
Macro Modelling, Crises and Policy

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Macro Modelling, Crises and Policy

1. How macroeconomic modelling developed
 - to provide quantitative policy advice and changed in response to macroeconomic crises
2. Comparing models and policies
 - Reproducibility! MMB: MacroModelBase & applications
3. A large-scale model competition: Forecasting recessions and recoveries
 - Replication! Out of sample forecasts for global financial crisis and corona crisis

1. How macroeconomic modelling developed

1936: How it began

Jan Tinbergen builds first macroeconomic model. Question: Should the government leave the Gold standard and devalue the Dutch guilder? “An Economic Policy for 1936,” presented to the Dutch Economics and Statistics Association.

“Tinbergen built his model to give advice on policy,” Dhaene & Barten (1990). “Under certain assumptions about exogenous variables and alternative values for policy instrument he generated a set of time paths for the endogenous variables, one for each policy alternative. These were compared with the no change case and the best one was selected.”

Taylor (2019) Quantitative policy recommendation in “path-space”.

Tinbergen: 1st Nobel Prize in Economics 1969

- Prize motivation: "for having developed and applied dynamic models for the analysis of economic processes."

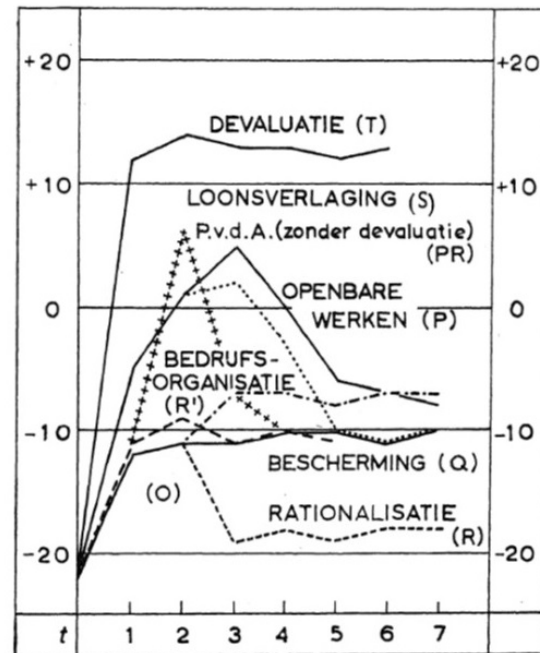
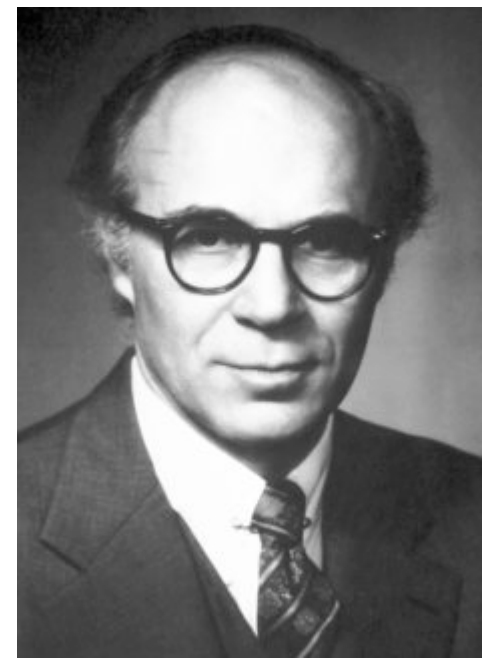


Fig. 20. Development of employment under different types of economic policy. The various policies are indicated by short and loose slogans or devices.



40s/50s/60s Cowles Foundation models

Nobel prize 1980 for Lawrence Klein "for the creation of econometric models and the application to the analysis of economic fluctuations and economic policies."



Klein: "After I completed my dissertation under Paul Samuelson, the next major step was a decision to join the econometrics team at the Cowles Commission of the University of Chicago, where the director, Jacob Marschak, gave me the challenging assignment of reviving Jan Tinbergen's early attempts at econometric model building for the United States.

1968 Project LINK. MIT-Penn-SSRC (MPS) Model at US Fed

The rational expectations revolution

- The „Great Inflation“ of the 1970s led to a re-think of macro-modelling, in particular the role of expectations and optimizing behavior.
- Critique of „path-space“ policy analysis
- 1995 Nobel prize for Robert Lucas "for having developed and applied the hypothesis of rational expectations, and thereby having transformed macroeconomic analysis and deepened our understanding of economic policy."



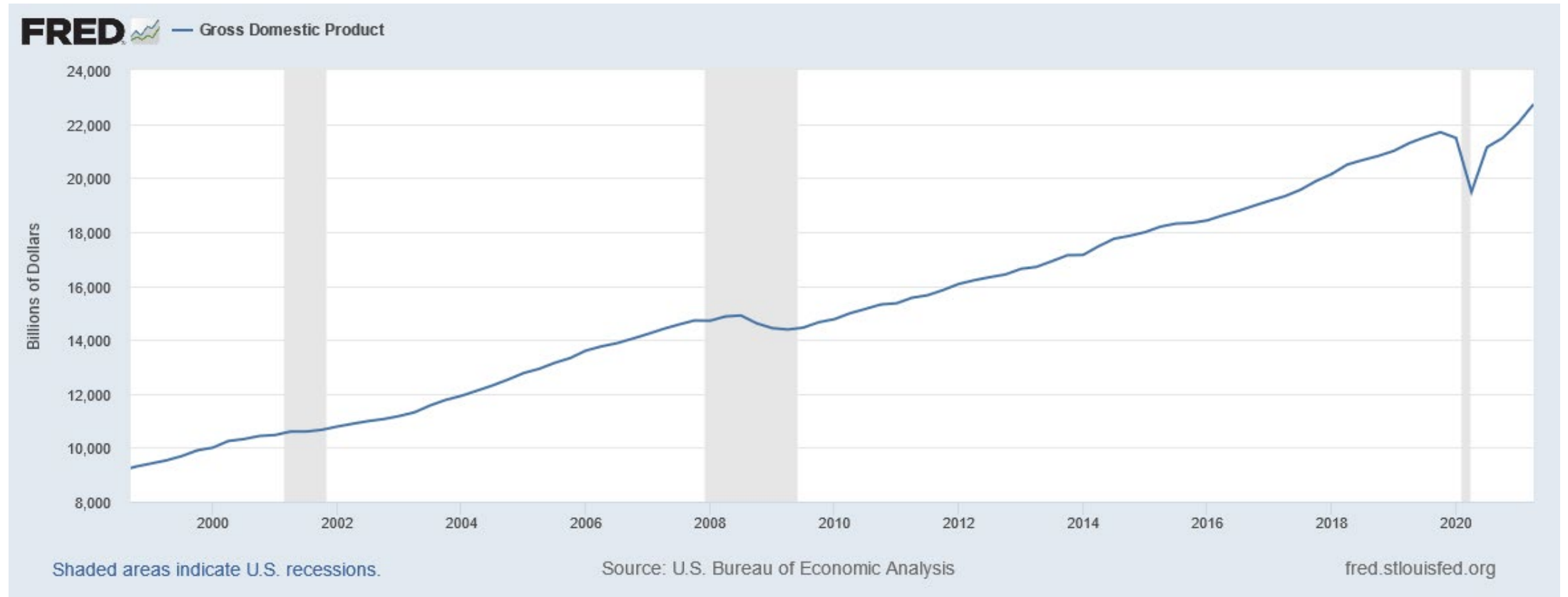
The New Keynesians

New model ingredients:

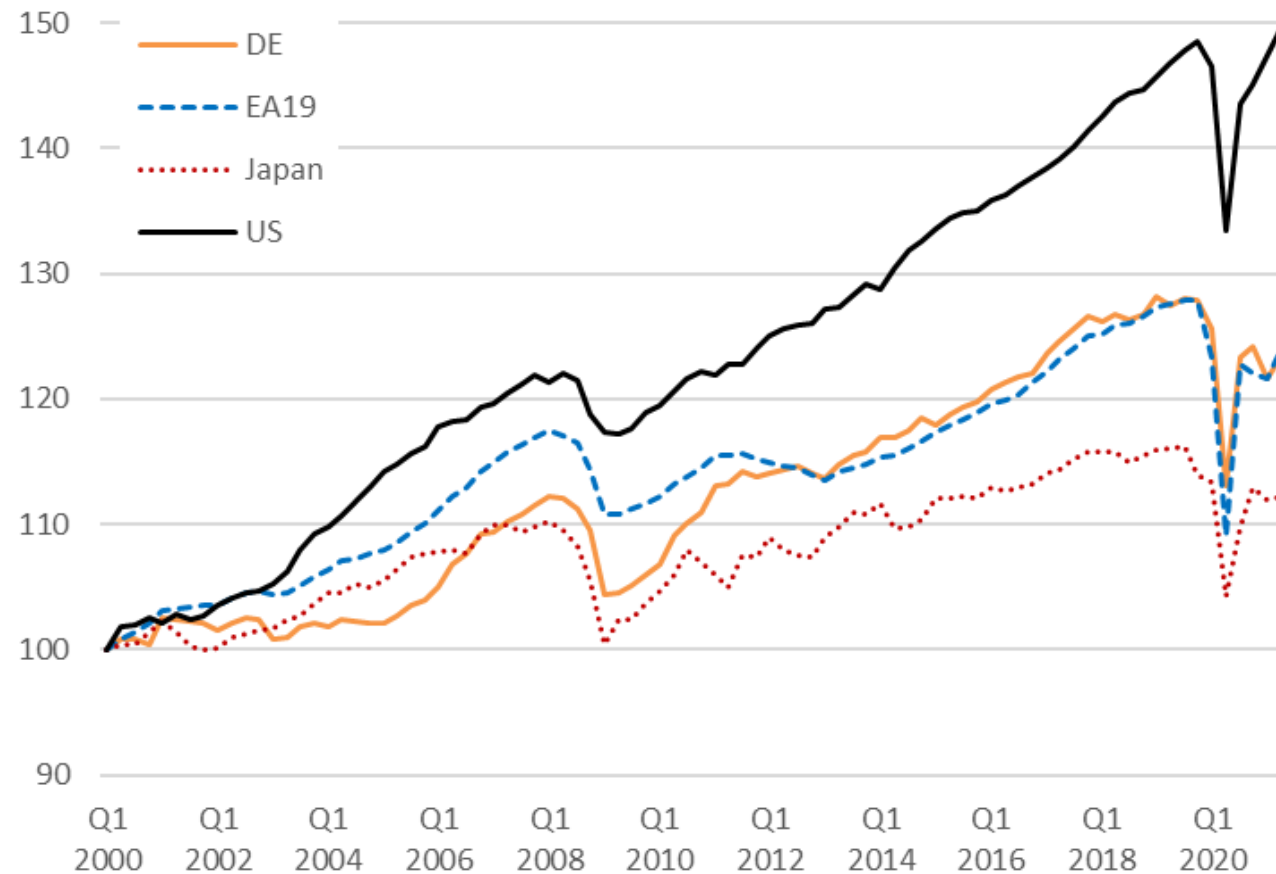
- Rational expectations
- Staggered wage and price contracts (Taylor 1979/80, Calvo 1983).
- Policy analyzed in „rule-space“, temporary real effects of monetary policy
- 1st wave: Modelling connected to 1st-order conditions of optimizing agents but not full-scale derivation (Taylor 1979, 1993, Fed's FRB-US model, IMF Multimod).
- 2nd wave: Monetary business cycle models, dynamic stochastic general equilibrium (Rotemberg/Woodford Goodfriend/King 1997, Christiano/Eichenbaum/Evans 2001/05. DSGE models ECB, Fed, IMF

The global financial crisis 2007: Major impact on macro modelling

The last 3 recessions and recoveries in the USA

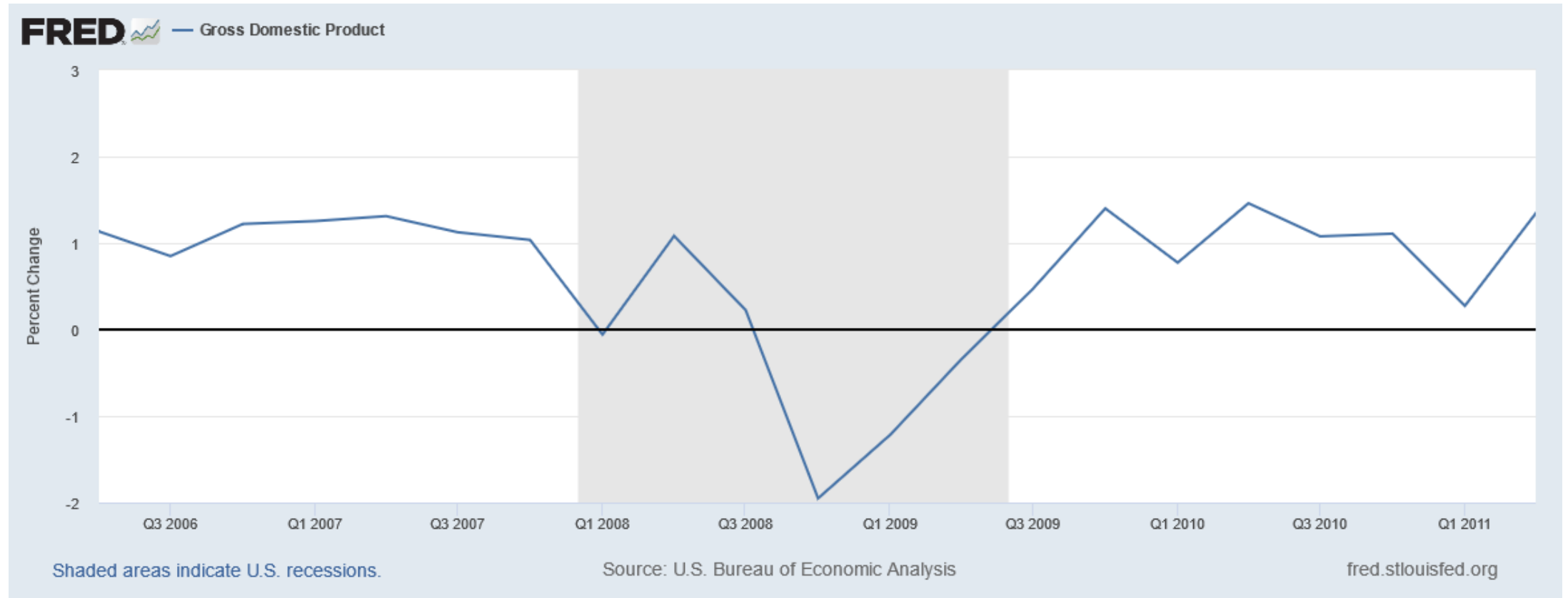


International comparison: GDP in financial and corona crisis



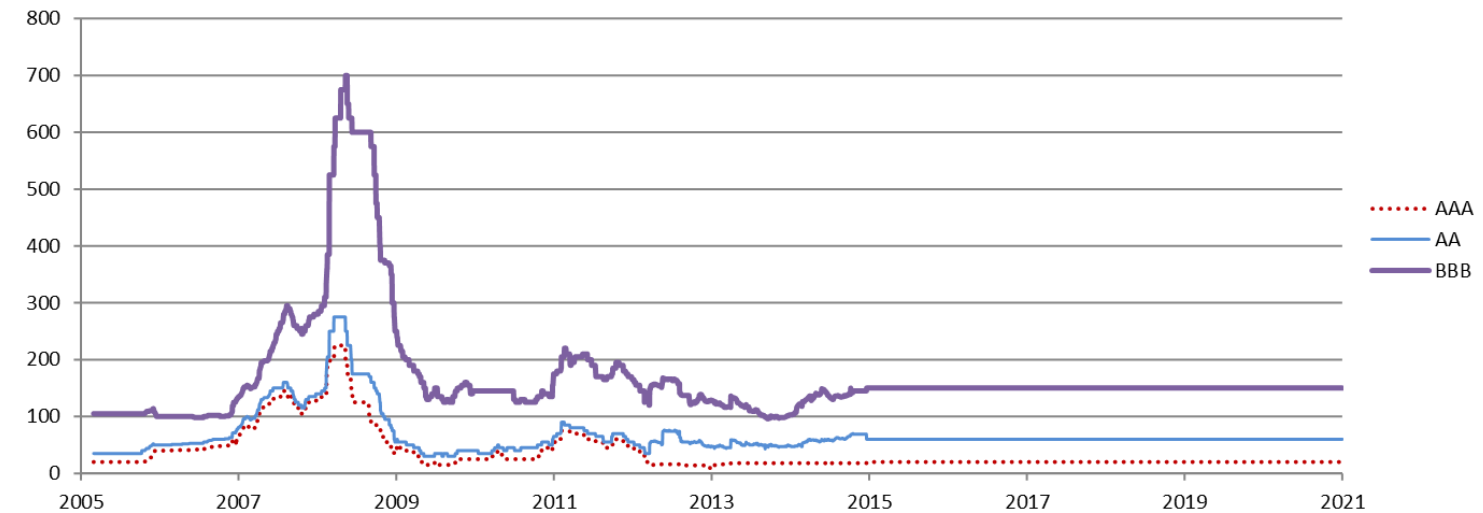
Source: Fred St. Louis, real GDP, 2000=100, seasonally adj (US at annual rate)

US GDP growth during the global financial crisis

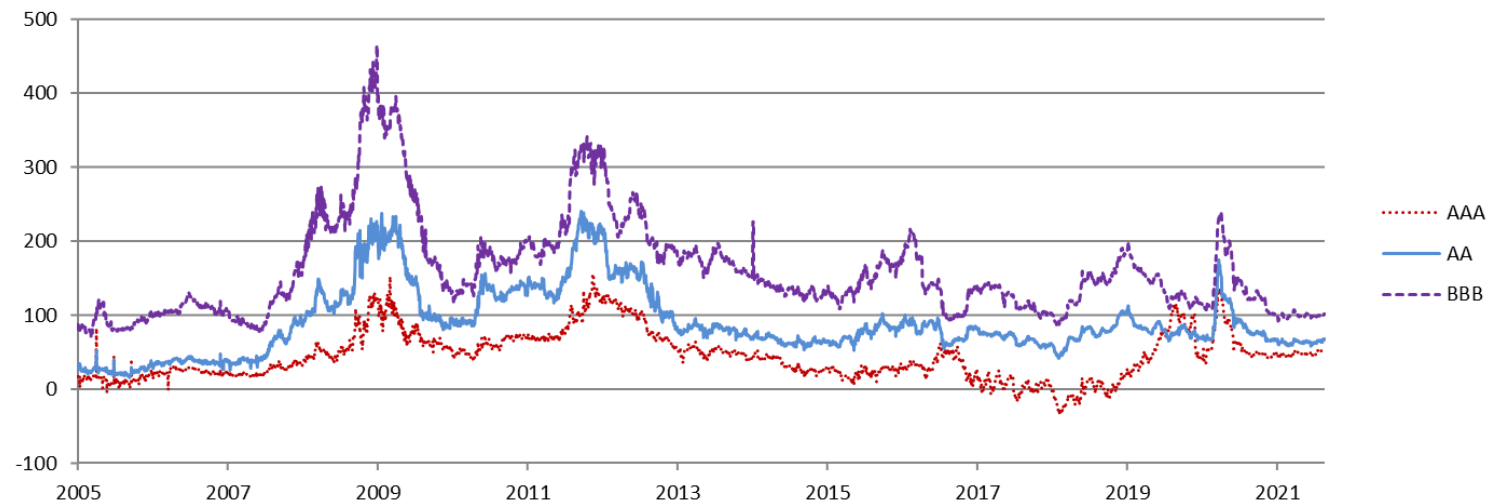


Corporate bond spreads in financial crisis

USA



Euro Area



Source: Thomson Reuters

Volker Wieland

Macro-financial modelling incorporating financial frictions

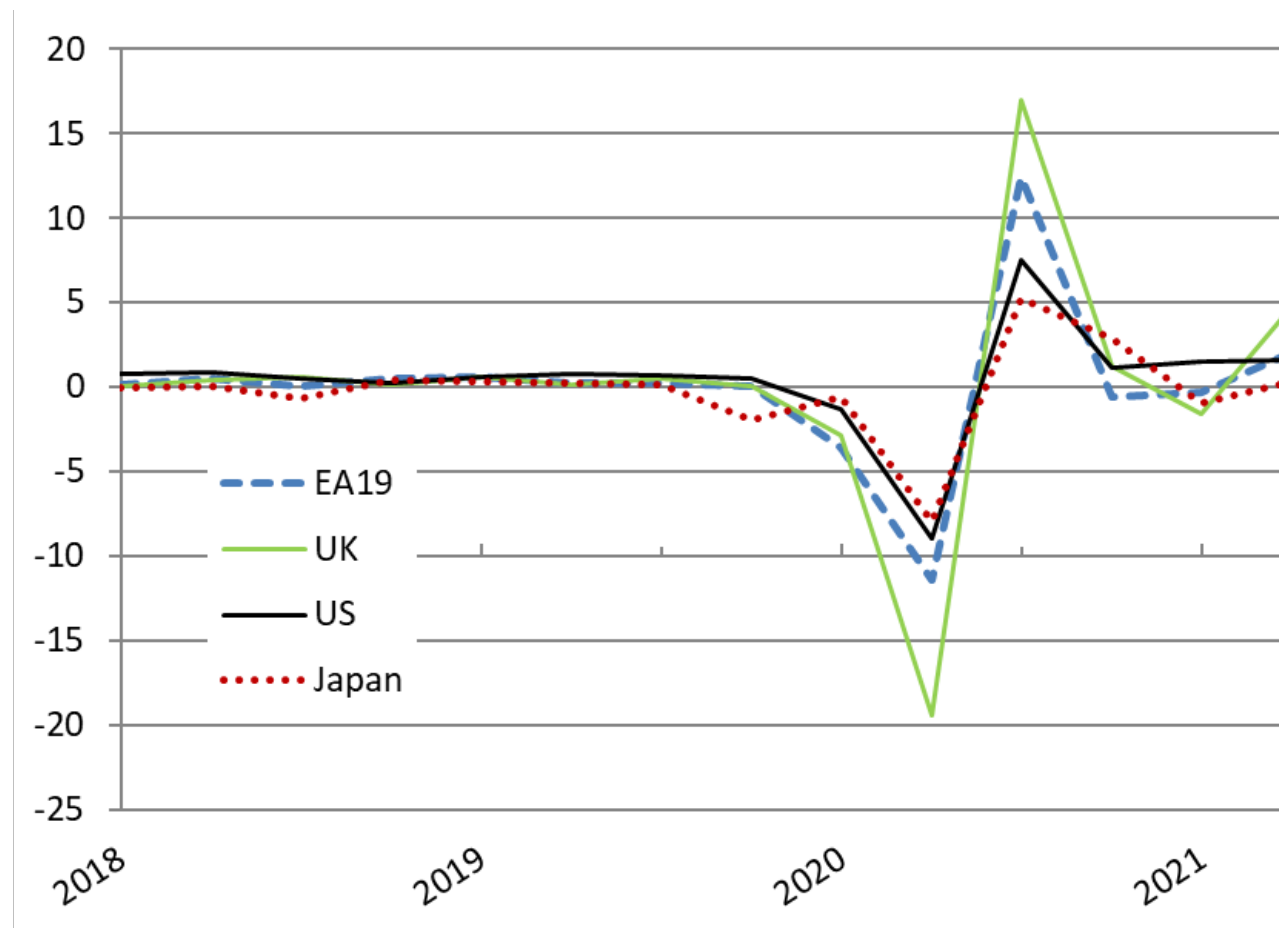
Example: financial accelerator in Bernanke, Gertler & Gilchrist (1999),

- Risk-averse households, risk-neutral entrepreneurs.
- Entrepreneurs borrow from households via financial intermediary, agency problem due to asymmetric information, entrepreneurs net-worth determines borrowing costs, high net-worth → low external finance premium. Net worth varies with business cycle, amplifies fluctuations.

Examples of estimated macro-financial models

- 1) Estimated small and medium-size financial accelerator models:
Christensen-Dib 2008, De Graeve 2008, Christiano-Motto-Rostagno, AER 2014, [US_CMR14](#), Del-Negro-Schorfheide 2015 AEJ-Macro, [US_DNGS15](#)
- 2) Estimated small and medium-size models with housing finance
Iacoviello, AER 2005, Iacoviello-Neri, AEJ-Macro 2010, [US_IN10](#), Kannan-Rabanal-Scott, Contr.Mac., 2012
- 3) Estimated medium-size models with banking sector and frictions
Gertler-Karadi (2011), Meh-Moran (2010), Gerali-Neri-Sessa-Signor. (2010)

The 2020 corona crisis: GDP growth



Note: quarter-on-quarter percentage changes, quarterly data

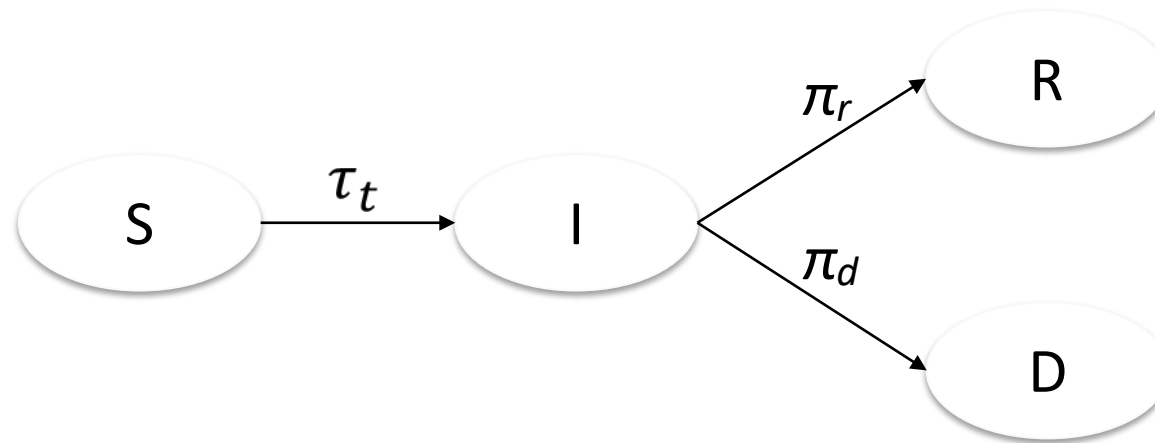
Source: OECD

Coronavirus Crisis: New Macro-Epi Modelling!

- New research combines macro models with models of epidemics to analyze the interaction of the spread of disease and the business cycle.
- First example: Eichenbaum, Rebelo, Trabant (04/2020), The Macroeconomics of Epidemics
- SIR model + simple real macro model

Integrating a Model of an Epidemic

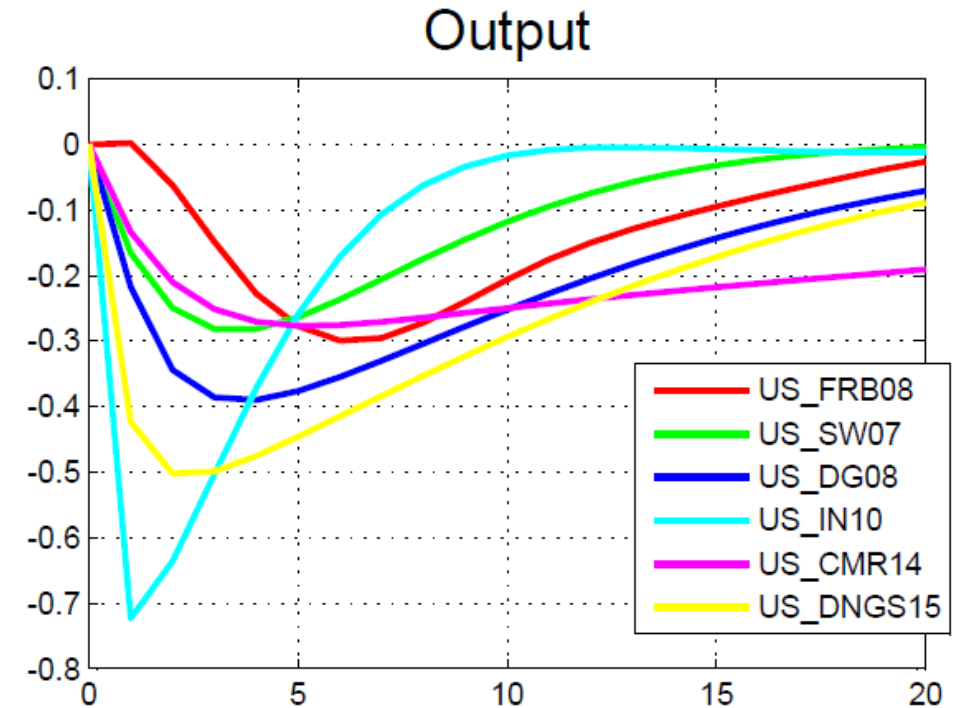
- 4 Types of Households:
Susceptible to becoming infected
Infected/Infectious (spread virus)
Recovered (immune) and Dead



τ_t : probability of infection, π_r : recovery rate, π_d : death

2. Comparing models and policies: Tools

Key principles: Reproducibility and Replicability!



MMB: Tools for comparing reproducible models and evaluating policies (robustness)

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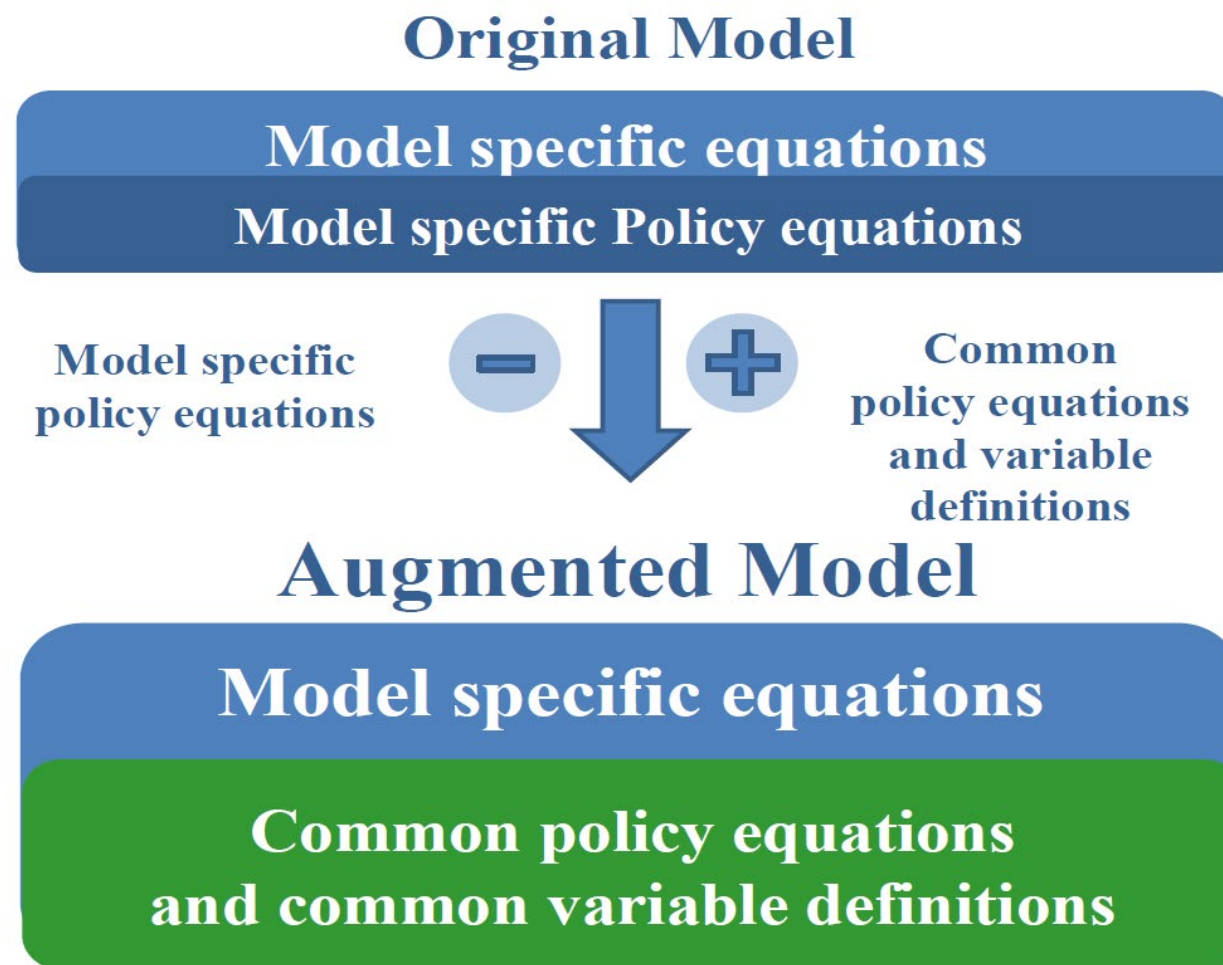
The Macroeconomic Model Comparison Initiative

The MMB is developed by contributors around the world under the auspices of the Macroeconomic Model Comparison Initiative (MMCI), a joint project of the **Hoover Institution at Stanford University** and the **Institute for Monetary and Financial Stability (IMFS) at Goethe University Frankfurt**, which is supported financially by the **Alfred P. Sloan Foundation**. The MMCI aims to facilitate the comparison of macroeconomic models, enable the reproducibility of macroeconomic research and bring together researchers in this area.

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A systematic approach to model comparison





Download

The latest MMB versions 2.3, 3.0 and 3.1 are released under the auspices of the **Macroeconomic Model Comparison Initiative (MMCI)**, a joint project of the **Hoover Institution** at Stanford University and the **Institute for Monetary and Financial Stability (IMFS)** at Goethe University Frankfurt that is supported financially by the **Alfred P. Sloan Foundation**.

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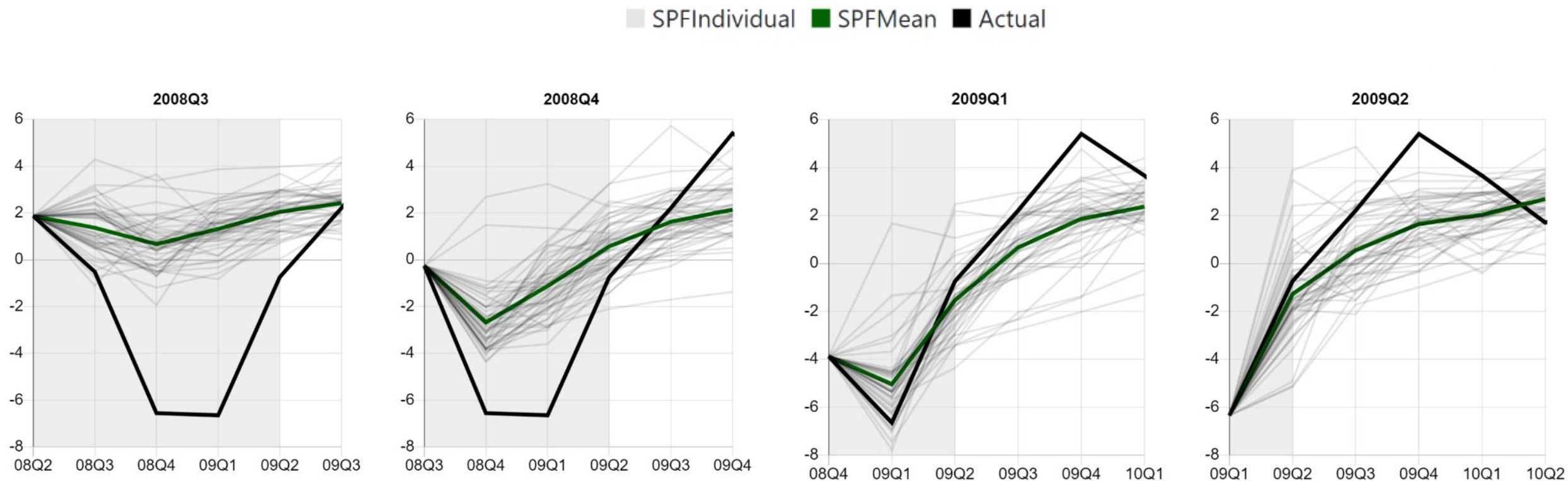
3. A large-scale model competition: Forecasting recessions and recoveries

Macro- vs macro-financial models! (vs professionals)

Replication principle: Re-estimating models with new (common) data and comparing out-of-sample forecasts!

- Binder, Farkas, Sun, Taylor, Wieland, Wolters (2021 in preparation)
- 3 Recession/recoveries: 2000/01, 2008/09, 2020/21
- Benchmark: Survey of professional forecasters
- Data: Quarterly **real-time** data **vintages** for U.S. economy
- Models:
 - Bayesian vector autoregression models (B-VARs)
 - Pre-GFC-type structural **macro models**
 - Post-GFC-type structural **macro-financial models**

Professionals failed to predict the GFC recession 2008/09



Reference point: compare forecast to the GDP data point taken from the vintage release two quarters after the quarter concerned.

Macro vs Macro Financial Models 2008/09

Period: Global Financial Crisis (GFC) recession and recovery 08/09

Models: Pre-GFC-type **macro** models, post-GFC-type **macro-financial** models

Information set: Balanced panel, model forecasts based exclusively on information from preceding quarter

- ➔ Note! Models are at a disadvantage versus SPF, because SPF nowcast of say GDP takes into account all other available higher-frequency data up to this point such as monthly industrial production or daily financial data.
- ➔ Also, professionals see Bear-Stearns and Lehman happen

Models by structure, size and number of financial variables

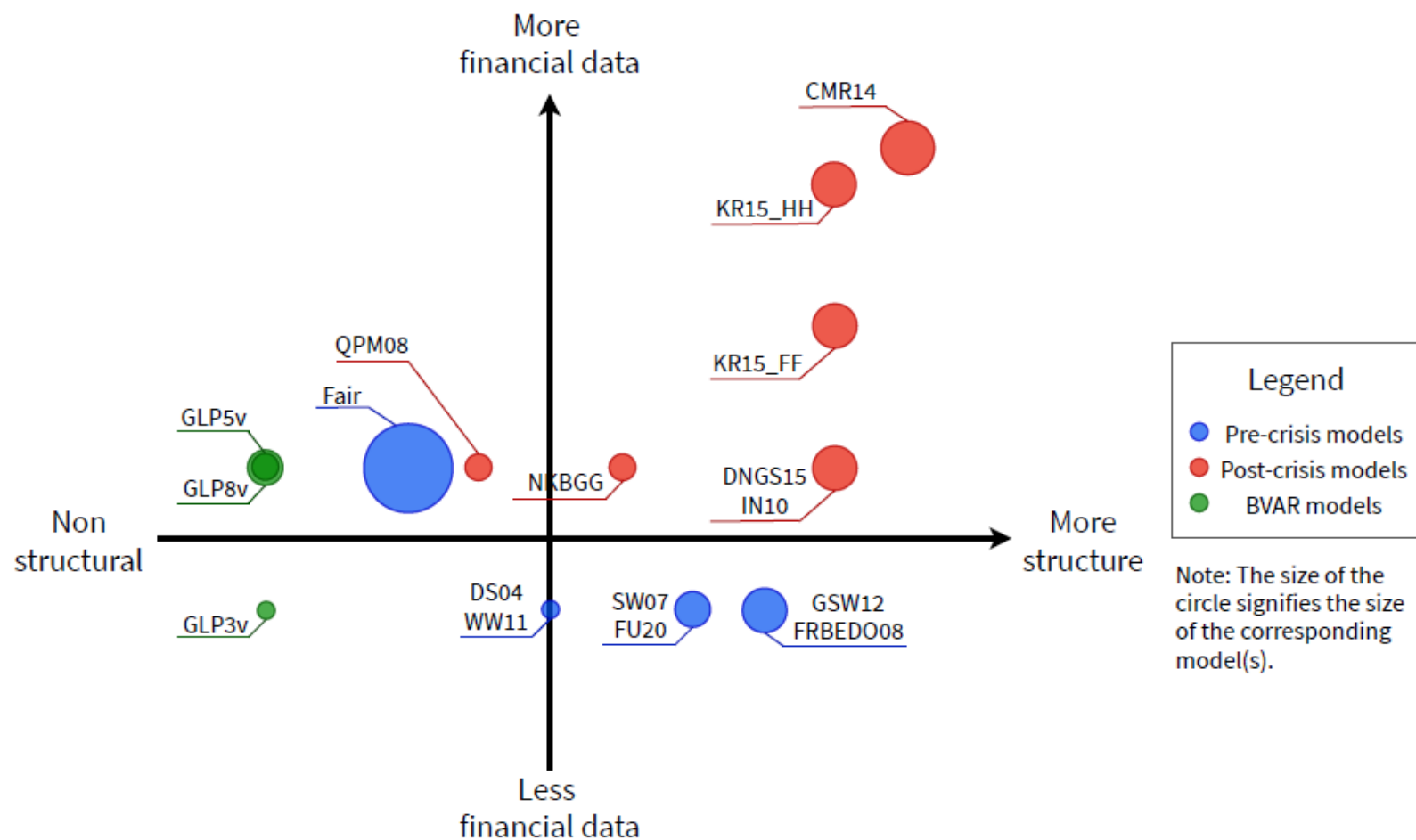
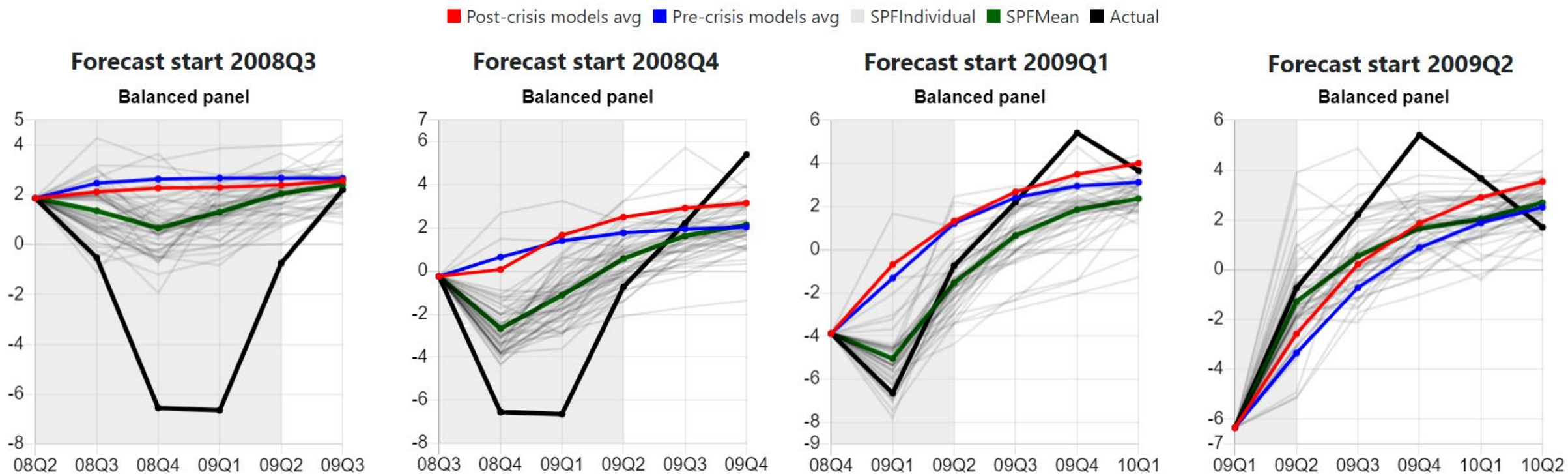


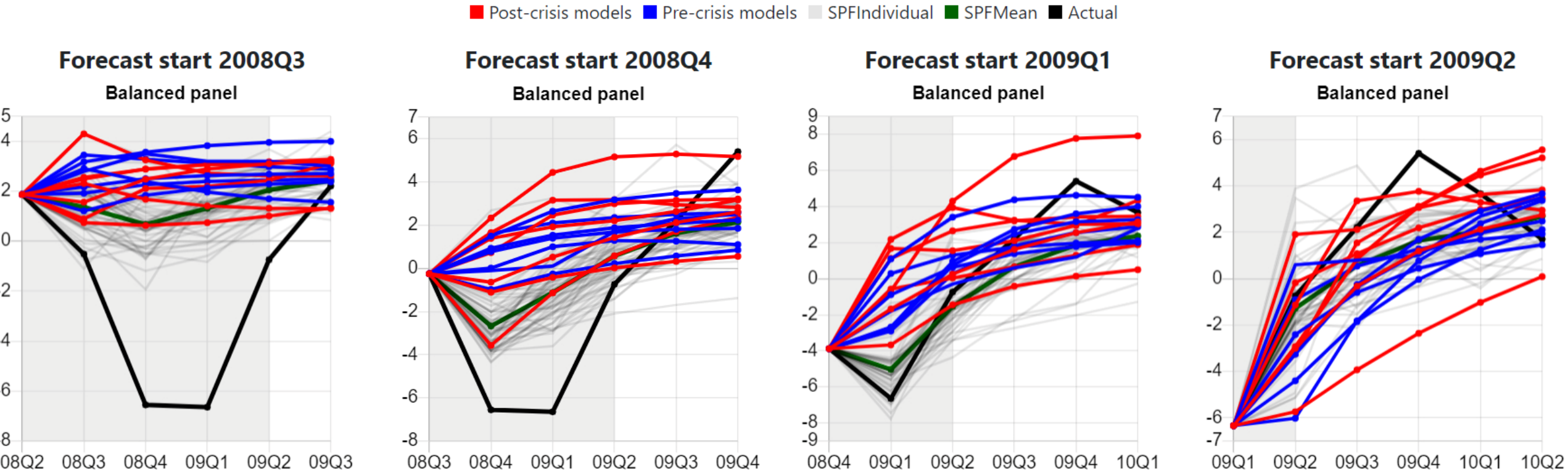
Table 1: Model Overview

Name/Reference	Short Name	Description	Observable Variables
	Pre-crisis models		
Del Negro and Schorfheide (2004)	DS04	standard 3-equation New Keynesian model with forward looking IS- and Phillips curve with government spending, technology and monetary policy shocks	3: output, inflation, interest rate
Wieland and Wolters (2011)	WW11	standard 3-equation New Keynesian model with forward looking IS- and Phillips curve with government spending, technology, monetary policy, preference and markup shocks	3: output, inflation, interest rate
Smets and Wouters (2007)	SW07	medium-scale DSGE model with nominal and real frictions and seven structural shocks	7: output, consumption, investment, inflation, wages, hours, interest rate
Fratto and Uhlig (2020)	FU20	medium-scale DSGE model that is only different from the SW07 model in its shock processes	7: output, consumption, investment, inflation, hours, wages, interest rate
Edge et al. (2008)	FRBEDO08	medium-scale DSGE-model developed at the Federal Reserve. Two sectors with different technology growth rates, demand side disaggregated into different consumption and investment components	11: output, inflation, interest rate, consumption of non-durables and services, consumption of durables, residential investment, business investment, hours, wages, inflation for consumer non-durables and services, inflation for consumer durables
Gali et al. (2012)	GSW12	medium-scale DSGE model similar to Smets and Wouters (2007) + labor market dynamics	8: output, consumption, investment, inflation, wages, employment level, unemployment rate, interest rate
Fair (2004)	Fair	large-scale Cowles-Commission type model with 25 stochastic equations + about 100 identities, large degree of disaggregation	more than 100
	Post-crisis models with Financial Frictions		
Bernanke et al. (1999)	NKBGG	small New Keynesian model with financial accelerator, estimated version of Bernanke et al. (1999) with small extensions	5: output, inflation, interest rate, investment, credit spread
Iacoviello and Neri (2010)	IN10	medium-scale DSGE model similar to Smets and Wouters (2007) + financing frictions + housing sector	10: consumption, residential investment, business investment, inflation, hours in the housing sector, hours in the goods sector, house prices, interest rate, wages in the housing sector, wages in the goods sector
Christiano et al. (2014)	CMR14	medium-scale DSGE model similar to Smets and Wouters (2007) + financial accelerator + fluctuations in idiosyncratic uncertainty	12: output, consumption, investment, inflation, relative price of investment goods, wages, hours, interest rate, credit growth, credit spread, term spread, net worth
Del Negro et al. (2015)	DNGS15	medium-scale DSGE model similar to Smets and Wouters (2007) + financial accelerator	8: output output, consumption, investment, inflation, wages, hours, interest rate, credit spread
Kolasa and Rubaszek (2015)	KR15_FF	medium-scale DSGE model (Del Negro et al., 2007) + financial accelerator	9: output, consumption, investment, inflation, wages, hours, interest rate, credit spread, loan growth
Kolasa and Rubaszek (2015)	KR15_HH	medium-scale DSGE model (Del Negro et al., 2007) + financing frictions + housing sector	11: output, consumption, investment, inflation, wages, hours, interest rate, residential investment, mortgage loans, house prices, mortgage loan spread
Carabenciov et al. (2008)	QPM08	IMF Quarterly Projection model without microeconomic foundations, hybrid IS- and Phillips curve, flexible long-run equilibrium	5: output, inflation, interest rate, unemployment rate, bank lending tightness
	Bayesian VARs		
Giannone et al. (2015b)	GLP3v, GLP5v, GLP8v	Bayesian VARs with optimal shrinkage prior estimated on the same observables as the above models	3 (same as the DS04 model), 5 (same as the NKBGG model), or 8 (same as the DNGS15 model)

Mean model forecasts vs mean SPF 08/09



Few macro-financial models close to SPF in short run, more models close in the longer run



Comparing accuracy systematically

- Root mean squared errors

$$RMSE_{j,h} = \sqrt{\frac{1}{T_1 - T_0 - h + 1} \sum_{T=T_0+h-1}^{T_1} (E[y_{j,T+h}|I_T] - y_{T+h})^2},$$

2008/09: Some models beat SPF at 3 to 4-quarter horizons (recovery phase)

Source	SW07				DS04				WW11				FU20				GSW12				FRBED008				Fair
Scenario	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	
0	1.76		2.06		2.10		2.72		2.37		2.88		2.38		2.15		1.88		1.69		2.50		1.88		1.91
1	1.30	1.22	1.53	1.36	1.31	1.23	1.27	1.12	1.37	1.30	1.34	1.23	1.55	1.39	1.59	1.46	1.31	1.15	1.33	1.28	1.45	1.31	1.41	1.14	1.32
Horizon 2	1.19	1.08	1.32	1.22	1.16	1.12	1.15	1.12	1.15	1.14	1.15	1.14	1.34	1.23	1.37	1.28	1.06	0.94	1.04	1.04	1.24	1.21	1.35	1.04	1.24
3	1.08	0.82	1.11	1.04	1.11	1.13	1.14	1.22	1.05	1.09	1.08	1.14	1.11	1.06	1.12	1.16	0.73	0.55	0.77	0.63	0.89	0.94	1.40	1.06	1.21
4	1.30	1.00	0.66	0.59	0.98	1.02	1.06	1.17	0.89	0.93	0.96	1.03	0.83	0.88	0.73	0.74	1.31	1.33	0.95	1.06	1.02	0.89	1.28	1.11	0.99

Source	NKBGG				QPM08				DNBS15				CMR14				KR15_FF				KR15_HH			
Scenario	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC
0	2.45		2.45		2.57		2.39		1.55		0.91		2.04		1.42		1.98		2.89		1.98		2.62	
1	1.46	1.35	1.39	1.27	1.34	1.30	1.30	1.30	1.15	1.13	1.04	1.07	1.41	1.25	1.24	1.18	1.55	1.13	1.56	1.43	1.49	1.13	1.63	1.13
Horizon 2	1.19	1.16	1.17	1.15	1.06	1.08	1.05	1.09	1.05	1.14	1.03	1.13	1.38	1.25	1.33	1.23	1.21	1.05	1.21	1.09	1.32	1.07	1.52	1.26
3	0.92	0.93	0.93	0.94	0.86	0.86	0.80	0.86	1.27	1.48	1.30	1.48	1.39	1.33	1.41	1.38	0.87	0.85	0.91	0.80	1.04	1.23	1.46	1.28
4	0.88	0.86	0.87	0.85	1.26	1.14	1.26	1.15	1.63	1.66	1.69	1.76	0.94	0.93	1.11	1.13	0.83	0.87	0.87	0.86	1.38	2.11	1.49	1.81

Source	IN10				VI16_BGG				VI16_GK				3vBVAR				5vBVAR				8vBVAR				SPF Mean
Scenario	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	
0	1.49		1.96		2.19		2.09		2.20		2.09		2.58		2.61		2.49		2.26		2.03		1.79		2.32
1	0.99		0.99		1.47	1.11	1.48	1.13	1.42	1.06	1.45	1.06	1.38	1.26	1.37	1.26	1.44	1.28	1.36	1.26	1.44	1.35	1.41	1.32	4.64
Horizon 2	0.92		0.90		1.60	1.26	1.57	1.26	1.54	1.14	1.54	1.13	1.28	1.19	1.23	1.16	1.39	1.28	1.34	1.24	1.39	1.32	1.39	1.28	4.52
3	0.94		0.99		2.50	2.13	2.44	2.09	2.28	1.83	2.25	1.80	1.47	1.42	1.39	1.33	1.83	1.73	1.78	1.59	1.80	1.66	1.85	1.56	2.42
4	1.11		1.20		2.86	2.60	2.82	2.60	2.60	2.26	2.55	2.30	1.22	1.51	1.17	1.46	1.78	1.86	1.80	1.74	1.67	1.62	1.75	1.53	1.83

2000/01 recession: Primarily macro models beat SPF short-run

(Professionals feared Sep 11 deepening recession)

Source	SW07				DS04				WW11				FU20				GSW12				FRBED08				Fair
Scenario	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	
0	0.64		0.66		0.72		0.91		0.86		1.00		0.56		0.59		0.76		1.36		0.64		0.95		1.04
1	0.68	0.66	0.69	0.69	0.92	0.94	0.95	1.01	0.93	0.95	0.94	0.98	0.63	0.70	0.70	0.70	0.97	0.89	0.72	0.77	0.83	0.97	0.92	0.96	0.99
Horizon 2	0.79	0.74	0.74	0.78	0.97	0.91	0.96	0.91	0.97	0.93	0.97	0.93	0.78	0.74	0.76	0.74	0.85	0.88	0.81	0.84	0.97	0.89	0.94	0.91	0.78
3	1.45	1.33	1.42	1.20	1.07	1.11	1.14	1.22	1.04	1.07	1.08	1.15	1.41	1.32	1.32	1.22	1.40	1.04	1.49	1.35	1.06	1.20	1.12	1.12	1.43
4	1.19	1.32	1.15	1.32	0.90	0.89	0.89	0.89	0.89	0.89	0.88	0.87	1.32	1.36	1.28	1.32	1.70	1.66	1.67	1.64	0.91	0.89	0.89	0.91	1.16

Source	NKBGG				QPM08				DNBS15				CMR14				KR15_FF				KR15_HH				
Scenario	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	
0	0.53		0.66		0.67		0.87		0.71		1.11		0.50		0.66		0.71		1.38		0.71		0.76		
1	0.76	0.82	0.80	0.86	0.74	0.67	0.68	0.72	0.99	0.97	1.07	1.05	0.85	0.95	0.91	1.00	0.99	1.21	1.10	1.21	1.00	1.21	0.71	1.21	
Horizon 2	0.81	0.82	0.79	0.80	0.88	0.95	0.86	0.86	1.00	0.96	1.07	1.02	0.99	0.89	0.93	0.93	0.91	0.83	0.98	0.86	0.88	0.67	0.99	0.93	
3	1.23	1.21	1.28	1.25	0.91	1.02	0.88	0.80	1.81	1.76	1.97	1.92	1.57	1.63	1.68	1.71	1.19	1.04	1.11	1.07	1.12	1.24	0.83	1.03	
4	1.17	1.17	1.17	1.17	1.03	1.10	1.07	1.11	1.41	1.40	1.46	1.43	1.18	1.23	1.20	1.18	1.07	1.08	1.12	1.10	1.41	1.28	0.95	0.92	

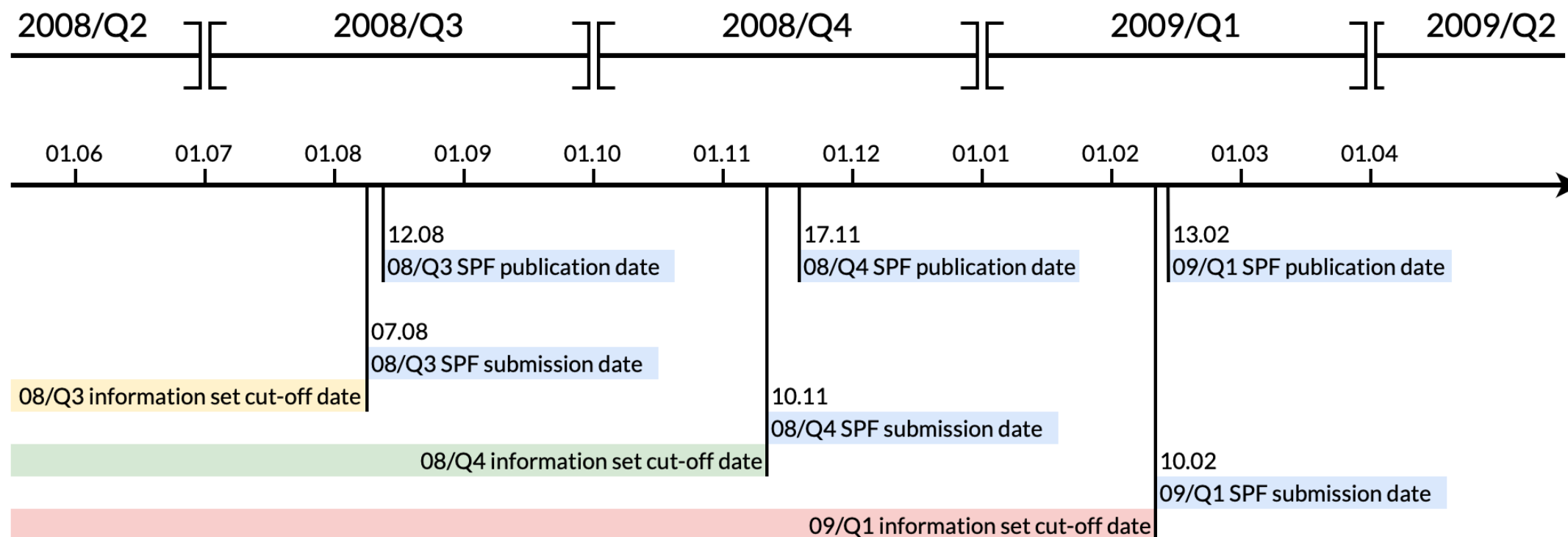
Source	IN10				VI16_BGG				VI16_GK				3vBVAR				5vBVAR				8vBVAR				SPF
Scenario	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	BP	SPF	CQ	FC	Mean
0	0.80		1.42		1.28		1.36		1.41		1.46		1.43		1.16		1.18		0.85		0.81		0.75		2.34
1	1.29		1.30		1.60	1.27	1.62	1.27	1.67	1.31	1.68	1.33	1.12	1.08	1.19	1.14	1.16	1.14	1.19	1.17	0.95	0.94	1.03	1.05	3.05
Horizon 2	1.41		1.40		1.84	1.43	1.87	1.45	1.91	1.46	1.92	1.50	1.31	1.27	1.42	1.31	1.36	1.27	1.45	1.33	1.18	1.20	1.16	1.06	2.62
3	2.76		2.58		3.58	3.14	3.67	3.20	3.68	3.16	3.72	3.28	1.38	1.32	1.50	1.39	1.35	1.33	1.48	1.42	1.19	1.29	1.18	1.23	1.55
4	2.40		2.16		3.18	2.88	3.23	2.93	3.21	2.90	3.23	2.96	1.34	1.41	1.61	1.55	1.31	1.35	1.55	1.60	1.06	1.36	1.23	1.17	1.74

Making up for the disadvantage of models' nowcasts

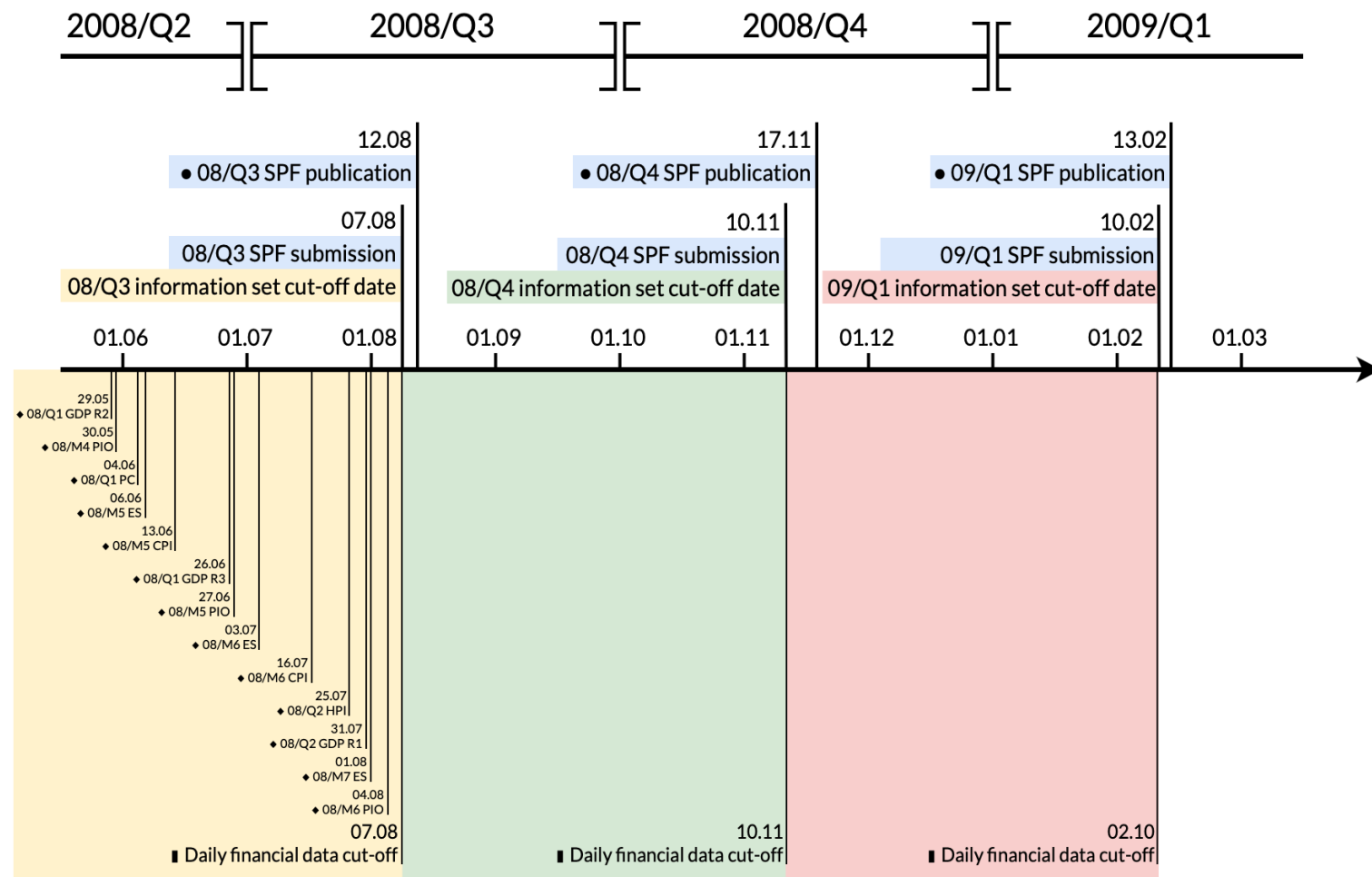
Expanding the information set for **nowcasting** the current quarter:

- (1) Condition on current quarter SPF nowcasts of output growth, unemployment rate, non-residential investment, residential investment
- (2) Condition on current quarter data: interest rates, credit spreads, mortgage spreads, and monthly observations such as inflation, unemployment, hours.
- (3) Condition on (2) and (3).

The timeline of releases



The timeline of releases



Abbreviations:

GDP: Gross Domestic Product Release from the U.S. Bureau of Economic Analysis
 PIO: Personal Income and Outlays Release from the U.S. Bureau of Economic Analysis
 PC: Labor Productivity and Costs Release from the U.S. Bureau of Labor Statistics
 ES: Employment Situation Release from the U.S. Bureau of Labor Statistics
 CPI: Consumer Price Index Release from the U.S. Bureau of Labor Statistics
 Rx: x-th release of the data, for example R1 for the first release

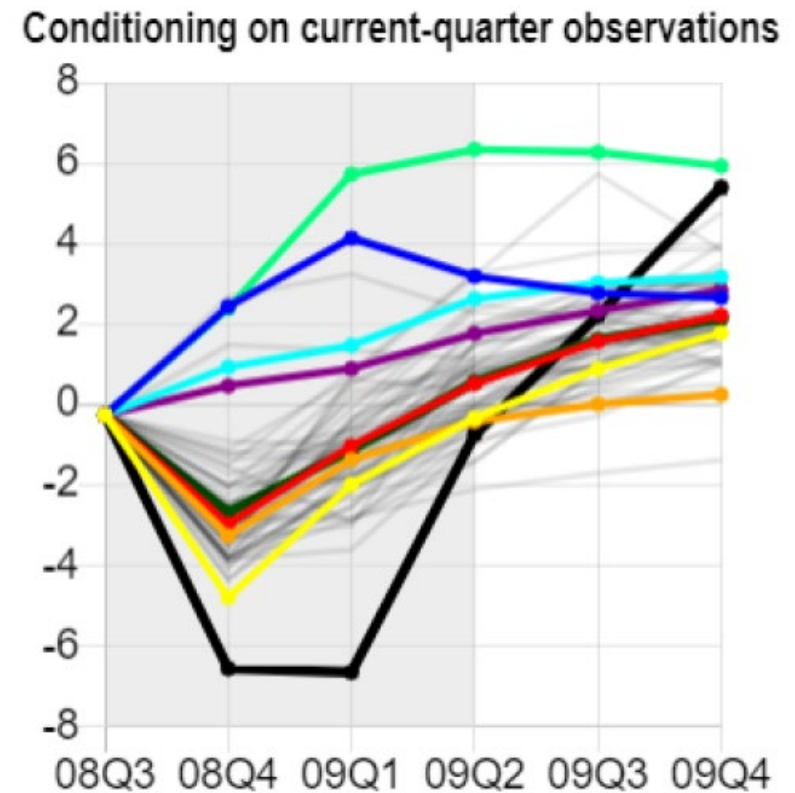
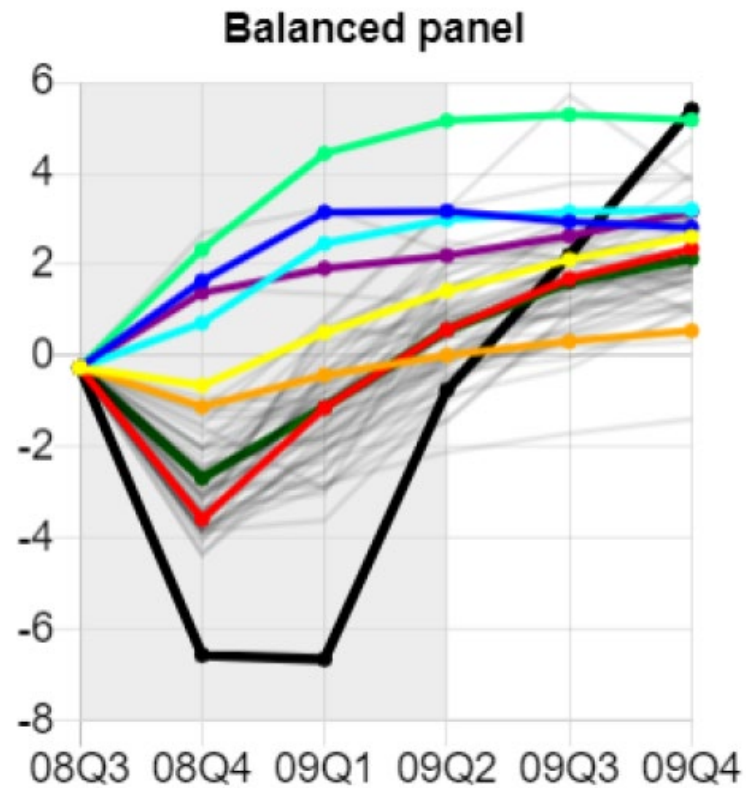
Legends

- ◆ Data included in all four scenarios
- Data included in the 2nd and 4th scenarios
- Data included in the 3rd and 4th scenarios

Post-GFC-type macro-financial models

CMR14 DNGS15 IN10 KR15_FF KR15_HH NKBGG QPM08 SPFIndividual SPFMean Actual

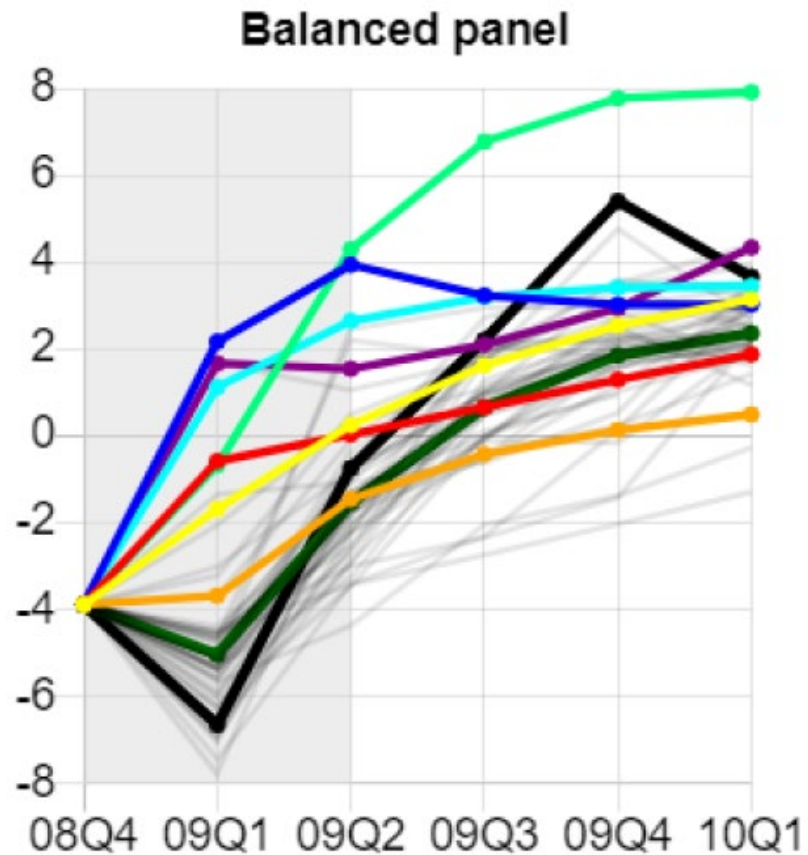
Forecast start 2008Q4



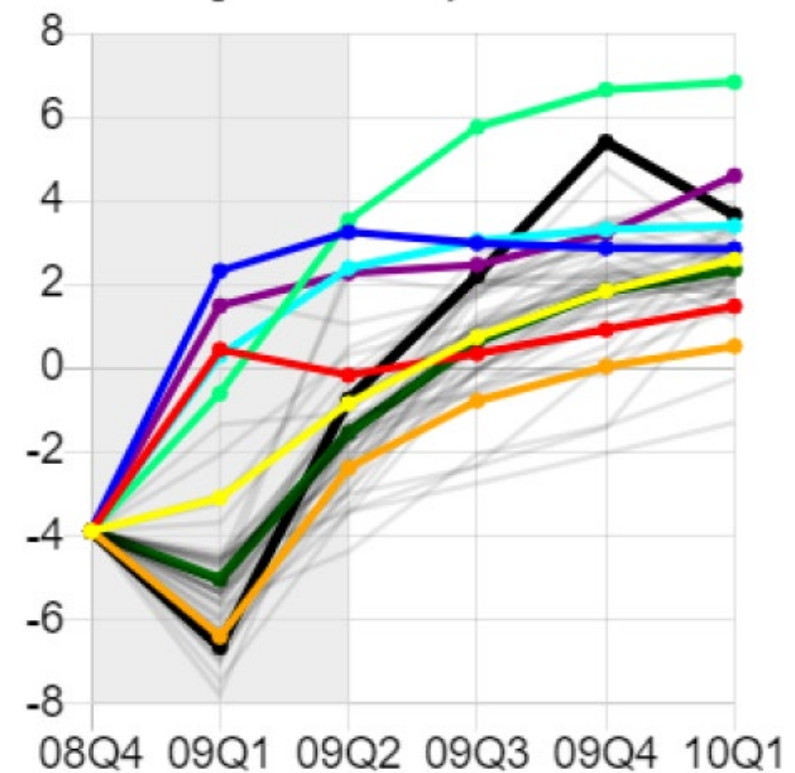
Post-GFC-type macro-financial models

CMR14 DNGS15 IN10 KR15_FF KR15_HH NKBGG QPM08 SPFIndividual SPFMean Actual

Forecast start 2009Q1



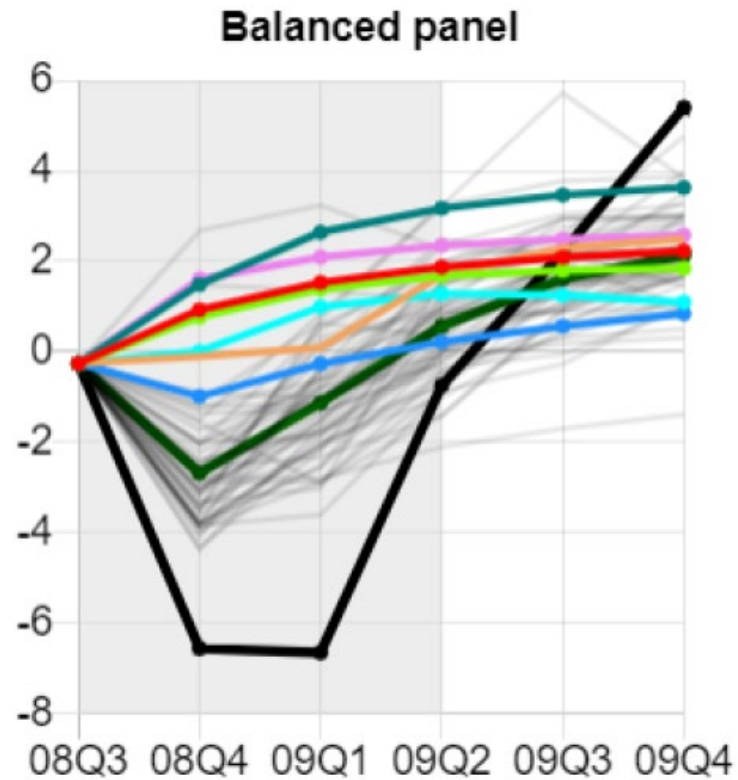
Conditioning on current-quarter observations



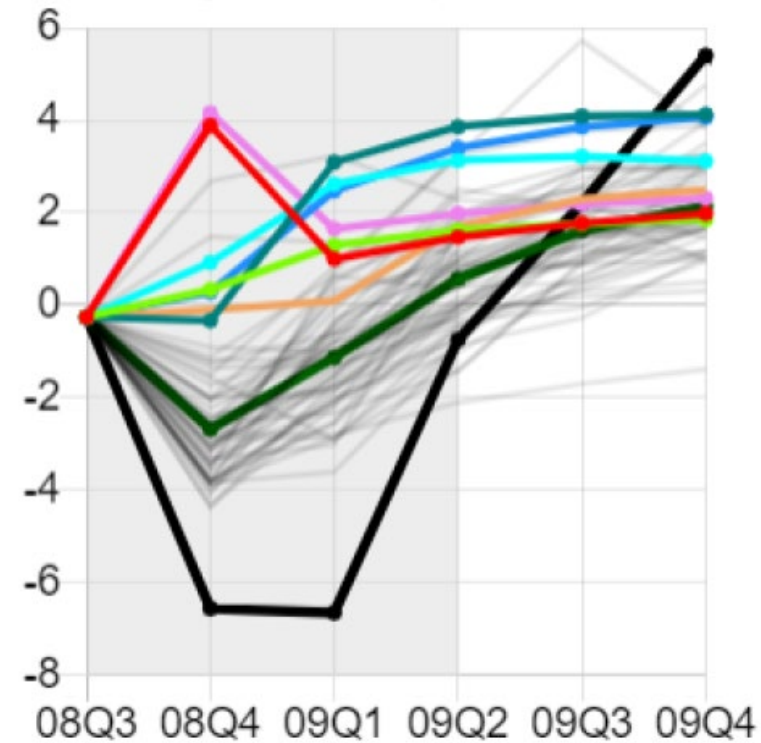
Pre-GFC-type macro models

■ DS04 ■ FRBEDO08 ■ FU20 ■ Fair ■ GSW12 ■ SW07 ■ WW11 ■ SPFIndividual ■ SPFMean ■ Actual

Forecast start 2008Q4



Conditioning on current-quarter observations

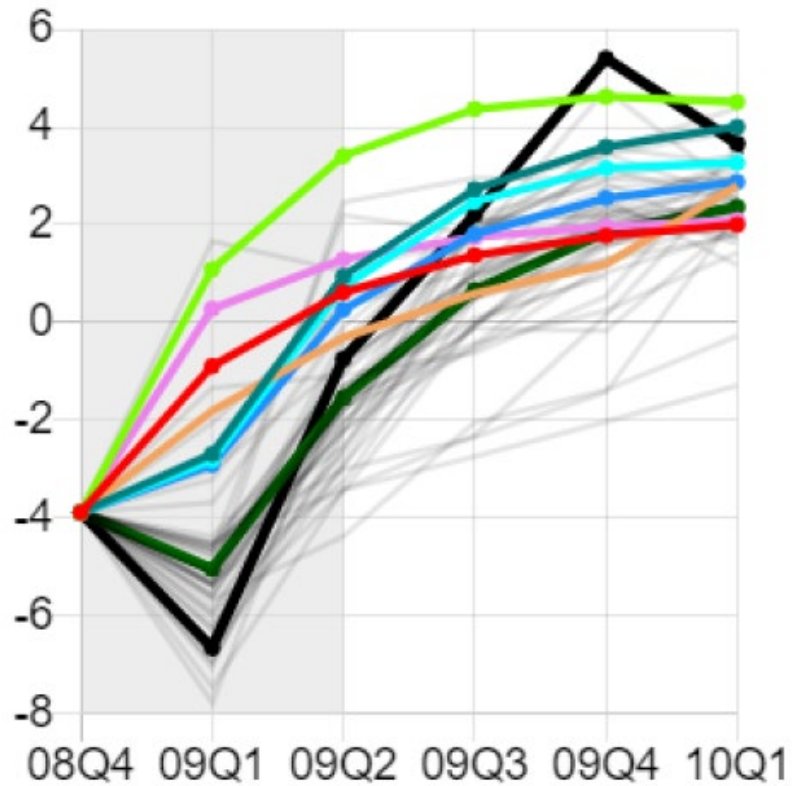


Pre-GFC-type macro models

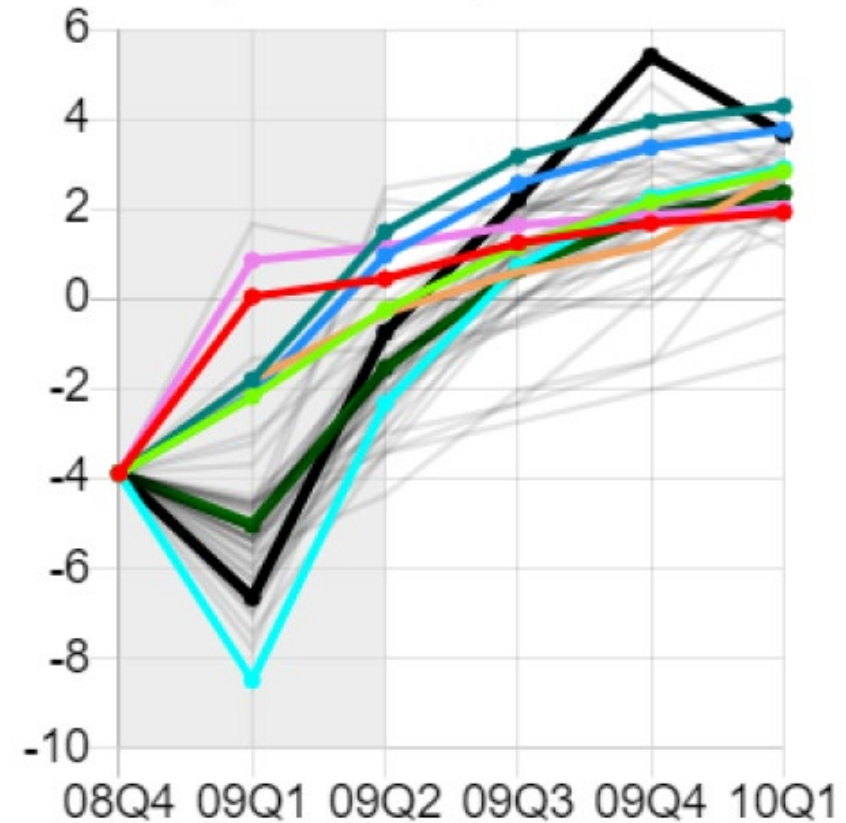
■ DS04 ■ FRBEDO08 ■ FU20 ■ Fair ■ GSW12 ■ SW07 ■ WW11 ■ SPFIndividual ■ SPFMean ■ Actual

Forecast start 2009Q1

Balanced panel

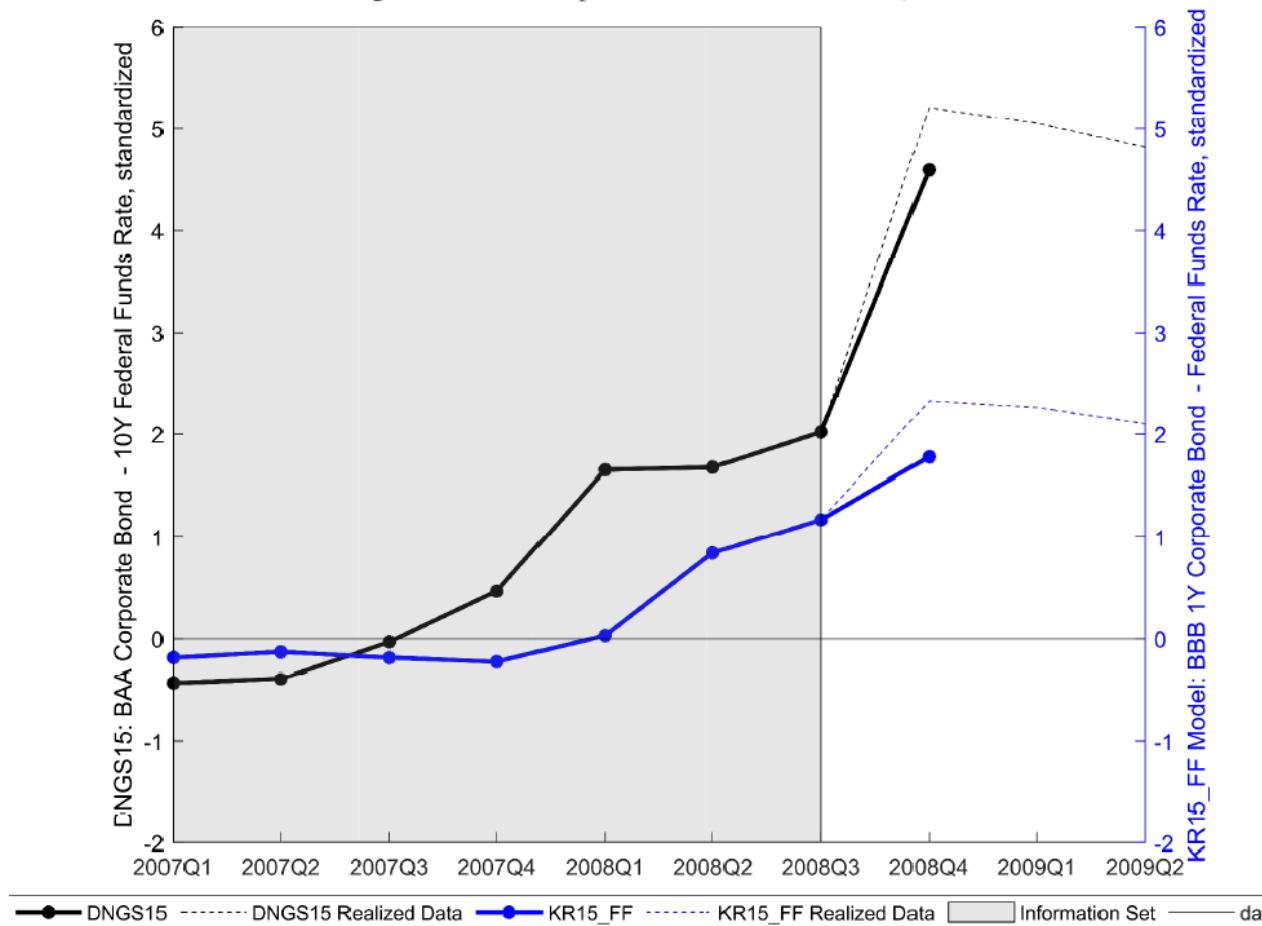


Conditioning on current-quarter observations



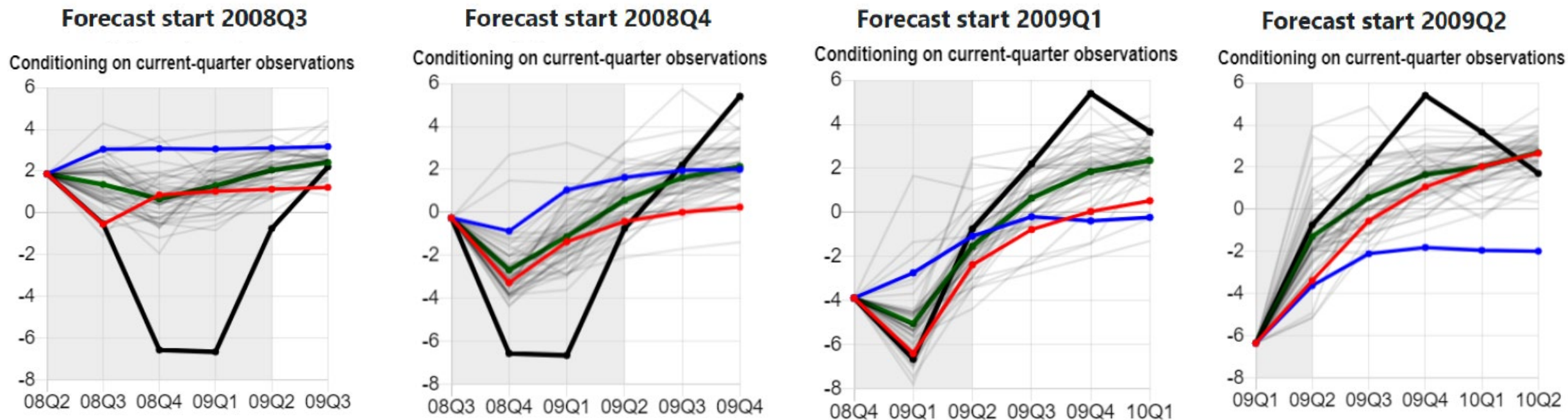
Key role of credit spread data (DNGS15, KR15_FF)

Figure 5: Credit Spread Variables in 2008Q4



Key role of model structure: DNGS15

■ DNGS15 ■ GLP8v ■ SPFIndividual ■ SPFMean ■ Actual

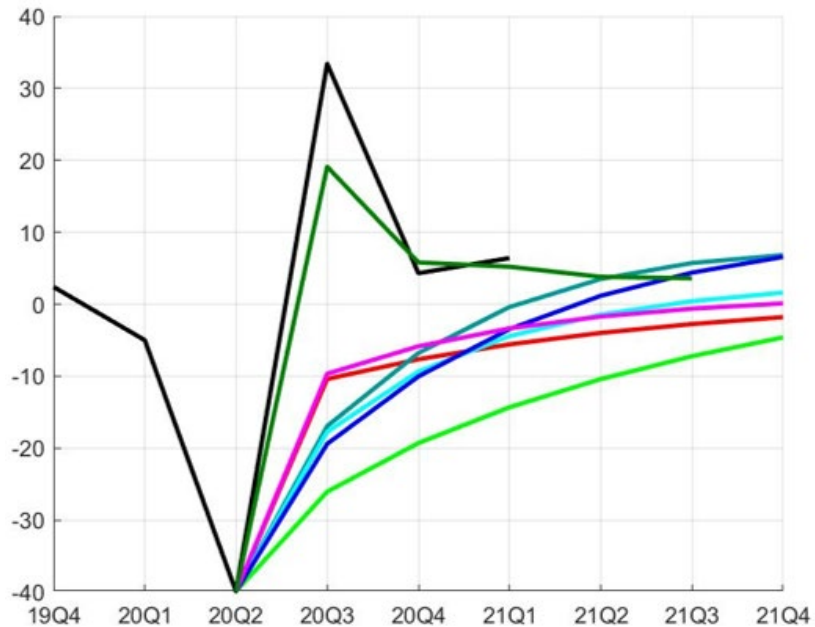


Forecasting the recovery from the corona crisis: Pre-GFC type models

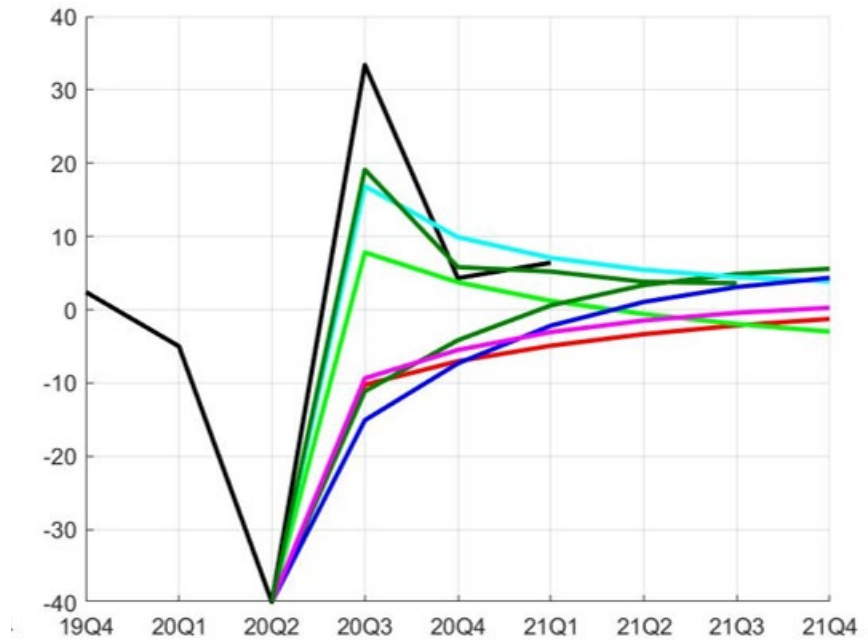
■ DS04 ■ FRBEDO08 ■ FU20 ■ GSW12 ■ SW07 ■ WW11 ■ SPFMean ■ Actual

Forecast start 2020Q3

Balanced panel



Conditioning on current-quarter observations

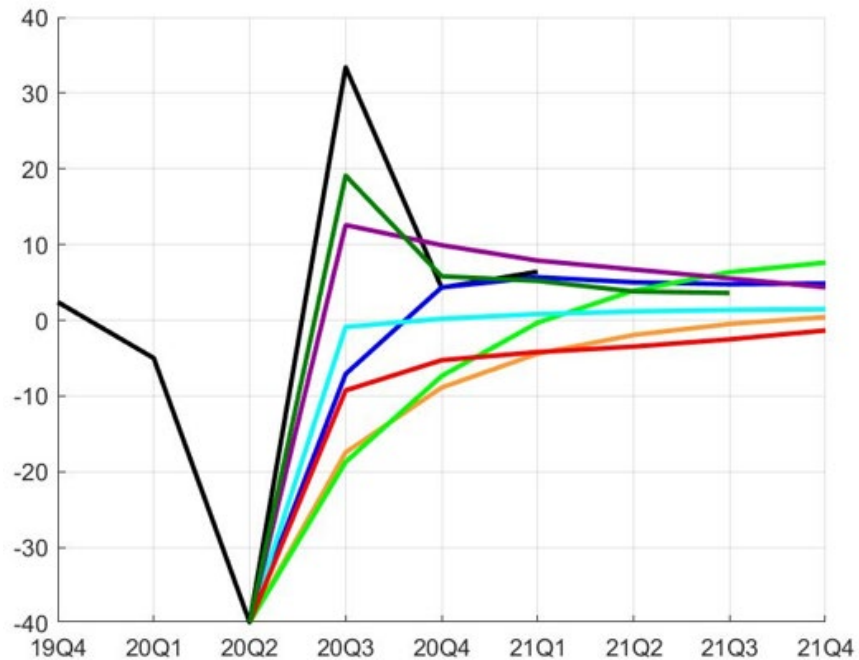


Forecasting the recovery from the corona crisis: Post-GFC type macro-financial models

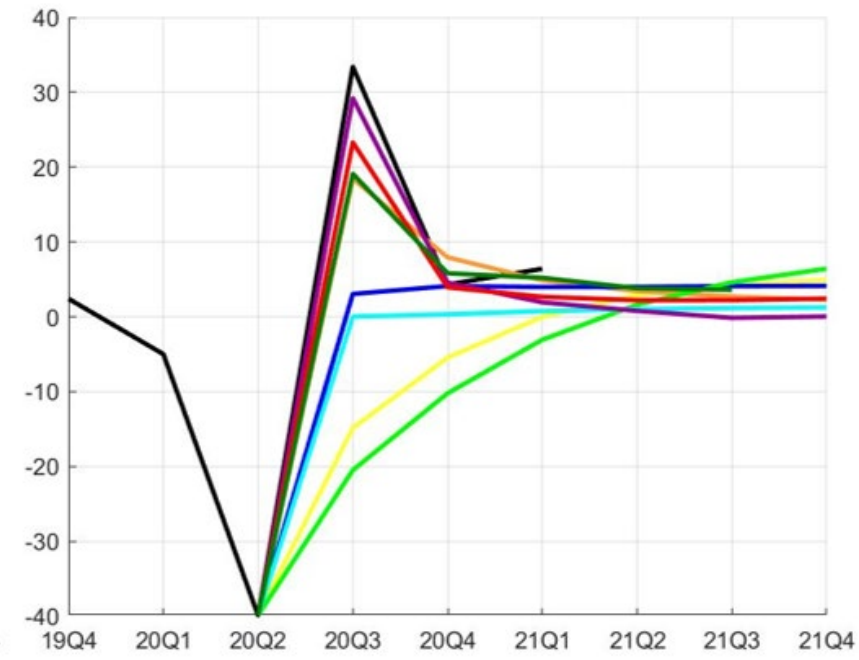
CMR14 DNGS15 IN10 KR15_FF KR15_HH NKBGG QPM08 SPFMean Actual

Forecast start 2020Q3

Balanced panel



Conditioning on current-quarter observations



Macro Modelling, Crises and Policy

1. How macroeconomic modelling developed
 - to provide quantitative policy advice and changed in response to macroeconomic crises
2. Comparing models and policies
 - Reproducibility! MMB: MacroModelBase & applications
3. A large-scale model competition: Forecasting recessions and recoveries
 - Replication! Out of sample forecasts for global financial crisis and corona crisis

FORECAST PLATFORM

Models

- ☐ US_NK_BAS ☐ US_SW07 ☐ DSGE_TEST ☐ NK_DS04
- ☐ US_FRBEDO08 ☐ NK_WW11 ☐ US_DNGS14 ☐ US_DNGS14_SW
- ☐ US_SW07_BGG
- ☐ BVAR - GLP prior ☐ BVAR - Minnesota prior **Minnesota prior parameters**

Estimation Methods

- ☐ Bayesian (Mode Estimation)
- ☐ Bayesian (Metropolis-Hastings)

Settings

Chain Length	50000	Burn-In	0.3
Number of Chains	2	Scale For Acceptance Rate	0.45

Plotting options

- ☐ Bayesian Impulse Response Functions with Periods = 10
- ☐ Historical Variance Decompositions with Periods = 10
- Plot variance decomposition in ☒ Absolute terms ☐ Relative terms

Data

Vintage Span

	Year(YYYY)	Quarter
First Vintage:	2007	Q4
Last Vintage:	2007	Q4

Data Type

☒ Real-Time ☐ Revised

Estimation Type

☒ Expanding Series ☐ Rolling Window

Sample settings

	Year(YYYY)	Quarter	Rolling Window Length (Quarters)
First Obs.:	1960	Q1	80

☐ Augment Data with SPF Nowcast ☐ Incl. Financial Variables as Nowcasts

Forecasts & Performances

Forecast Horizon: 5

Calculate RMSE

Plot Forecasts

Benchmark: Rev. Data(2Q Ahead)

Forecast Chart - Vintages

	Year(YYYY)	Quarter
First Vintage:	2007	Q4
Last Vintage:	2007	Q4

Plot Options

☐ Plot SPF

Model Forecasts: Mean

Density plot: NK_RW97_RT_E...

Continue