Nowcasting and Short-Term Forecasting of Russia GDP

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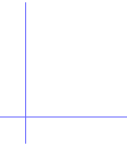
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Outline

- **Motivation**

- **Methodology and Data**

- **Results**

- **Implications**

  - New data and changes in a given nowcast

  - Block's contribution to GDP nowcast in 2014

- **Conclusions**

Motivation

1. Fill the gap in nowcasting and short-term forecasting at the Bank of Russia on the way to full Inflation Targeting

Whether large data set is necessary?

Pros:

- Large information set helps in forecasting: Boivin and Ng (2005), Forni, Hallin, Lippi, and Reichlin (2003)
- and nowcasting in some countries: CNB - Rusnak (2013), USA – "GDPNow"
- Bridge equations are not worse for nowcasting: Germany - Antipa et al. (2012), Brazil – Bragoli, et al. (2014)

- Robustness to outliers and revisions in individual series

Challenges:

- Low vs. high frequency
- Missing Values/"Ragged End Problem"
- Curse of dimensionality

Larger sample vs. smaller sample: Bessec (2012) on France

Full large sample vs. particular blocks of data: Bessec (2012) on France

2. Provide a closer look at "drivers" of GDP growth in Russia

Methodology and Data I

Dynamic Factor Model (DFM) of Doz, Giannone, Reichlin (2011), Giannone, Reichlin, Small (2008)

Consistent estimates of common factors

$$x_t = \Lambda F_t + \varepsilon_t$$
$$F_t = \Omega F_{t-1} + \xi_t$$
$$y_{t'} = C + A_1 F_{t'} + A_2 F_{t'-1} + \alpha y_{t'-1} + \eta_{t'}$$

Where: x_t- nx1 vector of monthly observed series at month t, after Mariano&Murasawa (2003) transformation

F_t - kx1 vector of monthly latent factors at month t

$y_{t'}$- quarterly real GDP growth (SA QoQ), $F_{t'} = F_t$ for t=3t', t'=1,2,3,....

ε_t - error term (not iid), independent of F_t;

ξ_t and η_t - iid,

$\varepsilon_t, \xi_t, \eta_t$ - independent of each other

Mariano&Murasawa (2003) transformation

Example: X_t - Industrial Production in month t

$$x_t = \frac{1}{3}((\ln X_t - \ln X_{t-3}) + (\ln X_{t-1} - \ln X_{t-4}) + (\ln X_{t-2} - \ln X_{t-5}))$$

Sample: January 2002 - November 2014

Surveys – 50 series

Hard data – 36 series

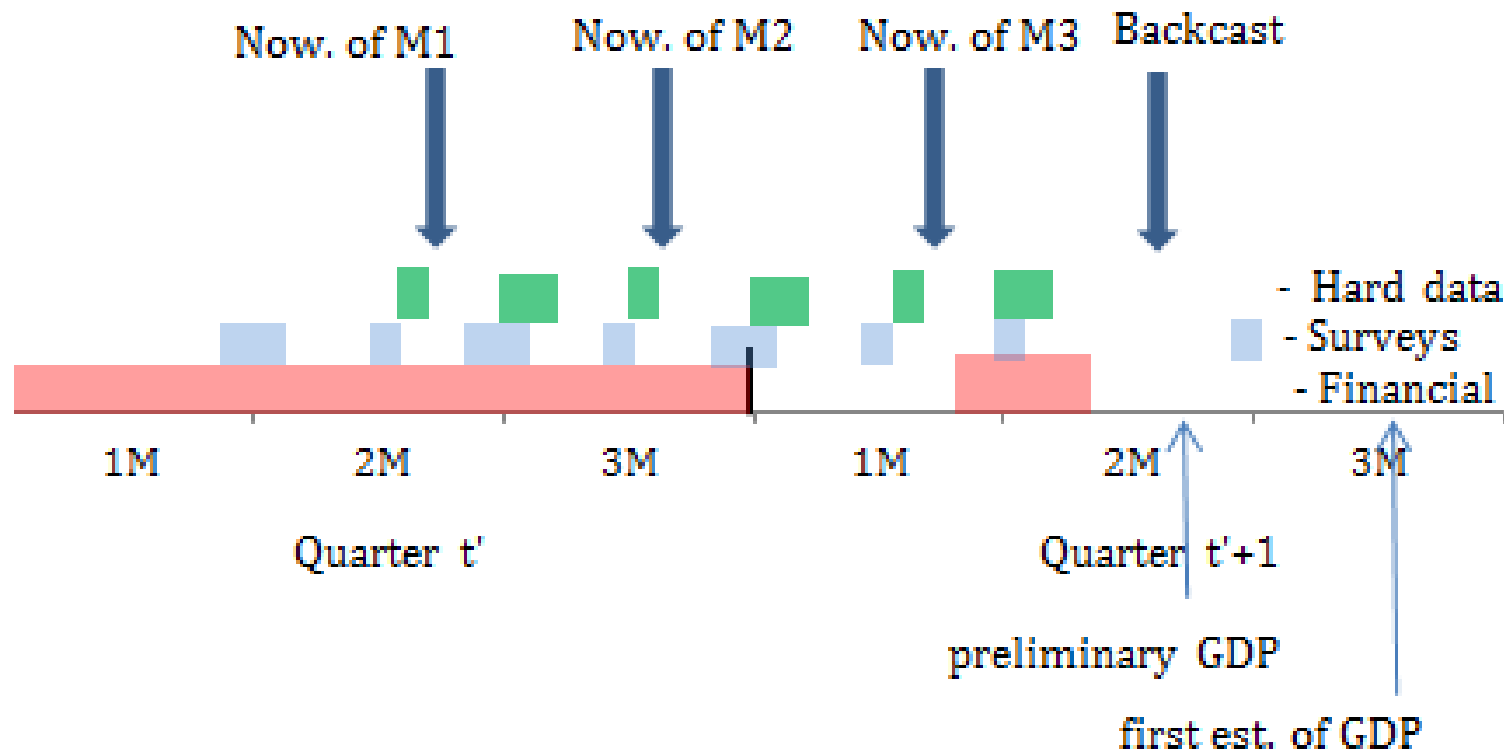External and Financial – 30 series

Full sample – 116 series

Pseudo Real Time starts January 2006 or January 2012

Revisions: lack of unrevised data series for Russia

Seasonality: month by month for out-of-sample SA in TRAMO/SEATS

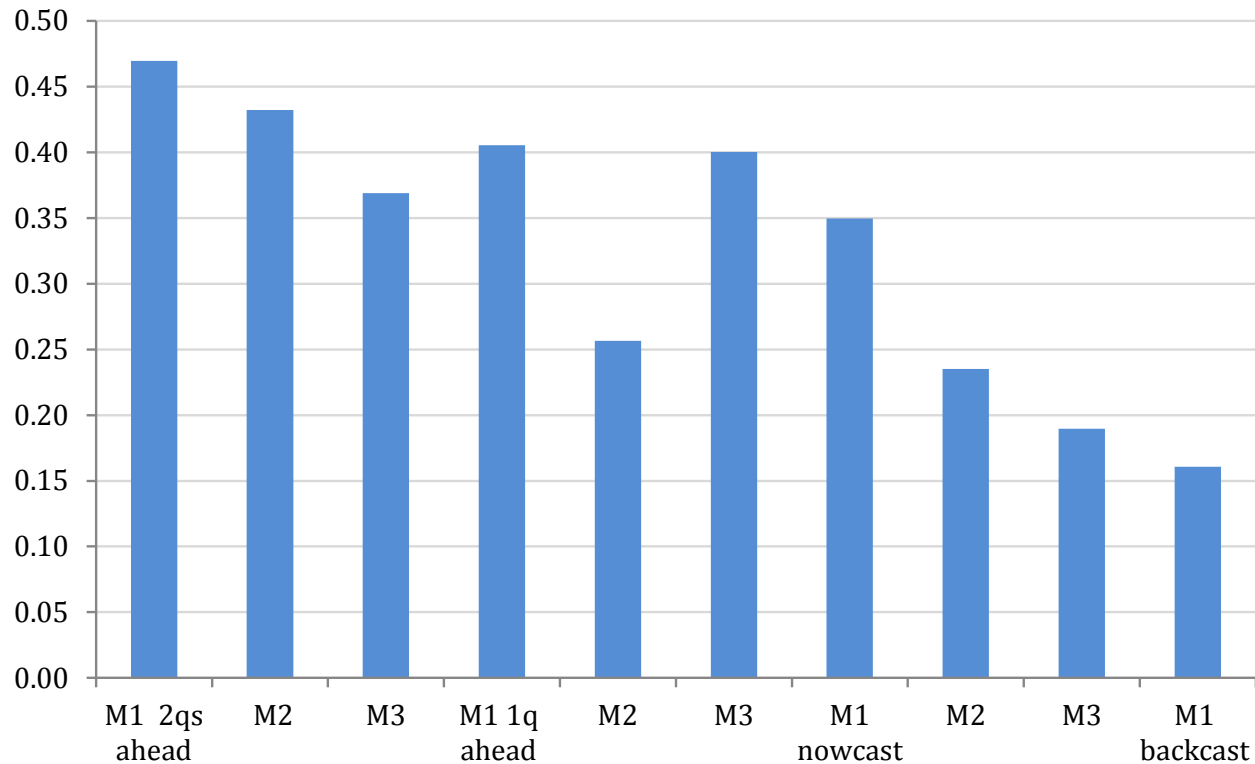Month t is included in calculations on 20th day after month t

Results I General

Root Mean Squared Error (RMSE) of out-of-sample backcast/nowcast/forecast in pseudo real time 2012 - 3rd quarter of 2014
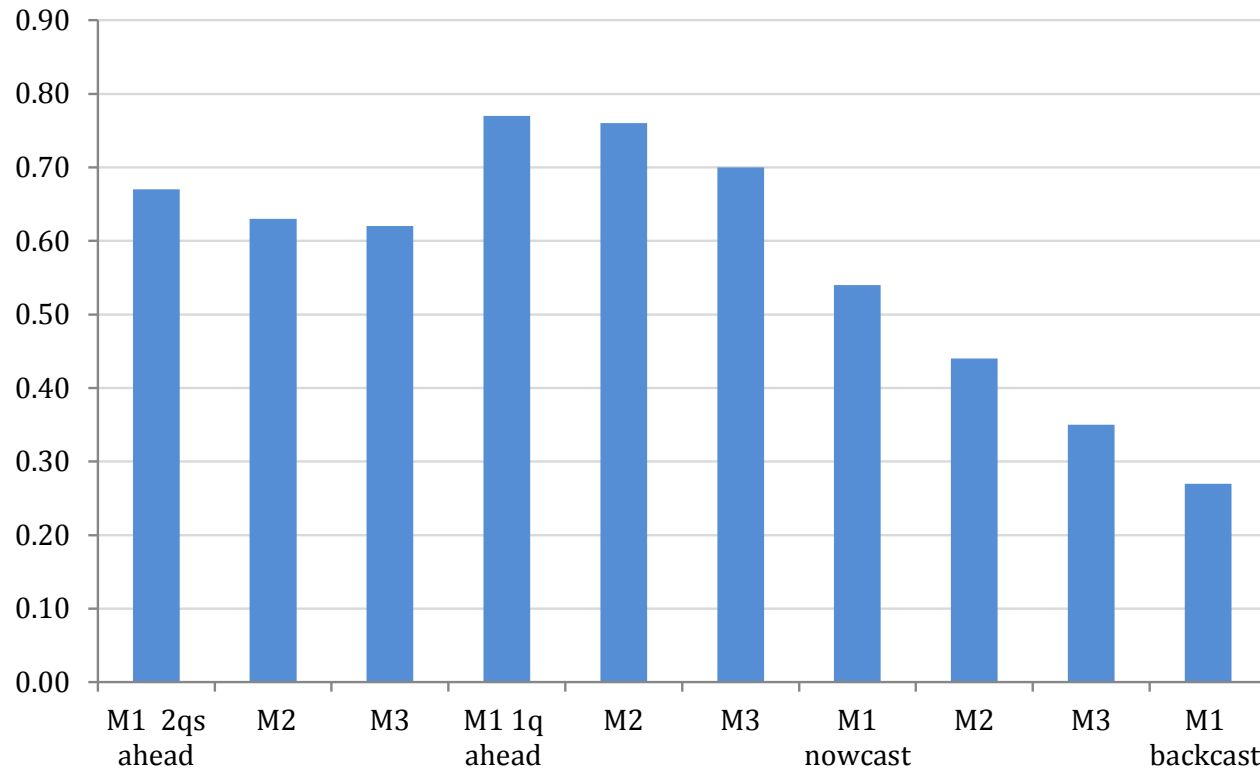
RMSE, full sample model with three factors, p.p. of QoQ GDP growth
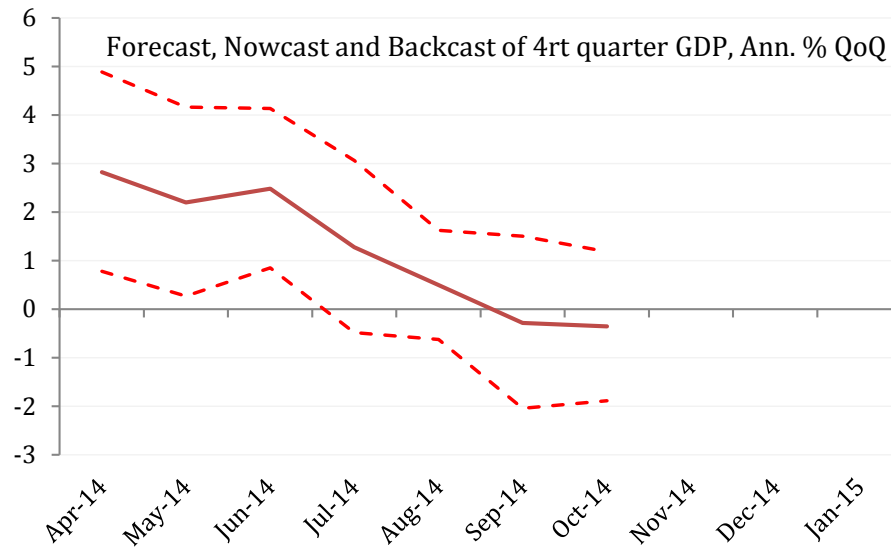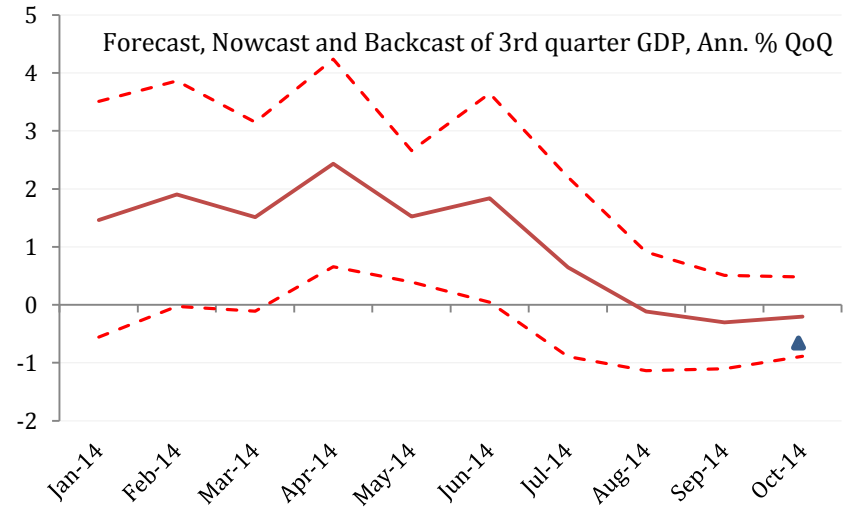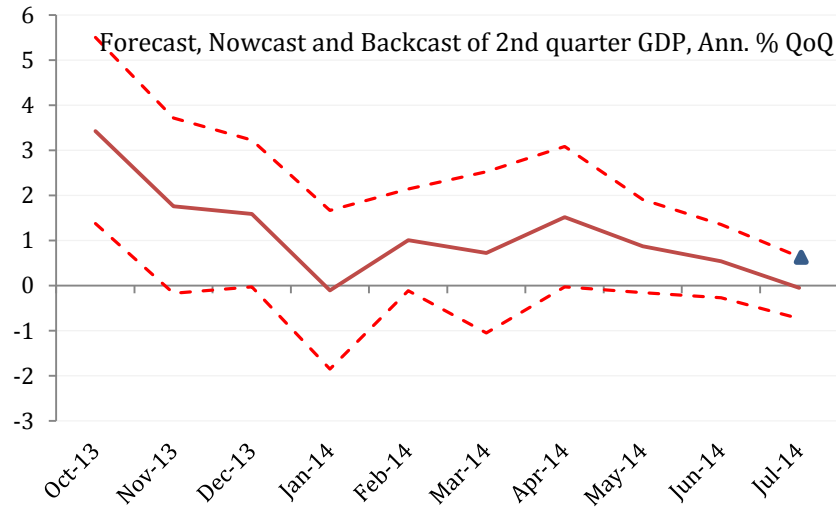
Results II General

Root Mean Squared Error (RMSE) of out-of-sample backcast/nowcast/forecast in pseudo real time 2006 - 3rd quarter of 2014

RMSE, full sample model with three factors, p.p. of QoQ GDP growth

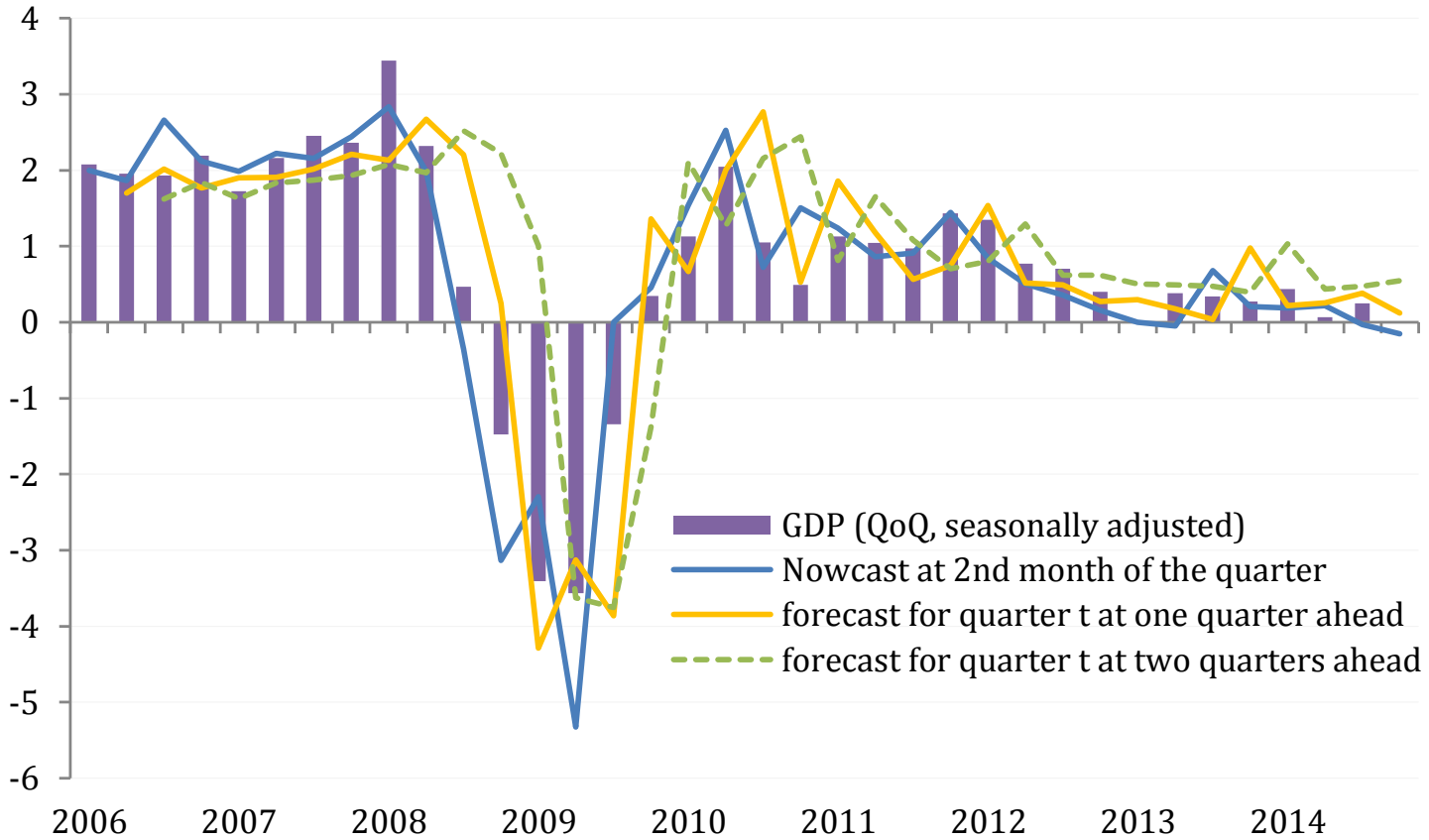# Results III Bootstrapping 70% confidence intervals

Forecast, Nowcast and Backcast of 2nd quarter GDP, Ann. % QoQ

Forecast, Nowcast and Backcast of 3rd quarter GDP, Ann. % QoQ

Forecast, Nowcast and Backcast of 4rt quarter GDP, Ann. % QoQ

Results IV Nowcasts and Forecasts vs. QoQ GDP

Legend:
- GDP (QoQ, seasonally adjusted)
- Nowcast at 2nd month of the quarter
- forecast for quarter t at one quarter ahead
- forecast for quarter t at two quarters ahead

Source: Rosstat, Bank of Russia calculations
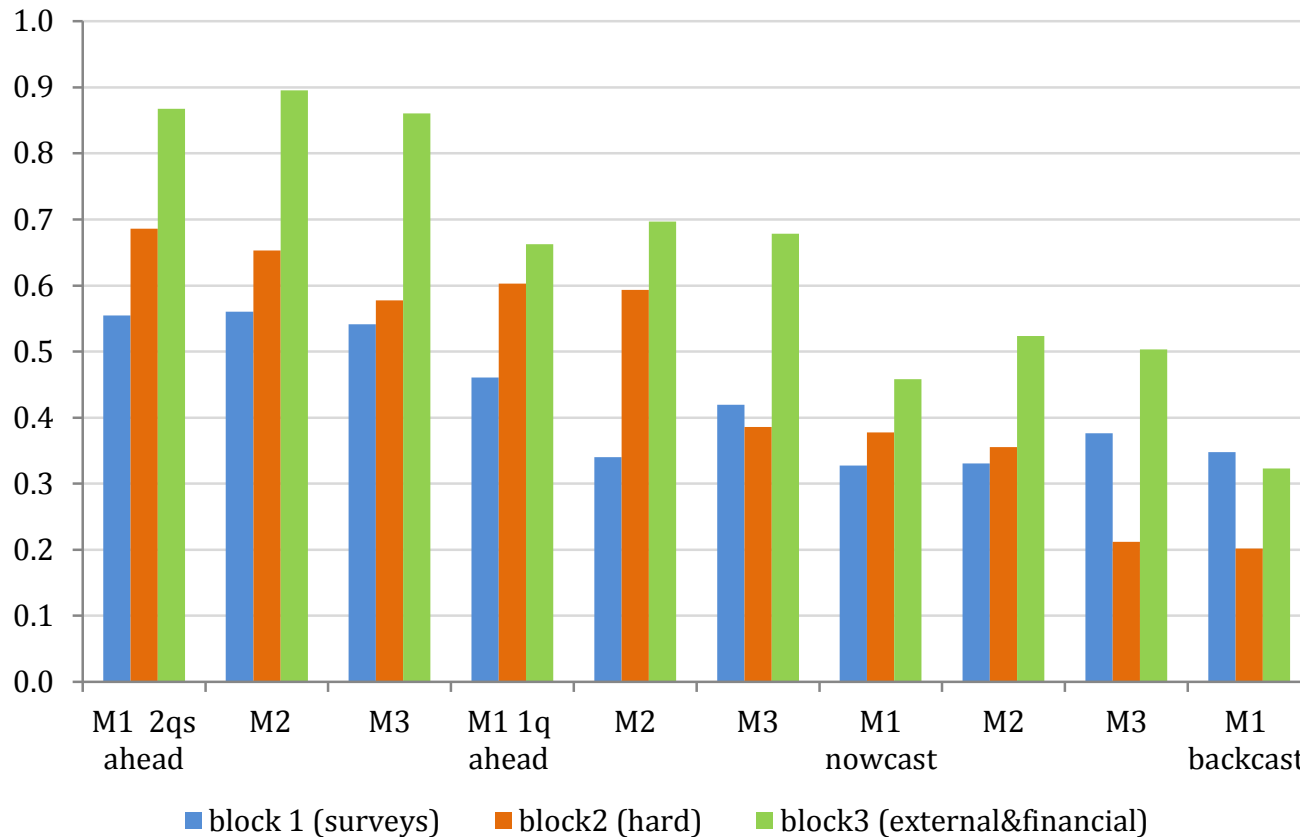
Diebold&Mariano (2002) test: 5% significance for full sample (or surveys) comparing with other combinations at forecasting. Hard data win at Nowcasting
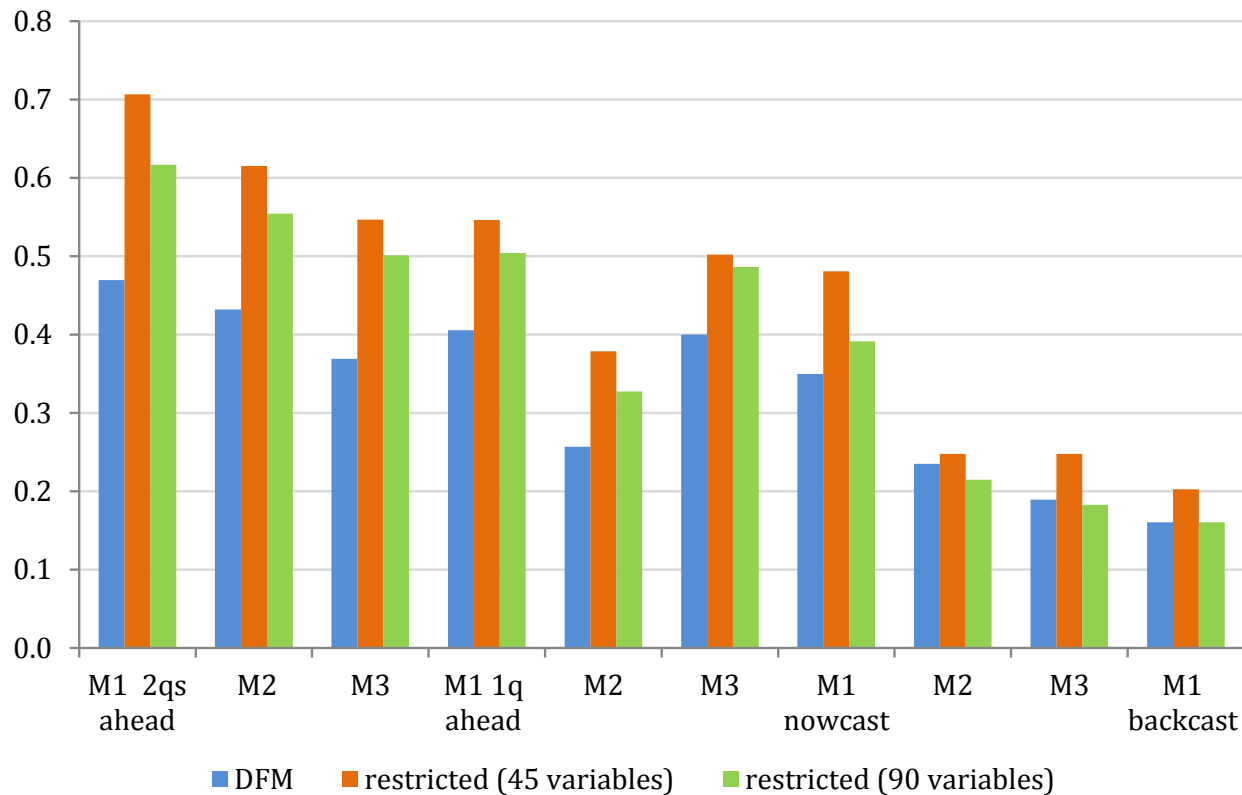
Restricted sample: balanced by blocks of 90 or 45 series

Diebold&Mariano (2002) test: the full DFM model is better for forecasting

Sample: from 2012 to 3ʳᵈ quarter 2014

RMSEs relative to RW, ratio
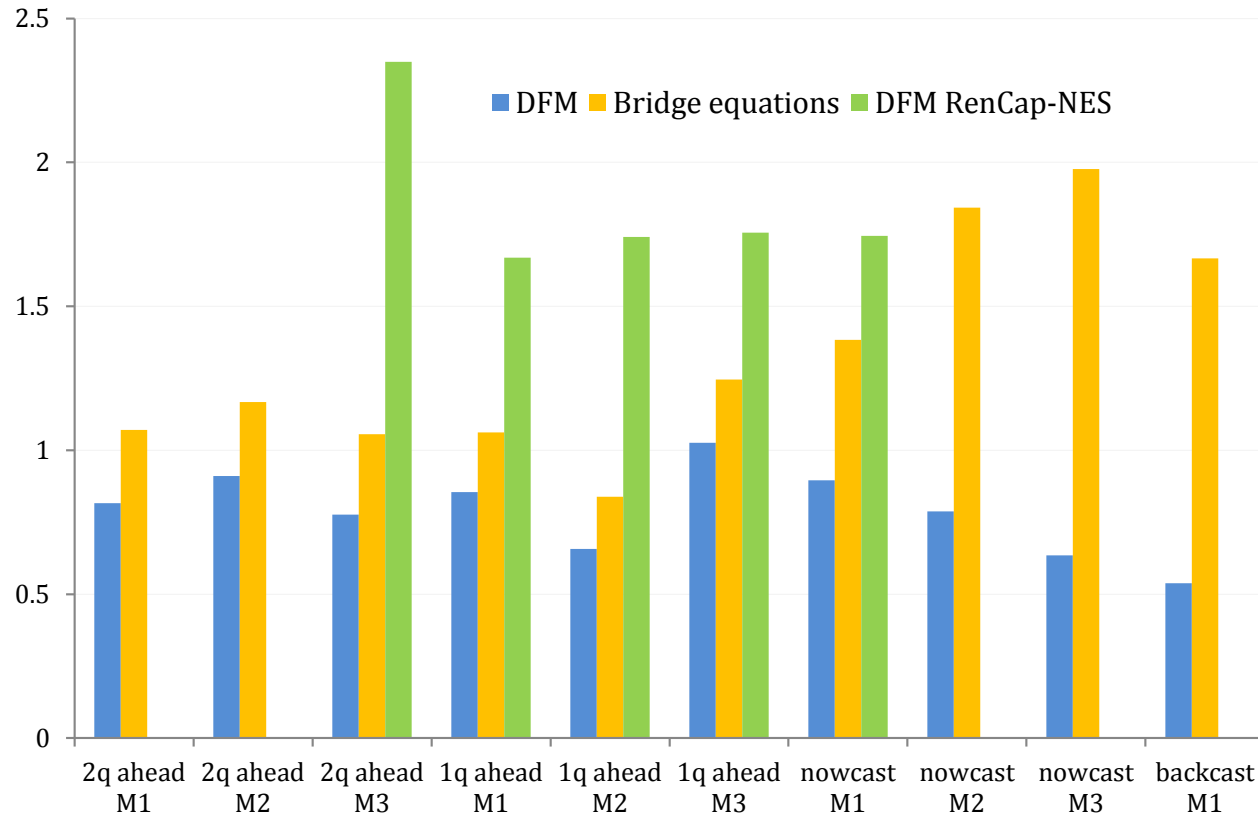
Diebold&Mariano (2002) test: the DFM model is better even for forecasting
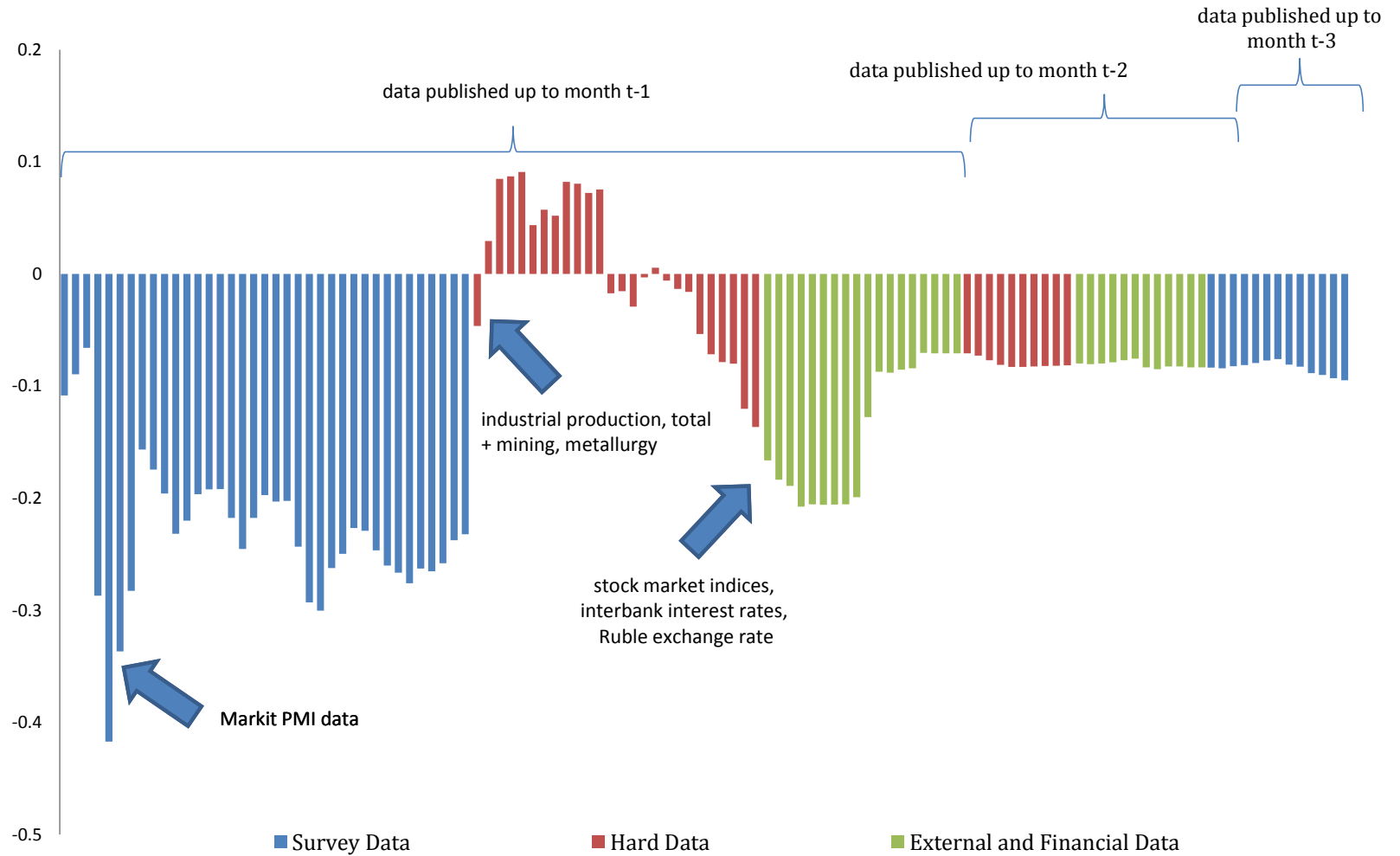
How to define which block comes first? Look at average over 6 (=3*2*1) decompositions

GDP nowcast and contemporary block contributions to the nowcast at given month, %QoQ

Lagged GDP impact is ususally small and absent for simplicity

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According to our exercise, we produce GDP forecast for the whole year as soon as April's statistics is released

Source: Rosstat, Bank of Russia calculations

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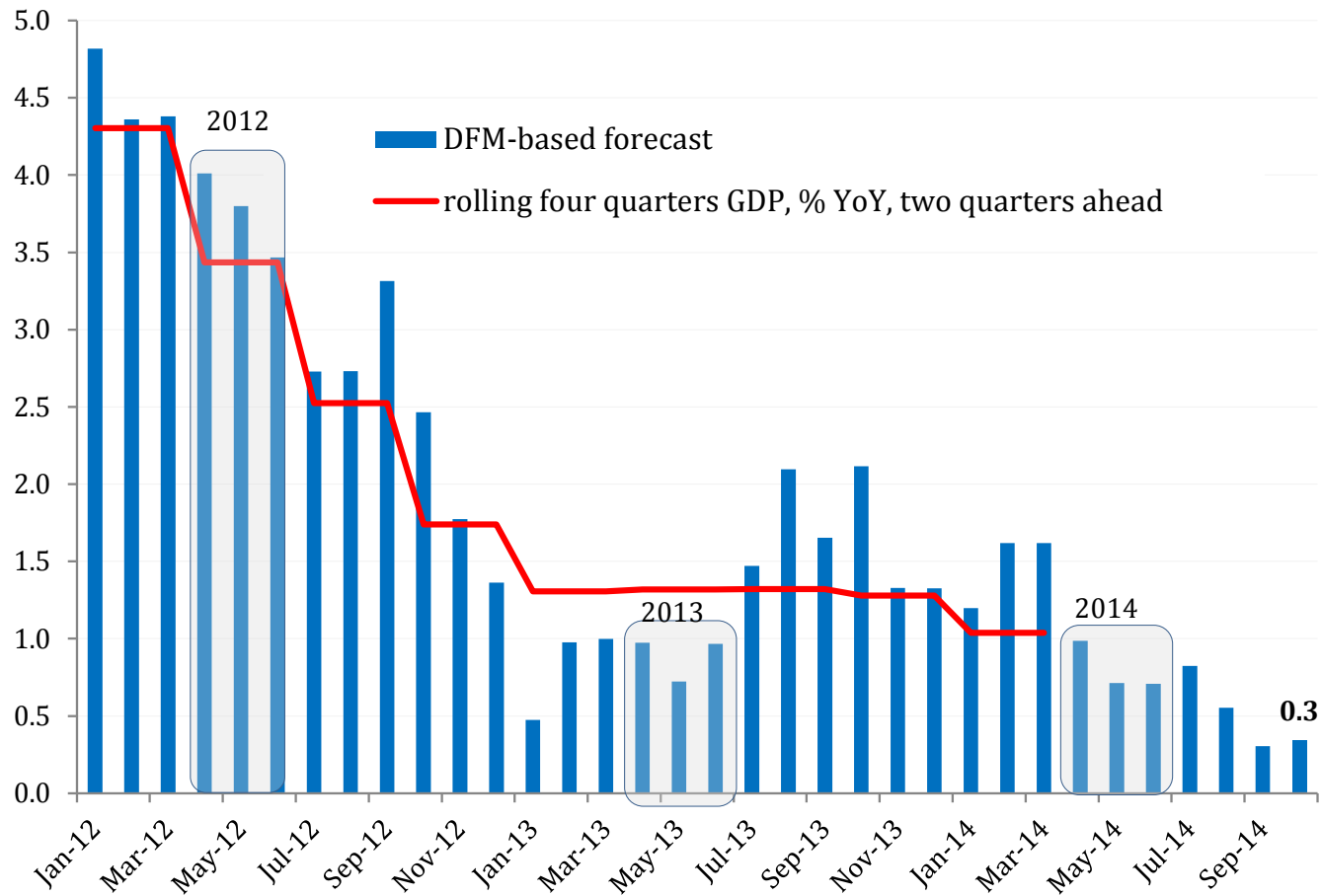
Conclusions

DFM models demonstrate plausible forecasting performance of Russian GDP

Analysis of RMSE's, including the conventional Diebold-Mariano test, shows better performance of DFMs in predicting Russian GDP vis-à-vis most common benchmark models

DFM specifications on over 100 variables

- outperform DFMs with fewer variables at forecast horizons
- have equal nowcasting accuracy to specifications on 36 variables with hard data included

Back up slide

Model and Forecast Horizon	FORECAST T+2			FORECAST T+1			NOWCAST T			BACKCAST T-1
	Month 1	Month 2	Month 3	Month 1	Month 2	Month 3	Month 1	Month 2	Month 3	Month 1
full_sample	0.47	0.43	0.37	0.41	0.26	0.40	0.35	0.24	0.19	0.16
block1_survey	0.55	0.56	0.54	0.46	0.34	0.42	0.33	0.33	0.38	0.35
block2_hard	0.69	0.65	0.58	0.60	0.59	0.39	0.38	0.36	0.21	0.20
block3_exfin	0.87	0.90	0.86	0.66	0.70	0.68	0.46	0.52	0.50	0.32
blocks 1&2	0.64	0.59	0.49	0.47	0.35	0.43	0.38	0.30	0.23	0.21
blocks 2&3	0.53	0.51	0.40	0.42	0.48	0.33	0.30	0.36	0.23	0.18
blocks 1&3	0.50	0.49	0.41	0.50	0.34	0.38	0.38	0.28	0.22	0.21
Best DFM	*0.47*	*0.43*	*0.37*	*0.41*	*0.26*	*0.33*	*0.30*	*0.24*	*0.19*	*0.16*
RW	0.58	0.47	0.47	0.47	0.39	0.39	0.39	0.30	0.30	0.30
BRIDGE							0.54	0.55	0.59	0.50
NES-RENCAP			1.12	0.79	0.68	0.69	0.68			
Best Benchmark										

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