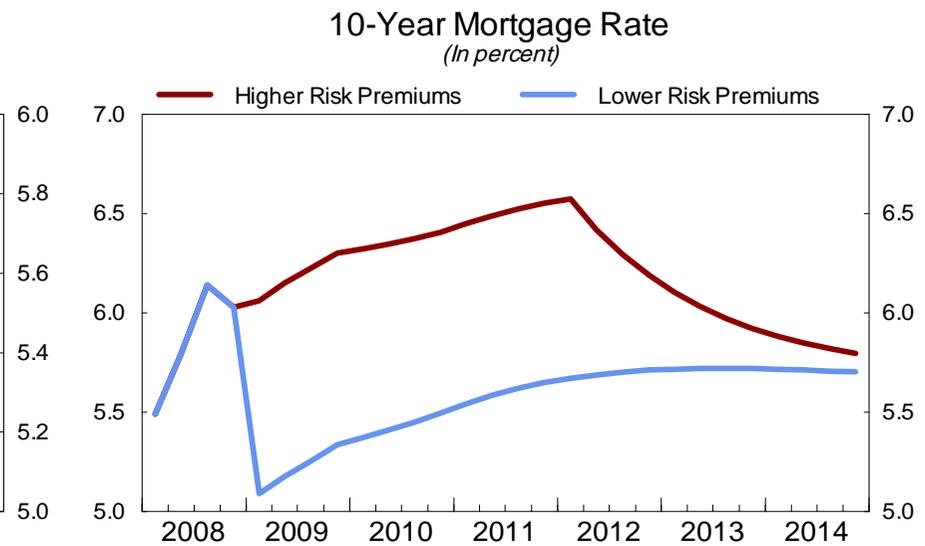### 3-Year Treasury Bond Yield
(In percent)

— Higher Risk Premiums — Lower Risk Premiums

10-Year Treasury Bond Yield
(In percent)

— Higher Risk Premiums — Lower Risk Premiums

3-Year Mortgage Rate
(In percent)

— Higher Risk Premiums — Lower Risk Premiums

10-Year Mortgage Rate
(In percent)

— Higher Risk Premiums — Lower Risk Premiums
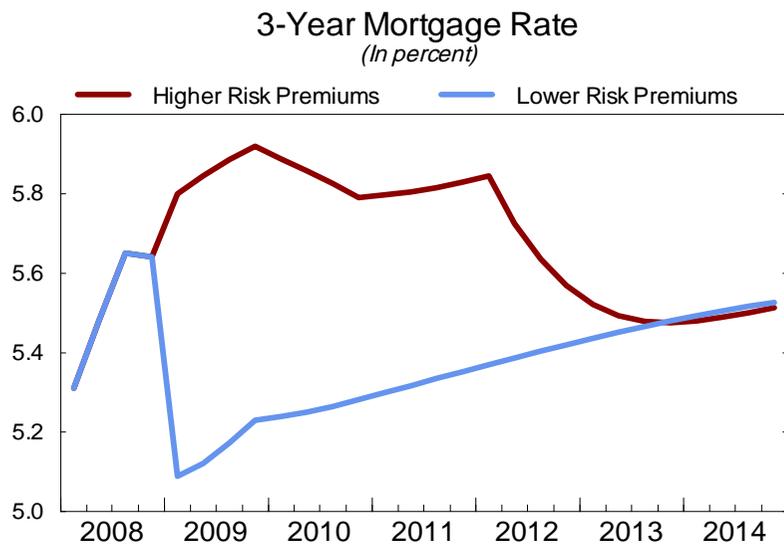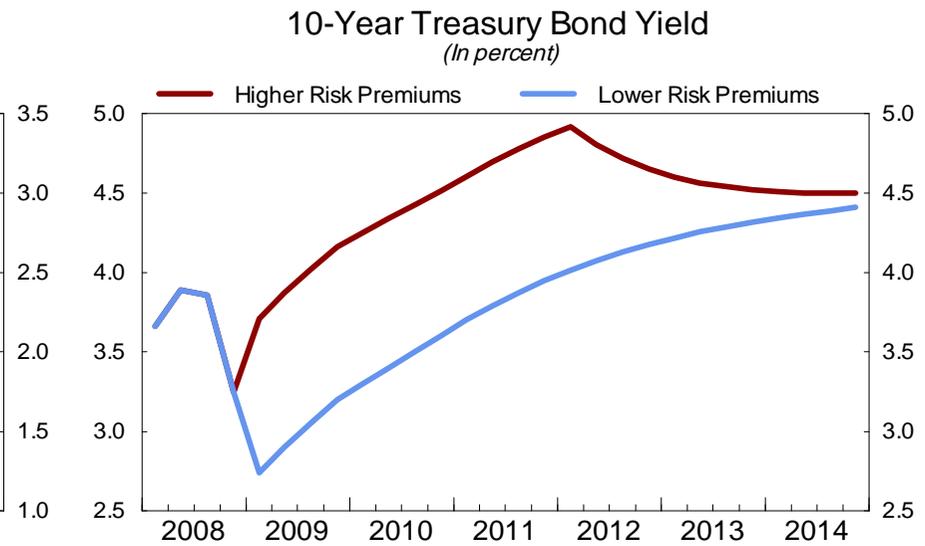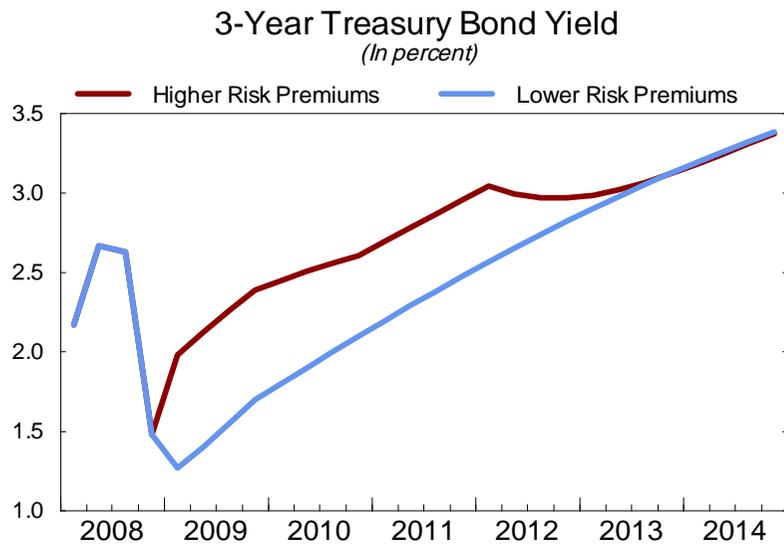
Scenario 2 simulations

- Scenario 2 involves comparing lower term risk premiums (blue lines) with a combination of higher term risk premiums and an increase of expected inflation (red line)

- Differences in term risk premiums same as in scenario 1 except that they begin in 2009Q2

- In addition, shock to country risk premium against the US dollar equal to 100 basis points that declines with autocorrelation equal to 0.95

- Anticipated shock to inflation – begins in 2011Q1 and rises to 4 percent q/q in 2012Q4 and starts declining gradually in 2014Q1

- Can interpret inflation scare as response to increase in size of balance sheet of Fed and/or lack of confidence with respect to exit strategy of Fed as economy strengthens

- Also, anticipated shock to equilibrium exchange rate of US dollar of 2 percent starting in 2009Q2

- Comparing simulation with higher risk premiums in scenario 1 with simulation with higher risk premiums and higher inflation expectations in scenario 2, the inflation scare and associated shocks result in much higher path for Fed funds rate, considerably weaker economy (more negative output gap persisting for much longer), appreciably higher inflation and weaker US dollar

- Also, inflation scare results in much higher longer-term interest rates

Figure 25: *Changes in Term Risk Premiums and in Inflation Expectations in the U.S.* [1]
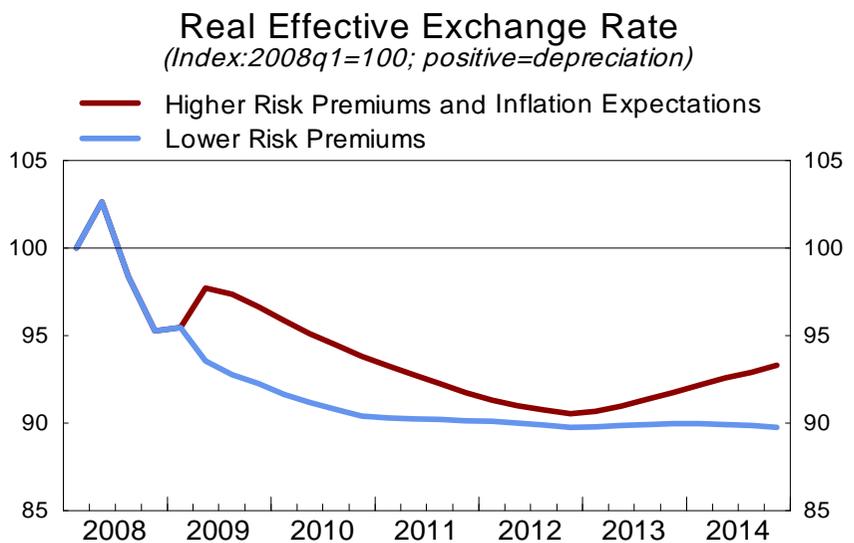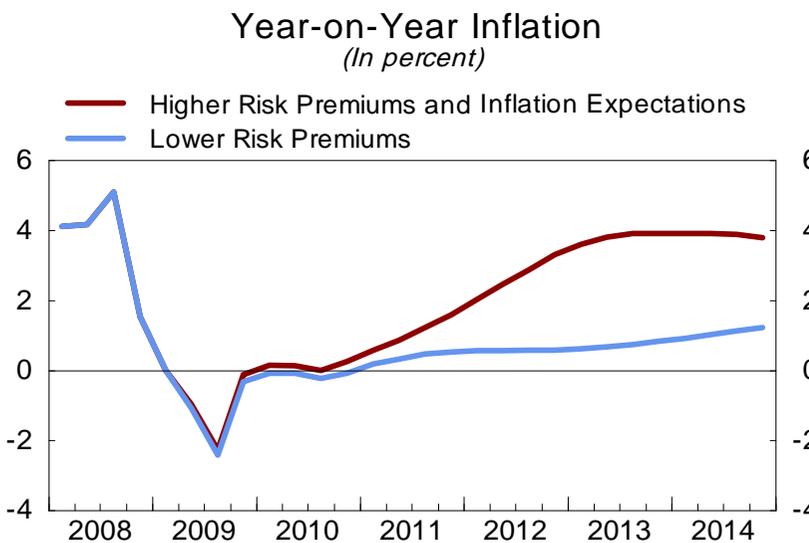
Fed Funds Rate
(In percent)

— Higher Risk Premiums and Inflation Expectations
— Lower Risk Premiums

Output Gap
(In percent)

— Higher Risk Premiums and Inflation Expectations
— Lower Risk Premiums

Year-on-Year Inflation
(In percent)

— Higher Risk Premiums and Inflation Expectations
— Lower Risk Premiums

Real Effective Exchange Rate
(Index:2008q1=100; positive=depreciation)

— Higher Risk Premiums and Inflation Expectations
— Lower Risk Premiums

Figure 26: *Changes in Term Risk Premiums and in Inflation Expectations in the U.S. [2]*

3-Year Treasury Bond Yield
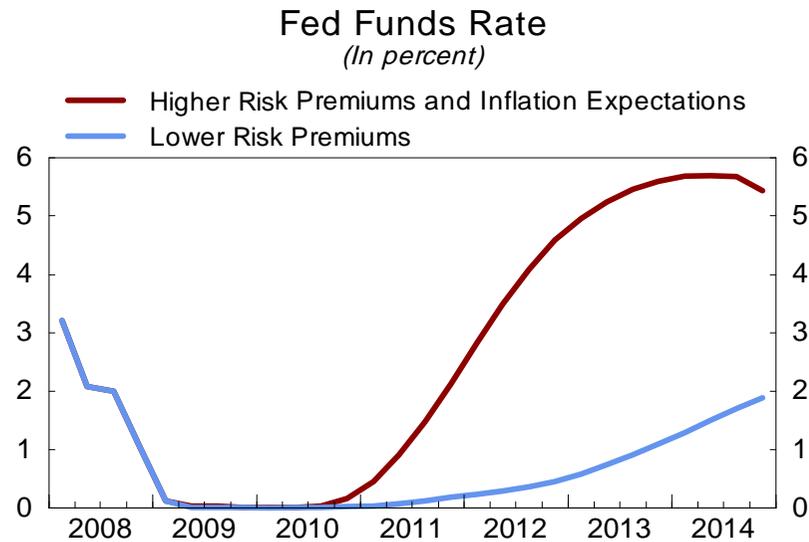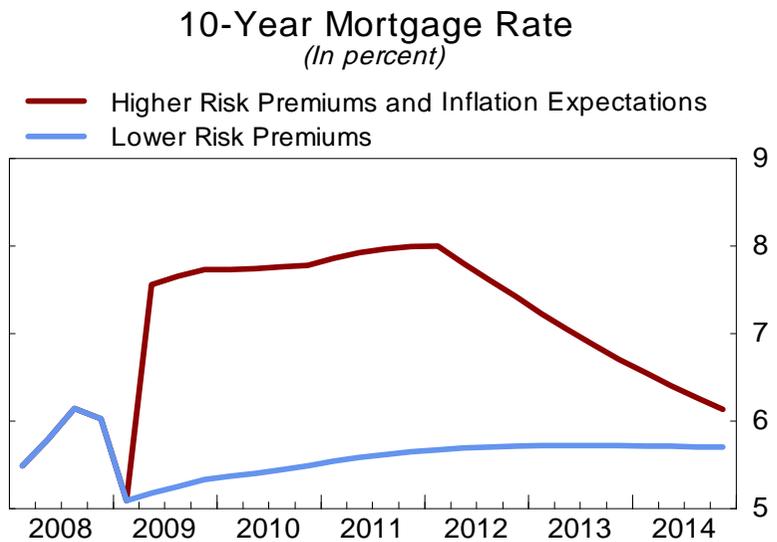### (In percent)

— Higher Risk Premiums and Inflation Expectations
— Lower Risk Premiums

10-Year Treasury Bond Yield
(In percent)

— Higher Risk Premiums and Inflation Expectations
— Lower Risk Premiums

3-Year Mortgage Rate
(In percent)

— Higher Risk Premiums and Inflation Expectations
— Lower Risk Premiums

10-Year Mortgage Rate
(In percent)

— Higher Risk Premiums and Inflation Expectations
— Lower Risk Premiums

3   Issues related to fiscal stimulus

Model

- Used IMF's Global Integrated Monetary and Fiscal Model (GIMF) to address fiscal issues (IMF SPN/09/03)

- Structural model based on optimizing behavior

- Model has a number of useful features

- In new-Keynesian tradition, it has a number of nominal and real rigidities

- Allows for non-Ricardian responses to fiscal actions by having overlapping generations with finite economic lifetimes and hand-to-mouth households

- Uses stylized Taylor-type interest rate reaction function

- Taxes on labor income have distortionary effects

- Government infrastructure spending eventually increases the productivity of private inputs.

*Results from model (if assume no credibility problems)*

- Government expenditures have higher multipliers than transfers

- Targeted transfers have higher multipliers than lump-sum transfers

- Monetary accommodation strengthens multipliers markedly

- Global stimulus stronger than regional stimulus

Credibility problems

- But credibility issues can result in partial or total offset to fiscal stimulus

- Absence of sustainability undermines effect of stimulus through increase in real interest rates

- Two types of experiments

- First, incorrect perception by public of much stronger and longer period of stimulus than announced by government

- Second, governments unable to return ratio of debt to GDP to baseline

- Base case shown as black line in figure 27

- Combination policy in which three quarters of increase in deficits higher government lump-sum transfers and one quarter higher government infrastructure investment

- Deficits increase by 1 percent of GDP in first year and 0.5 percent of GDP in second year

- Monetary policy accommodative, leaving nominal policy interest rates unchanged for 2 years

Figure 27: Fiscal Multipliers When Market Participants Expect Permanent Higher Deficits (Deviation from Baseline)
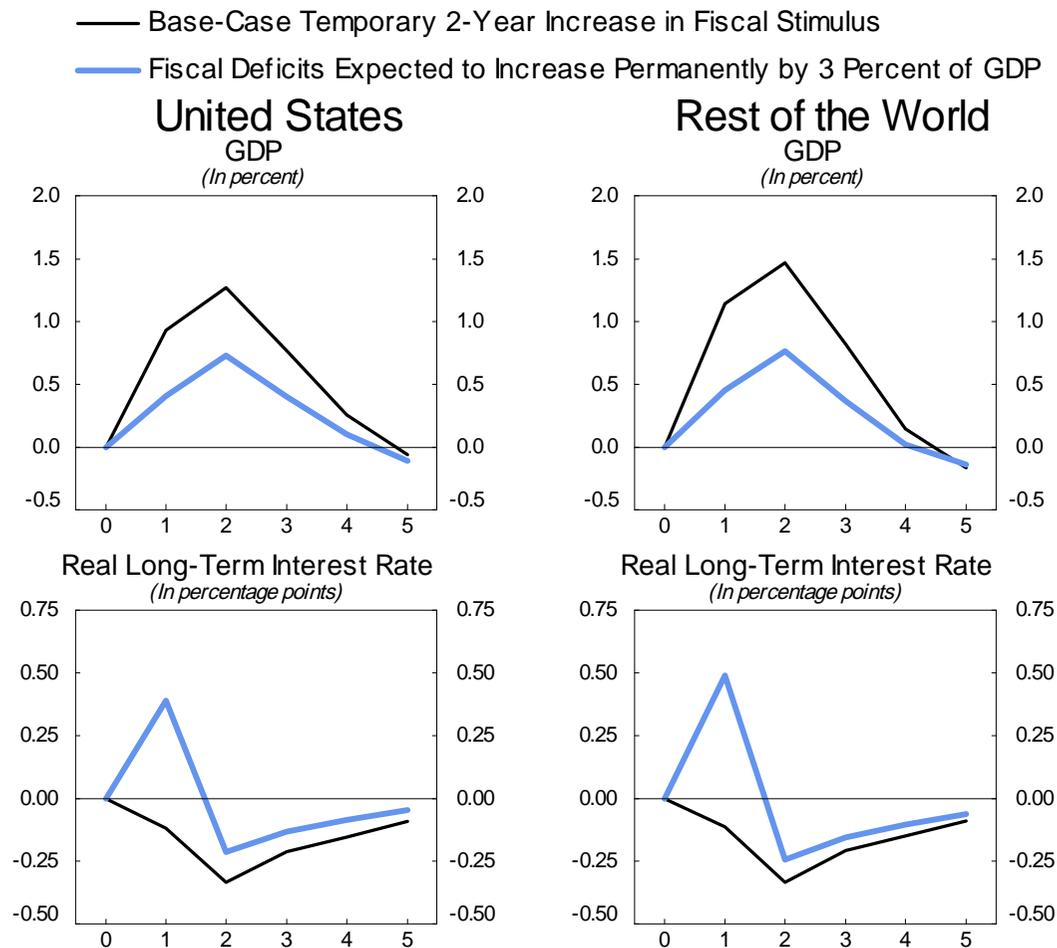
- Suppose public initially exaggerates size and duration of fiscal stimulus

- Private sector observes a deficit of 1 percent of GDP in year one and extrapolates a 2 percent deficit in year two and a 3 percent deficit in year three and thereafter

- In year two, private sector realizes policy will in fact deliver on its originally promised profile of deficits

- This scenario shown as blue line in Figure 27

- Increase in inflation resulting from stimulus-induced increase in output still succeeds in driving down short-term real interest rates

- But anticipation of lower national saving over time leads to increases in expected future real short-term interest rates and hence drives up real long-term interest rates in year one

- Lack of policy credibility during the first year of the stimulus roughly halves the output effect of the stimulus

- Next analyze long-run consequences of real lack of commitment rather than just perception of lack of commitment to fiscal discipline

- Table 4 shows simulated long-run crowding-out effects of permanent 10 percentage point increase in ratio of government debt to GDP

- If debt increase limited to US, world real interest rates rise 14 basis points and all countries experience 0.6 percent permanent contraction in GDP

- If all countries increase ratio of debt to GDP by 10 percentage points, effect on world real interest rates is 39 basis points and GDP permanently contracts by 1.3 percent worldwide

Table 4: Long-Term Crowding Out Effects of Higher Government Debt

(10 percentage point increase Government Debt Ratios)

	Increase in All Countries	Increase in the United States
Effects on:		
World:		
GDP	-1.3	-0.6
Consumption	-1.0	-0.5
Investment	-3.6	-1.4
Real Interest Rates	0.39	0.14
United States:		
GDP	-1.2	-0.5
Consumption	-0.9	-0.5
Investment	-3.5	-1.3
Real Interest Rates	0.39	0.14
Rest of the World		
GDP	-1.3	-0.6
Consumption	-1.1	-0.5
Investment	-3.6	-1.4
Real Interest Rates	0.39	0.14

4 Concluding remarks

Both sets of issues addressed in this paper relate to expectations and credibility

- In case of risk premiums, uncertainty about future developments and whether authorities will be able to deal with financial and macroeconomic crises effectively

- Undertaking appropriate policy processes and actions as needed (such as non-conventional policy actions) and credibly committing to exit from them as needed important in reducing risk premiums

- In case of fiscal stimulus, uncertainty about whether fiscal authorities will be able to prevent deficits and debts from diverging from baseline for very long period of time (i.e., need for credible exit strategy)

- This set of issues emphasizes importance of fiscal probity in good times and/or fiscal rules